

POPULAR SCIENCE

JUNE, 1946
25 CENTS

54
X

MONTHLY

An aerial, high-angle illustration of New York City, focusing on the construction of the Empire State Building. The building's dark green, fluted shaft rises from the bottom center, topped with a complex steel lattice structure. A tall, thin mast with cross-arms extends vertically from the top of the building. Several workers in blue overalls are visible on the lattice and the mast. The surrounding city is a dense grid of colorful buildings in shades of yellow, orange, and red. A river is visible in the upper left background. The overall style is that of a mid-20th-century magazine cover illustration.

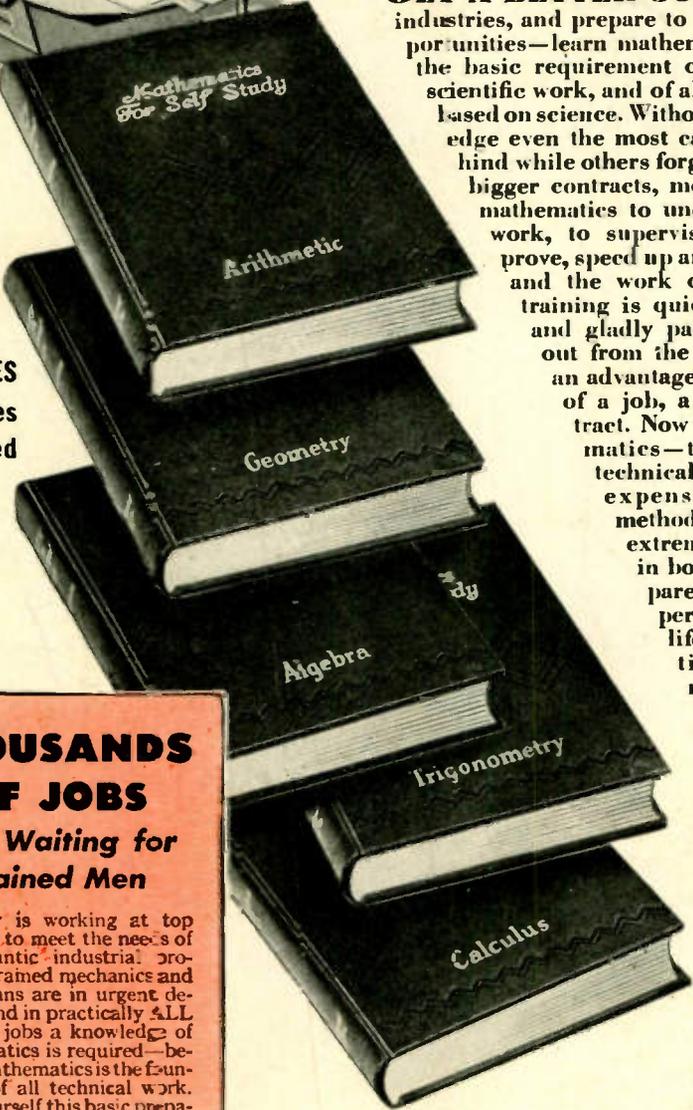
**Television
Reaches Out**
p. 66



Gain a complete
mastery of
MATHEMATICS

GET A BETTER JOB in America's great industries, and prepare to seize your coming opportunities—learn mathematics. Mathematics is the basic requirement of all mechanical and scientific work, and of all business or industry based on science. Without this essential knowledge even the most capable man is left behind while others forge ahead to better jobs, bigger contracts, more money. You need mathematics to understand all technical work, to supervise operations, to improve, speed up and check on your work and the work of others. Such basic training is quickly recognized today and gladly paid for. It singles you out from the crowd and gives you an advantage whether it is a matter of a job, a promotion or a contract. Now you can learn mathematics—the foundation of all technical work—by an easy, inexpensive and time-saving method. A very simple and extremely interesting course in book form has been prepared for you by an expert who has devoted a lifetime to teaching practical men the fundamentals of this important subject.

5 VOLUMES
1,598 Pages
Illustrated



**THOUSANDS
OF JOBS
Are Waiting for
Trained Men**

Industry is working at top capacity to meet the needs of our gigantic industrial program. Trained mechanics and technicians are in urgent demand, and in practically ALL of these jobs a knowledge of mathematics is required—because mathematics is the foundation of all technical work. Give yourself this basic preparation now by this quick, convenient, inexpensive method.

**New
Edition**

Revised for present-day needs. More useful, more practical than ever before!

**EXAMINE THESE
BOOKS FOR 10 DAYS
FREE!**

**THIS PRACTICAL SELF-STUDY COURSE
WILL QUICKLY GIVE YOU THE ESSENTIAL
KNOWLEDGE FOR SO MANY OF TODAY'S
JOBS IN BUSINESS AND INDUSTRY**

MATHEMATICS for Self Study

By J. E. Thompson, B. S. in E. E., A. M., Dept. of Mathematics, Pratt Institute

A COMPLETE COURSE AND REFERENCE LIBRARY

NEW EDITION — *More useful, more practical*

These books start right from the beginning with a review of arithmetic that gives you all special short cuts and trick problems that save countless hours of your time and make you more valuable to yourself and your job. Then they go right into higher mathematics and show how simple it is when an expert explains it for you.

Don't let appearances fool you, mathematics is *easy*. You can get these books on approval and see for yourself how much enjoyment you will have while getting this valuable training and solving interesting practical problems that puzzle your friends and fellow workers. In no time at all you will be tackling with ease the most difficult question on this subject.

These are but a few of the hundreds of subjects simplified and explained in this simple, complete self-study course in mathematics.

ARITHMETIC: Starting with a quick review of principles, it presents all the special calculation methods used in business and industry. Fundamental in all computations in engineering, in both plant and field. Essential methods for rapid calculation such as is needed in setting lathes, etc. Hundreds of other applications to technical work.

ALGEBRA: This volume makes algebra a live, interesting subject. It shows you, step by step, how to apply algebraic methods to the most complex problems. Explains how to solve problems which are involved in all business and industrial work relating to machines, engines, ships, autos, planes, etc. Logarithms and slide rule, and many other practical applications.

GEOMETRY: States clearly all needed facts about plane figures, circles, polygons, etc., covers all the topics essential in drafting and engineering. It deals at length with angles, triangles, circles, and the many other geometric figures that are basic to engineering design. Sheet-metal work, so important in airplane construction, is a direct application of these principles.

TRIGONOMETRY: This volume makes easy the principles of angles and triangles, shows you how to use tables that explain their functions. Practically every problem in machine work, land surveying, mechanics, astronomy and navigation is solved by methods of trigonometry. These methods are explained simply, with actual examples of calculations of height and distance, the construction of buildings, bridges and dams, the cutting of gears, etc.

CALCULUS: You will enjoy mastering calculus in this interesting new way and will find it will enable you to solve problems that can be solved in no other way. This branch of mathematics deals with rate problems. It is essential in computation involving objects moving with varying rates of speed. It also enables us to find the most efficient design for any kind of mechanism, engine, or moving vehicle.

AN EXPERT GIVES YOU HIS SIMPLIFIED METHODS

Mr. Thompson, the author of these books, is not an ordinary teacher of mathematics. He has had many years' experience in giving students the kind of mathematical training they need in practical work. He presents each practical method and problem in the clearest and simplest way. He gets right down to the kind of information that you need in your daily work.

SEND NO MONEY

The coupon at the right brings you the 5 books for 10 days' trial. After 10 days, if not completely satisfied, return the books to us without obligation. If you keep them, send us the small down payment of \$2.95, balance in three monthly payments. Mail the coupon today.

**D. VAN NOSTRAND
COMPANY, INC., Publishers**
250 Fourth Avenue • New York 3, N. Y.

MAIL THIS COUPON

D. Van Nostrand Company, Inc., Publishers, 250 Fourth Ave., New York 3, N. Y.

Send me **MATHEMATICS FOR SELF STUDY** in 5 volumes. Within 10 days I will either return the books or send you \$2.95 as first payment and \$2.00 per month for three months until the total price of \$8.95, plus a few cents postage, is paid.

(If you send remittance of \$8.95 with this coupon, we will pay the postage. Same return privilege, refund guaranteed.)

Name Please Print

Address

City (Zone) ... State

Reference

Address

JUNE
1946

POPULAR SCIENCE

Monthlies & Handbooks MONTHLY

REG. U. S. PAT. OFF.

EDITOR:

Perry Githens

MANAGING EDITORS: Fred O. Newman, Volta Torrey

ART EDITOR: Robert Reid Macguire

HOME & WORKSHOP EDITOR:

Harry Walton

ASSOCIATE EDITORS: Edward F. Allen, Alden P. Armagnac, Bernard P. Blankman, Devon Francis, James L. Freeman, Wesley S. Griswold, Robert Gorman, Hartley E. Howe, Frank Rowsome, Jr., Gold V. Sanders, Leon Shloss, R. P. Stevenson

WESTERN EDITOR: Andrew R. Boone

ART DIRECTORS: Michele de Santis, Harry Samuels, F. Sweeney

ART ASSOCIATES: Samuel Dukler, Stewart Rouse, Frances Cooper (Production)

STAFF PHOTOGRAPHERS: W. W. Morris, Hubert Luckett

EDITORIAL ASSISTANTS: Elsie E. Brandt, Michael Cheriello, Carol Ennis, David McNamara, Lillian Thalendorf, Saverio Rada, Ruth Westphal

PUBLISHER:

Godfrey Hammond

JUNE 1946

Cover Painting by RAY PIOCH

SCIENCE NEWS

Television Reaches Out..... 66
 Plastics Coming Your Way..... 79
 Our World Ages Violently..... 87
 Lubrication Without Oil..... 99
 Superfuels for Tomorrow's Cars.....124

SCIENCE AT WORK

Thunderbolt at Work..... 65
 New Ship "Props"..... 73
 Bull's-eyes in the Night..... 73
 Tiny Machine Turns Pages..... 80
 Flame Thrower Works in Woods..... 92
 Farm Tool Lays Sidewalks..... 92
 \$100,000,000 Harvest from Ideas..... 93
 Catching the Wind on a Dial.....106
 Audible Police Blotter.....107
 Reducing Airplane "Prop" Vibration.....108

(CONTINUED ON PAGE 4)

Measuring the Invisible.....117
 Speedy Airtight Wrapping.....129

PSM FEATURES

Handy Fire Department..... 81
 The House That Has Everything..... 84
 China's Dream Dam..... 98
 Almanac in the Woods.....109
 New Light on Old Masters.....111
 Clouds to Faucets.....122
 Living Automatically.....128
 Tricks with Toy Balloons.....194
 House of a Thousand Pipes.....204
 Supermodels for Our Indoor Navy.....208

AVIATION

First with the Fastest..... 74
 Radar Becomes Life Line..... 82
 What's New in Aviation..... 89
 Republic Rainbow..... 97
 Wings on the Wind.....104
 Nazi Come-Apart Interceptor.....129
 Movies for Plane Passengers.....129
 Tomorrow's Mail Trains.....130

AUTOMOBILES

Gas Turbine for Autos.....121
 Useful Auto Hints.....137
 Rocket Brakes for Emergency Stops?.....138
 Summerizing Your Car.....140
 Auto Ideas.....141
 Gus Goes to the Races.....142

INVENTIONS

New Ideas from the Inventors.....102
 I'd Like to See Them Make.....119

PHOTOGRAPHY

Color Prints from Your Own Enlarger.....114
 American Cameras Step Out..... 132
 Curious Photos..... 183
 Trick Titler for Home Movies.....184
 Photo Ideas..... 186
 New Photo Equipment.....187
 How Chemistry Creates a Photo.....198

Published monthly at 353 Fourth Avenue, New York 10, N. Y. by Popular Science Publishing Co., Inc. Godfrey Hammond, President and Treasurer; R. C. Wilson, Raymond J. Brown, Stephen P. Glennon, B. Ray Keefer, Vice Presidents; F. W. Briggs, Secretary. Entered as second-class matter Dec. 28, 1918, at the Post Office at New York under the act of March 3, 1879; additional entry as second-class matter at Dayton, Ohio. Entered as second-class matter at the Post Office Department, Canada. Printed in U.S.A. Copyright, 1946, by Popular Science Publishing Co., Inc. All rights reserved in the United States, Great Britain, and in all countries participating in the International Copyright Convention and Pan-American Copyright Convention. Yearly subscriptions to United States and its possessions, \$2.50; Canada, \$3.00; foreign countries, excepting Canada, \$3.50. Subscribers must notify us of change of address four weeks in advance of the next publication date. Be sure to give both old and new addresses.

*Thirteen Miles Wide
and a Mile Deep*



Its startling immensity, its brilliant coloring, place the Grand Canyon of Arizona high among the scenic wonders of the world.

One of the best and highest vantage points is beautiful Grand Canyon Lodge on the brink of the North Rim.

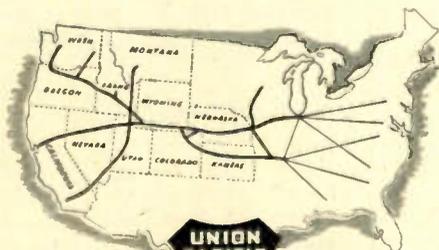
Three great attractions; the Grand Canyon . . . Bryce Canyon and Zion National Parks in Utah . . . no two alike in natural formations, are closely grouped in one vast wonderland. These Parks open to the public on June 1st.

**GRAND
CANYON
NATIONAL
PARK**

It's worth spending days in these National Parks and there's a variety of guest accommodations. Or, if preferred, visit them as a convenient "stop-over" when enroute to or from Southern California via Union Pacific.

Go by train and rest as you ride. Enjoy sound sleep, delightful meals. Your journey by rail will be a highlight of your vacation.

Serving more western scenic regions than any other railroad, Union Pacific offers America's greatest travel bargain.



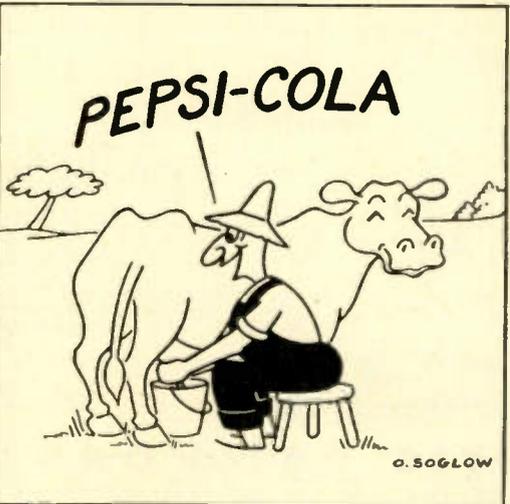
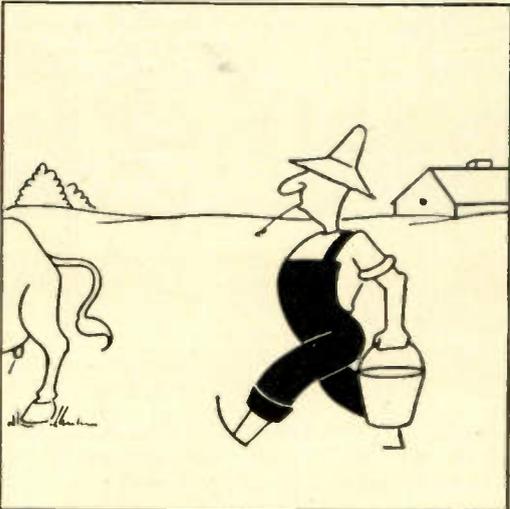
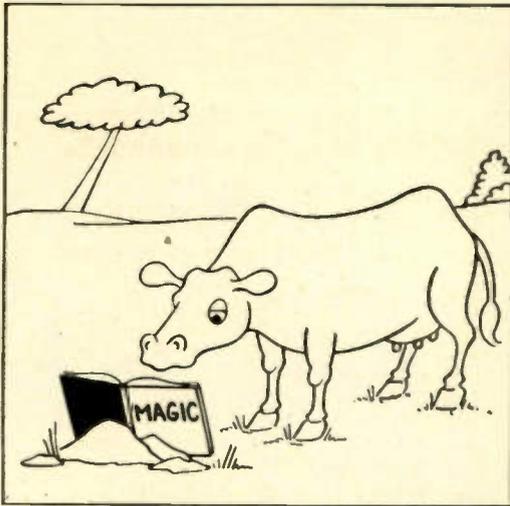
be Specific -
say "Union Pacific"

Attention — Amateur Photographers!
Prizes totaling \$4,500 awarded for movie and still photos taken in So. Utah-Arizona National Parks. For Contest Rules and Official Entry Blank, write Photo Contest, Room 120-P, Union Pacific Bldg., Omaha 2, Neb.

The Progressive

UNION PACIFIC RAILROAD

ROAD OF THE *Streamliners* AND THE *Challengers*



MECHANICS & SHOPCRAFT

Tiny Super-engine (Part I).....	146
Cleanout Holes in Blade Holder.....	163
How's Your Shop Eye?.....	165
"Pan" Catches Drill-Press Chips.....	169
New Shop Ideas.....	180
Punch Press from a Bicycle Fork.....	182

HOME MECHANICS & HANDICRAFT

Whittled Model of the "Burp Gun".....	153
Beach Comfort.....	156
Glazing Fine Craftwork.....	158
Three Tiles on Cedar Tray.....	163
Dentifrices Shine Up Plastics.....	163
Stamp Pad Inside Desk Drawer.....	163
Forms for Concrete Slab Floors.....	166
Mixing Concrete.....	169
Workshop Index File.....	170
Repairing a Stove-In Hull.....	171
Chessmen to the Queen's Taste.....	174
Model of Washington's Coach.....	176
Jig Holds Insulation Bats.....	182
Tin Can Holds Rubber Tubing.....	202
Pail Makes Oven for Plastic.....	202
Frosted Area for Test-Tube Notes.....	202
Paper-Clip Gadgets.....	203
What's Wrong?.....	205
Open-Joint Plywood Walls.....	205
Lamp-Bulb Brooder.....	206
Tool Removes Sod for Fertilizing.....	207

RADIO & ELECTRICITY

Diminutive Dynamo.....	92
Plastic Pickup Arm.....	188
Recording-Disk Grooving Rig.....	188
News in Electronics.....	189
Filters in Radio.....	190
Growler Accessories.....	196
Pipestem Light Frees the Hands.....	197
Resistances of Lamp Filaments.....	197

DEPARTMENTS

Voice of Science.....	7
Letters.....	16
March of Science.....	134
Home Owners.....	136
What's Your Ingenuity Quotient?.....	152
Keeping the Home Shipshape.....	160
Modern Living.....	162
New Tools.....	164
Table Tricks.....	173
Editorial Memo.....	286

FINISH YOUR HIGH SCHOOL COURSE

THAT'S the most important step you can take. Think back over your high school days, review the list below and supply the information in the coupon at the bottom of the page. Then fill in your own name and address and mail the coupon to us.

- | | | | |
|-------------------------|-----------------------|-----------------------------|---------------------------|
| 1. English—1st year | 11. Botany | 23. Language—1st year | 27b. Drawing—Designing |
| 1a. English—2nd year | 12. Biology | 23a. Language—2nd year | 27c. Drawing—Mechanical |
| 1b. English—3rd year | 13. Physiology | 23b. Language—3rd year | 27d. Drawing—Industrial |
| 1c. English—4th year | 14. Chemistry | 23c. Language—4th year | 28. History of Art |
| 2. Public Speaking | 15. Physics | 23d. Language—1st year | 29. Manual Training |
| 3. Oral English | 16. General Science | 23e. Language—2nd year | 30. Typing |
| 4. Journalism | 17. History—Ancient | 23f. Language—3rd year | 31. Shorthand |
| 5. Dramatics | 17a. History—Medieval | 23g. Language—4th year | 32. Bookkeeping |
| 6. Business English | 17b. History—Modern | 24. Home Economics | 33. Commercial Arithmetic |
| 7. Algebra—1st year | 17c. History—U. S. | 24a. Home Economics—1st yr. | 34. Commercial Law |
| 7a. Algebra—Advanced | 18. Civics | 24b. Home Economics—2nd yr. | 35. Commercial Geography |
| 8. Geometry—Plane | 19. Sociology | 25. Home Nursing | 36. Glee Club |
| 8a. Geometry—Solid | 20. Economics | 26. Foods | 37. Band |
| 9. Trigonometry | 21. Pacific Rim | 27. Drawing—Free Hand | 38. Orchestra |
| 10. General Mathematics | 22. Current Events | 27a. Drawing—Commercial | 39. Physical Education |

The arrangement of numbers in the list above corresponds with the arrangement in coupon below.

INTERNATIONAL CORRESPONDENCE SCHOOLS

BOX 7660-L, SCRANTON 9, PENNA.

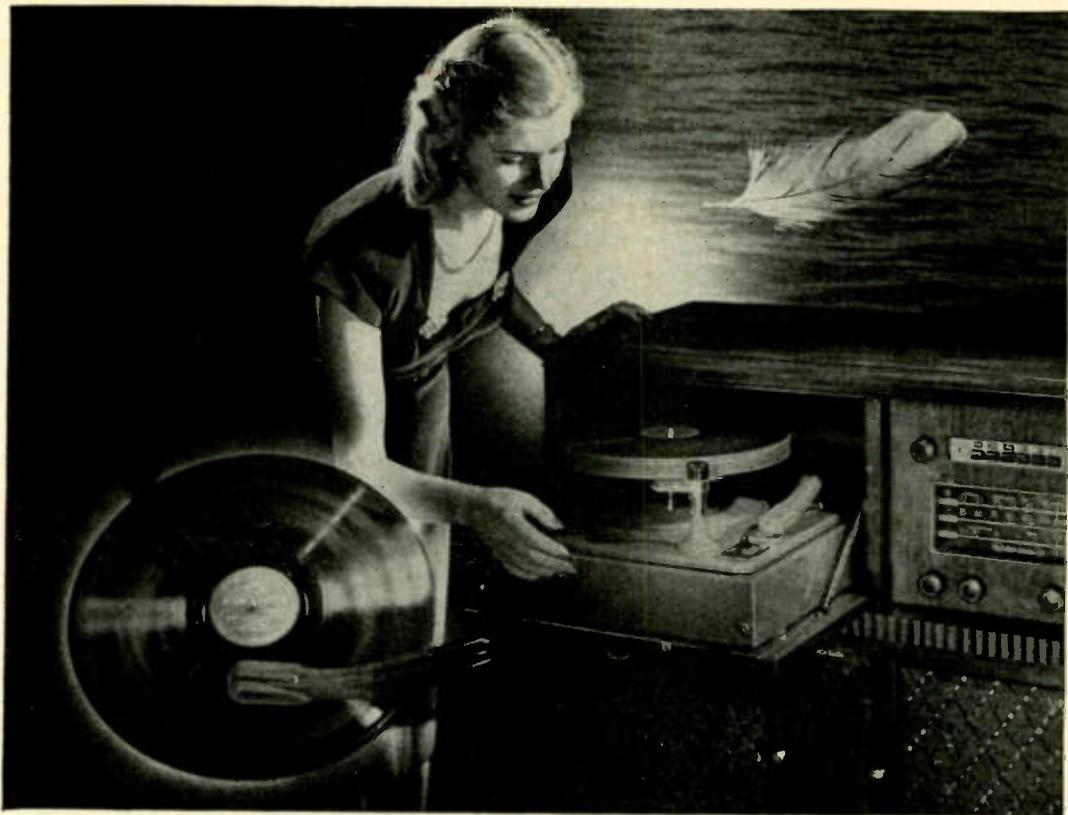
This is to certify that I _____ attended the _____
High School of _____ from _____ to _____ 19____

Below is a statement of my record.

	Yrs. Taken 1, 2, 3, 4	No. Weeks	Periods Per Week	Grade	Credits		Yrs. Taken 1, 2, 3, 4	No. Weeks	Periods Per Week	Grade	Credits		Yrs. Taken 1, 2, 3, 4	No. Weeks	Periods Per Week	Grade	Credits	
1						11						23						27b
1a						12						23a						27c
1b						13						23b						27d
1c						14						23c						28
2						15						23d						29
3						16						23e						30
4						17						23f						31
5						17a						23g						32
6						17b						24						33
7						17c						24a						34
7a						18						24b						35
8						19						25						36
8a						20						26						37
9						21						27						38
10						22						27a						39

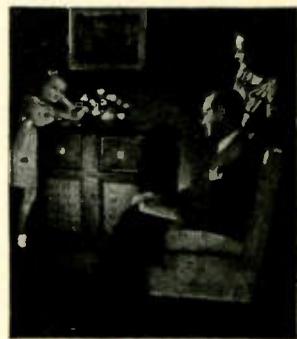
I.C.S. On the record above, please tell me, without obligation, how I can make up the needed credits to merit my High School Diploma.

Name _____ Age _____ Home Address _____
City _____ State _____ Present Position _____ Working Hrs. _____ A. M. to _____ P. M.



The Victrola, made exclusively by RCA Victor, gives higher fidelity and longer record life through its jewel-point pickup.*

**Your Victrola's jewel-point pickup
floats like a feather on water—**



Victrola radio-phonograph, at approximately \$275. "Rollout" record changer handling twelve 10-inch, or ten 12-inch records. Permanent jewel-point pickup—no needles. American and foreign radio reception. An outstanding radio-phonograph combination—thanks to RCA Laboratories.

Instead of having the usual rigidly mounted needle that must be continually changed, your Victrola radio-phonograph has a permanent and flexible sapphire playing tip that fairly floats over the record.

It follows the groove with effortless ease, achieves new clarity and richness of tone, adds longer life to records, and acts as a filter against surface noise. Truly, your Victrola's jewel-point pickup brings you the ultimate in recorded music pleasure.

This pickup was perfected at RCA Laboratories—where every

product bearing the RCA label is kept at the very top of its field.

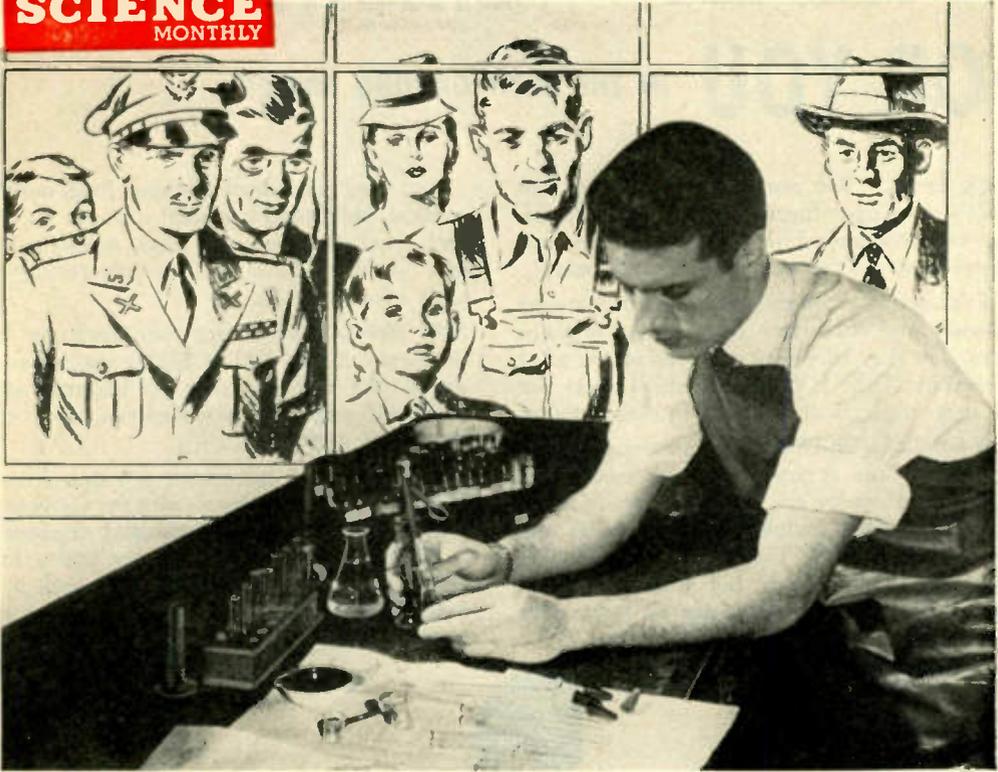
And so when you buy an RCA Victor radio, or television receiver, Victrola, or even an RCA radio tube, RCA Laboratories is your assurance that you are getting one of the finest instruments of its kind that science has yet achieved.

Radio Corporation of America, RCA Building, Radio City, New York 20 . . . Listen to The RCA Victor Show, Sundays, 4:30 P. M., Eastern Daylight Time, over the NBC Network.



RADIO CORPORATION of AMERICA

•Victrola T. M. Reg. U. S. Pat. Off.



Look Behind You, Students of Science . . .

THIS is Paul J. Ovando, one of the thousands of science students whose careers were interrupted by the war. After service in the Navy, he is now back at Columbia. It will be 1950 before he gets his degree in medicine.

Understandably, such members of the lost generation of young scientists are working long and hard to make up for time lost. Understandably, they may hurry past such "humanities" courses as English or history, now creeping into the curriculum of even the most technical schools. But much as this country needs M.D.s and Ph.D.s, it needs scientists who are also citizens.

Time was when a scientist could be a hermit, secure in some quiet cave of pure research. These days, things are different. Even nuclear physicists must have sociological savvy. And the most beautifully bearded academicians find a little practical politicking

comes in handy with professional groups and congressional committees alike.

People are now a visible part of every scientific problem. As beneficiaries or victims of the products of science; as parents and purchasers and voters. Public opinion and public money are increasingly necessary in scientific progress. That means institutions with their contributors, industry with its stockholders, and government with its citizens.

So, many a scientist who once scorned popularization of a program is now boning up on English as the technique of communication, and history as the record of human nature in action.

In this new world of science, you students of science have an added responsibility: you must learn to understand—and to make yourselves understood.

Penry Withers

THE MECHANICAL FIELD HAS A **BRIGHT FUTURE**

FOR YOU IN THE ARMY GROUND FORCES

A big break? Bet your life! A whirl at the world's most up-to-the-minute mechanical training—with good pay while you learn. More offers, too—so generous they take your breath away!

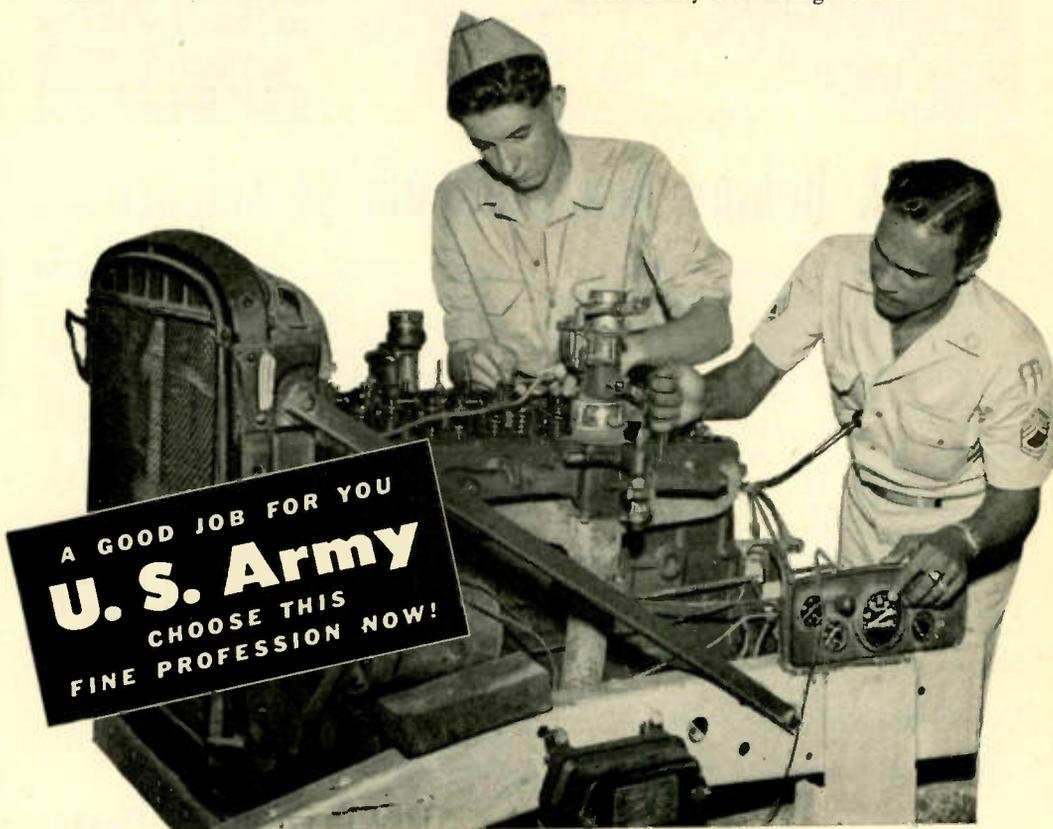
If you are 18 to 34 inclusive (17 with parents' consent) and enlist now for a period of three years, you may choose to join one of the arms or services of the U. S. Army, which offers you the best mechanical training available today.

FREE ON-THE-JOB TRAINING. You may qualify for one of the Army's top-flight mechanical schools, and master the technical details of all kinds of engines, including Diesel, radial and internal combustion. There is lots of practical experience in repairing and maintaining the Army's own equipment—and there's none more modern.

Add good pay, travel, clothing, food, quarters, medical and dental care and a 30-day furlough each year, a retirement plan second-to-none, and you'll see that it's an opportunity you can't afford to miss.

FREE EDUCATION. After your discharge from the Army, the GI Bill of Rights entitles you to attend any college, trade or business school which will admit you, provided you enlist before October 6, 1946.

After a 3-year enlistment, you may have up to 48 months of education, with the Government paying your tuition and incidental expenses up to \$500 per ordinary school year, and a living allowance of \$65 a month (\$90 a month if you have dependents). Get all the facts at your nearest Army Recruiting Station.



A GOOD JOB FOR YOU
U. S. Army
CHOOSE THIS
FINE PROFESSION NOW!

Why be a BOOKKEEPER?

...When Accountancy offers more Money and Success...

If you are a bookkeeper, you are right on the threshold of a profession that pays far above average—where there's real opportunity to get ahead and move up fast.

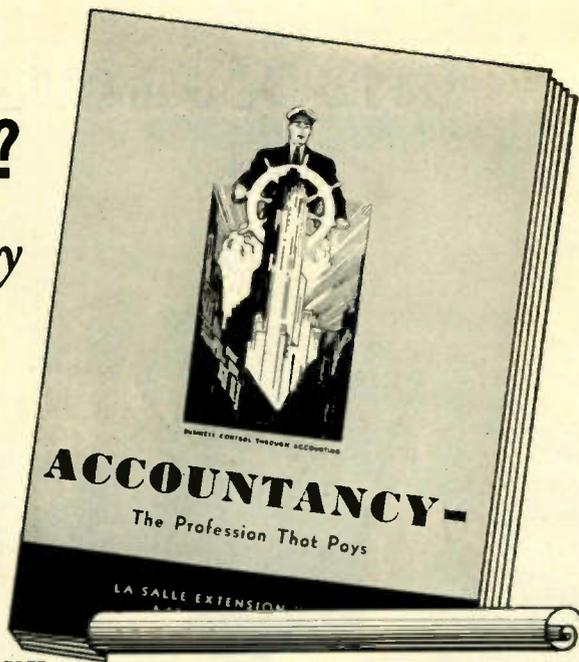
Why not step UP from bookkeeping—be an accountant—make *real* money!

You can learn Accountancy by the interesting LaSalle Problem Method—in your convenient spare time, at home, without losing a day from your work. You learn by *doing* . . . you study Accounting principles and solve Accounting problems under the clear guidance of experienced C.P.A.'s. You cover Accountancy from the basic principles right up through Accounting Systems and Income Tax Procedure—to advanced training for the C.P.A. degree if you so desire. And as you go along step-by-step, you master the principles of auditing, business law, statistical control, cost accounting, organization, management, finance, etc.

You go as fast or as slowly as you choose. And you may start "cashing in" on your new ability long before you complete the training—as thousands of others have proved. Many advance quickly to better positions, even before they are half way through. And that is only the *beginning* of a growing and continuing success for the rest of your business life.

Why remain "just a bookkeeper" when Accountancy holds so much for you? Our free 48-page booklet, "ACCOUNTANCY, THE PROFESSION THAT PAYS," tells you what you must know to be an Accountant, and how you can prepare in your leisure time, at moderate cost and on easy terms.

Send the coupon today. Get all the facts and judge for yourself. There is no obligation. You are already started in this field...find out how you can rapidly go to the top! Mail coupon NOW!



FREE BOOKLET

LA SALLE Extension University

A Correspondence Institution

Dept. 683-H • 417 S. Dearborn • Chicago 5, Ill.

I'd like to know more about your home study program to help me prepare for an accounting career. Please send me your free 48-page booklet, "Accountancy, the Profession That Pays."

Name

Position Age

Address

City, Zone and State

**"I'm GOING
to be an
ACCOUNTANT!"**



**LASALLE
EXTENSION UNIVERSITY**
A Correspondence Institution

JUNE 9
1946

UNSUSPECTED POWER



The Mysterious Influence In The Air You Breathe!

THE SOUL OF THE UNIVERSE is in the air you breathe. Deposited in your blood—with each inhalation you take—is *the intelligence* that directs the course of the planets through the misty reaches of space, and the strange phenomenon of life itself.

What is it that causes your heart to beat, your lungs to expand and contract? What mind directs *the cells* of your being, each in their purpose—some to create bone, others tissue and hair? What *consciousness* pervades these vibratory *globules of life* and gives them awareness of their Cosmic function?

Are you one of the millions who have looked *beyond yourself* for some external Divine Power or agency? Have you searched in vain for some outer sign or word of Divine assurance when in doubt or in need? Now learn of the *unsuspected power* that exists in every simple breath—and that becomes *part of you*. The ancient Egyptians believed that the essence of life was borne on the wings of the air. The Bible pro-

claims that with the first breath man becomes not just an animated being—but a “*living soul*.” Try this experiment, and prove a Vital Life Force exists in the air. When you are in pain or despondent take a deep breath. Hold it as long as comfortable—then notice the momentary relief.

This Amazing Free Book

Would you seriously like to know how to draw upon this Intelligence of the Cosmic, with which the air is permeated? You can use it to awaken the creative powers of your mind, and for making life an experience of *achievement*. Use the coupon below for a free copy of the book, “The Mastery of Life.” It tells how in the privacy of your home *you may learn* to use these simple, useful, *natural laws*.

USE THIS GIFT COUPON

Scribe C. S. V. The Rosicrucians (AMORC)
Rosicrucian Park, San Jose, California

I am sincerely interested in learning how to use the mysterious influences of the universe in the betterment of my life. Please send me a free copy of the book, “The Mastery of Life.”

NAME _____

ADDRESS _____

Rosicrucians are NOT a religious organization

THE ROSICRUCIANS (AMORC) SAN JOSE, CALIFORNIA, U. S. A.



I Will Show You How to Learn RADIO by Practicing in Spare Time

**I Send You
6 Big Kits
of Radio Parts**



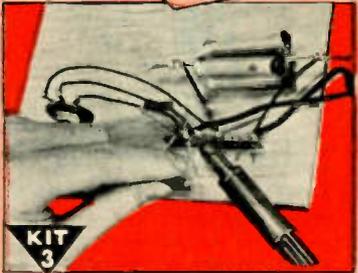
KIT 1

I send you Soldering Equipment and Radio Parts; show you how to do Radio soldering; how to mount and connect Radio parts; give you practical experience.



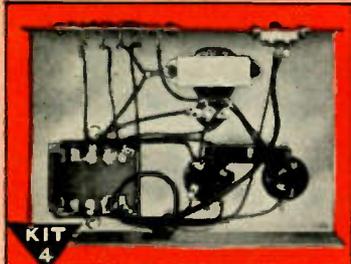
KIT 2

Early in my course I show you how to build this N.R.I. Tester with parts I send. It soon helps you fix neighborhood Radios and earn EXTRA money in spare time.



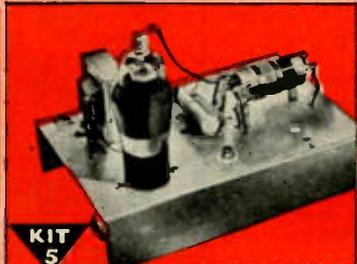
KIT 3

You get parts to build Radio Circuits; then test them; see how they work; learn how to design special circuits; how to locate and repair circuit defects.



KIT 4

You get parts to build this Vacuum Tube Power Pack; make changes which give you experience with packs of many kinds; learn to correct power pack troubles.



KIT 5

Building this A. M. Signal Generator gives you more valuable experience. It provides amplitude-modulated signals for many tests and experiments.



KIT 6

You build this Super-heterodyne Receiver which brings in local and distant stations—and gives you more experience to help you win success in Radio.

KNOW RADIO - Win Success I Will Train You at Home - SAMPLE LESSON FREE

Send coupon for FREE Sample Lesson, "Getting Acquainted with Receiver Servicing," and FREE 64-page book, "Win Rich Rewards in Radio." See how N.R.I. trains you at home. Read how you practice building, testing, repairing Radios with SIX BIG KITS of Radio parts I send you.

Future for Trained Men Is Bright in Radio, Television, Electronics

The Radio Repair business is booming NOW. Fixing Radios pays good money as a spare time or full time business. Trained Radio Technicians also find good pay opportunities in Police, Aviation, Marine Radio, in Broadcasting, Radio Manufacturing, Public Address work, etc. Think of the boom coming now that new Radios can be made! Think of

even greater opportunities when Television, and Electronics are available to the public!

Many Beginners Soon Make \$5, \$10 a Week EXTRA in Spare Time

The day you enroll I start sending EXTRA MONEY JOB SHEETS to help you make EXTRA money fixing Radios in spare time while learning. MAIL COUPON for sample

lesson and 64-page book FREE. It's packed with facts about opportunities for you. Read about my Course. Read letters from men I trained, telling what they are doing, earning. MAIL COUPON in envelope or paste on penny postal. J. E. SMITH, President, Dept. 6FP3, National Radio Institute, Pioneer Home Study Radio School, Washington 9, D. C.

Our 32nd Year of Training Men for Success in Radio

Good for Both - FREE

MR. J. E. SMITH, President, Dept. 6FP3
National Radio Institute,
Washington 9, D. C.

Mail me FREE, your sample lesson and 64-page book. (No salesman will call. Please write plainly.)

Name..... Age.....
Address.....
City..... Zone..... State..... 4FR
() If you are a war veteran, check here



**My Course Includes Training in
TELEVISION - ELECTRONICS**

LANGUAGE IS POWER



... Forge ahead, win special assignments, promotion, better job in global peace time opportunities through ability to speak a foreign language.

Speak FRENCH
RUSSIAN
GERMAN
ITALIAN
SPANISH
PORTUGUESE

or any of 23 other languages by the LINGUAPHONE METHOD

The World's Most Approved Language Courses

It's all talk; natural every-day conversation. In your own home you can learn to speak any of 29 languages by the world-famous Linguaphone Ear-Eye Conversational Method. It is amazingly simple and practical. You HEAR voices of native teachers ... they speak to you as often as you want them, never tiring ... you REPEAT what they say, answer their questions ... before you are actually aware, you are conversing in a foreign language.

Learn alone, or have the family or friends join you in a delightful pastime that pays dividends.

Solve time, work and money, learn the Linguaphone Way which has helped thousands in the Army, Navy, Flying, Signal Corps and other services, as well as more than 1 million home-study students.

FREE—Get the facts about this time and money saving way to learn languages—send for the FREE illustrated Linguaphone Book.

LINGUAPHONE INSTITUTE

47 RCA Building, New York 20, New York

LINGUAPHONE INSTITUTE
47 RCA Bldg., New York 20, N.Y.

Send me the FREE Linguaphone Book.

Name

Address..... City.....

Language Interested.....

HOME-STUDY BRINGS BIGGER PAY

Don't be caught napping when Opportunity knocks. Prepare for advancement and more money by training now for the job ahead. *Free 48-Page Books Tell How.* Write for the book on the business field you like—or mail us this ad with your name and address in the margin. Now, please.

- | | |
|--|--|
| <input type="checkbox"/> Higher Accountancy | <input type="checkbox"/> Business Management |
| <input type="checkbox"/> Traffic Management | <input type="checkbox"/> Business Corres. |
| <input type="checkbox"/> Law—Degree of LL.B. | <input type="checkbox"/> Salesmanship |
| <input type="checkbox"/> Commercial Law | <input type="checkbox"/> Modern Foremanship |
| <input type="checkbox"/> Industrial Management | <input type="checkbox"/> Expert Bookkeeping |
| <input type="checkbox"/> Stenotypy | <input type="checkbox"/> C. P. A. Coaching |

LASALLE EXTENSION UNIVERSITY

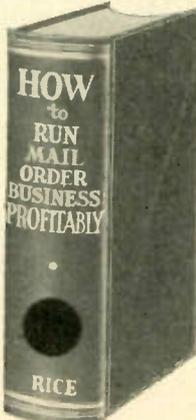
A Correspondence Institution

Dept. 683-R, 417 So. Dearborn St. Chicago 5

POPULAR
12 SCIENCE

How to Make Money by Mail

Down-to-earth facts, directions (illustrated) for running business profitably using expertly for YOUR good fortune the employee, trainee, planes which Gov't places at your disposal CHEAP. Get orders by mail, ship by express or freight or mail, get out of the kindness of heaven... 14th edition, enlarged to 576 pages, now selling. It's YOUR winner. Make this year and the following years worth more. . . . THIS knowledge really PAYS OFF.



THE EASY WAY to start new or expand your present occupation. Do it NOW.

Extraordinary plain, simple skill, know-how. No theory. Fact story of rich experience of author E. Rice day-by-day. How many times have we heard: "I wish I had some money, this patent would earn me a fortune," or "why can't my crop pay better?" or "I wish I knew how to sell this gadget myself," or "why should my boss alone do this when I too know how the money is made?" . . . Listen, you do not need money to start this Rice way. His method automatically pays all bills same day rendered, no bank loans, pay as you go, no borrowing from relatives or friends, no seamen. Also no worry, you are in charge of your own all paid for. Rice paid of \$5000 in mortgages a year after using this skillful idea.

45 Years of PROOF

Sounds fishy? Sure but this has been done steadily for 45 years, depression or no depression, by the author; that is why he wrote this book, to pass the good word along. Make it go with anything you have which is salable, or with what you are now doing. Rice made his pay plan so from the start when living in one room in a city lodging house. Turn your city or country home, your work, your hobby, into money. How to get orders coming steadily at cost of only 5¢ for each \$100 taken in. The popular error to avoid in trying for sales. Business won't free

while others have to pay for it. How to conceive the money-getting advertisement . . . Profitable changes from ordinary ideas and methods. Not usual cut-and-dried pattern. 48 adventures, a dictated book in everyday language by Rice doing day by day what he discloses in his book can be done by his method. No dictionary writing. . . . Read how others are profiting big. Take a chance on this book being worth a fortune to you and yours and send \$2.95. Book mailed same day order is received. Or ask two friends to chip in 50 cents each with your 99c to get this book. Hundreds of buyers whose letters we show you declare emphatically its superlative goodness. Follow its easy pattern for success. Cloth bound, 576 pages, 8 1/2 by 5 1/2. Best seller. 14th edition now selling. Cut out the \$2.95 HOW BOX here, pin or stick it to sheet of paper bearing your name and address, mail in envelope with money order or check for \$2.95 to

HOW
\$2.95

HOWARD ST. HOUSE, Melrose 76E, Massachusetts

Get Ready for Big After War Opportunities!

I Will Train You

at Home Until

You Get a GOOD

PAY JOB in

DRAFTING

Act now to get a better job with more pay and pleasant working conditions. Get into Drafting—the basic profession where all post war products will start. I will train you at home—give you experience—doing the same kind of jobs you will do with the best paying firms. I furnish instruments, drawing table and all equipment when you start. Write today for vital facts and FREE illustrated book. Give Age.

Engineer Dobe, Div. 26, Libertyville, Ill.

Big Money for Workers In Home or Shop



LICENSED CONCRETE SPECIALISTS wanted. No experience needed. Make Color-glazed concrete lawn, cemetery pottery without molds. New, low cost, patented method. Hundreds of designs, sizes, shapes. Use only sand, cement, cheap materials. Statuary, novelties, giftware. Tiles, floors, walks. Imitation marble, granite, stone cemetery products, furniture, etc. Patching, repairing, resurfacing jobs. Basement leaksealing. Many other big pay projects. Booklet, cost data, details free. Men only.



NATIONAL POTTERIES COMPANY

542 West Lincoln,

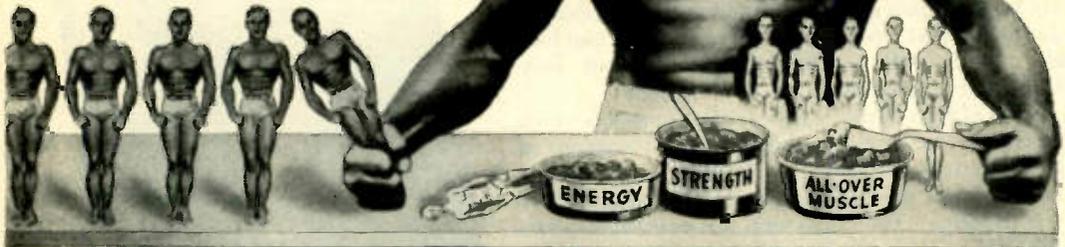
Fergus Falls, Minnesota

What's My Job? - I Manufacture Weaklings into MEN!

Charles Atlas

Actual photograph of the man who holds the title "The World's Most Perfectly Developed Man."

GIVE ME a skinny, peepsy, second-rate body—and I'll cram it so full of handsome, bulging new muscle that your friends will grow bug-eyed! . . . I'll wake up that sleeping energy of yours and make it hum like a high-powered motor! Man, you'll feel and look different! You'll begin to LIVE!



**Let Me Make YOU a NEW MAN
—IN JUST 15 MINUTES A DAY!**

YOU wouldn't believe it, but I myself used to be a 97-lb. weakling. Fellows called me "Skinny." Girls snickered and made fun of me behind my back. I was a flop. THEN I discovered my marvelous new muscle-building system—"Dynamic Tension." And it turned me into such a complete specimen of MANHOOD that today I hold the title "THE WORLD'S MOST PERFECTLY DEVELOPED MAN."

That's how I traded in my "bag of bones" for a barrel of muscle! And I felt so much better, so much on top of the world in my big, new, husky body, that I decided to devote my whole life to helping other fellows change themselves into "perfectly developed men."

What Is "Dynamic Tension"? How Does It Work?

When you look in the mirror and see a healthy, husky, strapping fellow smiling back at you—then you'll be astounded at how short a time it takes "Dynamic Tension" to GET RESULTS!

"Dynamic Tension" is the easy, NATURAL method you can practice in the privacy of your own room—JUST 15 MINUTES EACH DAY—while your scrawny shoulder muscles begin to swell, ripple . . . those spindly arms and legs of yours bulge . . . and your whole body starts to feel "alive," full of zip and go!

One Postage Stamp May Change Your Whole Life!

As I've pictured up above, I'm steadily building broad-shouldered, dynamic MEN—day by day—the country over.

2,000,000 fellows, young and old, have already gambled a postage stamp to ask for my FREE book. They wanted to read and see for themselves how I'm building up scrawny bodies, and how I'm paring down fat, flabby ones—how I'm turning them into breath-taking human dynamos of pure MANPOWER.

Take just a few seconds NOW to fill in and mail the coupon at right, and you will receive at once my FREE book—"Everlasting Health and Strength" that PROVES with actual snap-shots what "Dynamic Tension" has done for others—what it can do for YOU! Address: CHARLES ATLAS, Dept. 1F, 115 East 23rd Street, New York 10, N. Y.

FREE

Mail the coupon below right now for my FREE illustrated book, "Everlasting Health and Strength." Tells all about "Dynamic Tension" methods. Crammed with pictures, facts! Address me personally: CHARLES ATLAS, Dept. 1F, 115 E. 23rd St., New York 10, N. Y.

**MAIL COUPON
FOR
FREE BOOK**



**CHARLES ATLAS, Dept. 1F
115 East 23rd St., New York 10, N. Y.**

I want the proof that your system of "Dynamic Tension" will help make a New Man of me—give me a healthy, husky body and big muscular development. Send me your free book, "Everlasting Health and Strength."

Name
(Please print or write plainly)

Address

City Zone No.
(If any) State

Check here if under 16 for Booklet A.

JUNE 13
1946

Would You Gamble 3¢ to win HAPPINESS?

THREE CENTS—the price of a postage stamp—is not much of a gamble, and the stakes are high!

If you are discontented, unhappy, not getting ahead . . . if you are worried about rising living costs and what you are going to do when the war is over . . . if you want to feel equal to other people mentally and financially . . . then you will want to know something about the easy to use principles of self-improvement taught by the Mayan Order. Many people who have used this secret system claim wonderful improvement in mind power. Some give credit to Mayan teachings for helping gain new love from wives or husbands. Many say that now, for the first time, they can face the future with confidence and without fear. Others tell of astonishing new health.

The Mayan Order is a secret brotherhood which bases its teachings on the traditional wisdom of that mysterious race of astrologers and temple builders, the ancient Mayans of Mexico and Central America. They deal with the problem of making PRAYERS work; how to use your subconscious mind, and thousands of other practical, helpful suggestions.

If you are an average man or woman who is in a rut financially and mentally, the cost of a postage stamp may alter your whole life. All you're gambling is 3¢—so you can't lose.

The Mayan Order will be glad to send a copy of their FREE book, *Mayan Mysteries*, which explains Mayan teachings. It tells of the surprising accomplishments of your own mind and how to put cosmic power on YOUR side. There is no obligation in mailing the coupon. You decide for yourself what to do after you read the FREE book, *Mayan Mysteries*. Don't just sit and wait and wish for a better life—DO SOMETHING. Mail the coupon NOW.

THE MAYAN ORDER
BOX 2710, DEPT. 766
SAN ANTONIO, TEXAS



ROSE DAWN, Official Scribe
The Mayan Order

Rose Dawn, brilliant radio personality known to millions, wants others to benefit from Mayanry as she has done!

JUST MAIL COUPON
... SEND NO MONEY

THE MAYAN ORDER, Box 2710
Dept. 766, San Antonio, Texas

I want you to show me what the Mayan Order has actually done for others. Please send me your FREE book. This places me under no obligation whatever.

Name.....

Address.....

City..... State.....

INVENTORS

Get **FREE BOOK**

NOW IS THE TIME TO PATENT AND SELL YOUR INVENTION

Now, more than ever before, is the right time to patent and sell your invention. Why? Because manufacturers everywhere, in striving to keep ahead of competition, are looking for new inventions and buying up the patent rights thereon so that they will have better and more attractive items to make and sell. Hence, the wise thing for you to do is also to act at once. Protect your invention—and yourself—by applying for a patent now.

FREE "PATENT GUIDE" EXPLAINS WHAT TO DO

Our Free 48-page "Patent Guide for the Inventor" contains complete information about patent procedure and selling inventions. It tells what details, drawings, etc. are necessary to apply for a Patent; how to protect your invention and safeguard your rights; and countless other facts that every inventor will want to know. In addition, it contains over 150 illustrations of basic mechanical movements. The Patent Laws were enacted for your benefit—to give you protection for the features of your invention which are Patentable. But these features must be legally and concisely set forth in the form of "claims". This phase of the procedure is so complex that the U.S. Patent Office advises the Inventor to engage a competent Registered Patent Attorney. We maintain a large staff—carefully trained registered patent attorneys—expert draftsmen—experienced searchers—to serve you.

TAKE FIRST STEP NOW

With the "Patent Guide" you will receive also Free a "Record of Invention" form which will enable you at once to establish the date of your invention, before you file your Patent application. This step costs you nothing yet may be vital to your success. Remember—in Patent Matters, ACTION IS IMPORTANT. Delay can be costly. Write for a free copy of our "Patent Guide" today. Clarence A. O'Brien & Harvey B. Jacobson, Registered Patent Attorneys, 62-F, Adams Building, Washington 4, D. C.

**CLARENCE A. O'BRIEN
& HARVEY B. JACOBSON**
REGISTERED PATENT ATTORNEYS



MAIL THIS COUPON TODAY

CLARENCE A. O'BRIEN & HARVEY B. JACOBSON
Registered Patent Attorneys before the United States Patent Office
62-F, Adams Building, Washington 4, D. C.

Please send me your 48-Page "Patent Guide for the Inventor" and your specially prepared "Record of Invention" form FREE. This request does not obligate me.

Name.....
Address.....
City..... State.....

(Please write or print plainly.)

JUNE 15 1946



these books can help you

GET A BETTER JOB AND MAKE MORE MONEY

More knowledge—higher education—more practical planning—these are the things you need for personal success—and these wonderful books will help you attain your goal—quickly, surely, and economically! Read, study

and learn in your spare time, with these four, complete comprehensive books by expert authors! Now made available to you by International Textbook Co., one of America's leading publishers of technical books for home and classroom.

LEARN for FUN and PROFIT

ACT IMMEDIATELY! ORDER NOW! Prices guaranteed until July 1, 1946 only!

Endicott's "HOW TO FIND AND SUCCEED IN YOUR POST-WAR JOB", 156 pages—every page value-full of helpful, valuable suggestions for anyone who seeks a job—or a better one! Illustrated with over 30 cartoons—a MUST for to-day—and to-morrow! \$1.75, postage extra.



Order NOW any or all of these great books on our 5-day money-back guarantee! If not completely satisfied, money refunded immediately and no questions asked! Prices guaranteed until July 1, 1946 only.

"WOODWORKING for EVERYBODY" by Shea & Wenger. The first, COMPLETE book on woodworking—excellent for hobbyists and those who want to learn! An outstanding presentation of materials, machinery and processes, with 46 actual projects! You'll wish you had this book before! \$2.75, postage extra.



"HOUSEHOLD MECHANICS" by Bedell & Gardner \$2.75 postage extra



tra and "PLASTICS" \$3 postage extra by Mansperger & Pepper—2 wonderful books that home craftsmen, students and educators should not be without! 2 best-sellers in their fields—not to be confused with ordinary books—must be seen to be fully appreciated! ORDER NOW—USE the HANDY COUPON ORDER FORM!!

5-DAY MONEY-BACK GUARANTEE

Tear out coupon and mail today!

International Textbook Co., Dept. PS, Scranton 9, Pa.
Please send me the following books as marked. I enclose check or money order for \$..... or send C.O.D., I will pay postman.
 How To Find and Succeed in your Post War Job... \$1.75
 Woodworking For Everybody... \$2.75
 Household Mechanics... \$2.75
 Plastics... \$3.00

Name.....
Address.....
City..... State.....

ACT NOW!
LEARN IN YOUR SPARE TIME AT HOME

LETTERS

About That Athodyd

Sir:

I noticed an article in a recent issue concerning the athodyd jet and its application to small planes. This article shows the jet placed in the tip of the propeller in conventional style. I have thought of a design which places these jets closer to the hub, in the form of an engine, in order to get more power for larger planes, etc. Placing them in this fashion allows these units to be added in decks of four or more, allowing the entire assembly to rotate inside of a jet cowl to drive the prop...

PAUL W. ORCHARD, JR.

New Orleans, La.

Sir:

With real respect to Inventor Fonberg and to your technical staff, a pair of items could stand comment. 1) "A compressorless jet, like the athodyd, is not self-starting." Mr. Fonberg's has a thermal compressor. Its loose, present design allows air intake to combustion over a wider range than usual—i. e., to start under little load. . . . 2) The jet does NOT push . . .

A. L. MURPHY

Trona, California

Sir:

. . . So it's the "push of the jet through the rear of the cone" that hurls the athodyd forward, is it?

HUBERT V. CARYELL, JR.

Toledo, O.

Information on the athodyd may be obtained from Aircraft Jet and Rocket Corp., 949 East 29th St., Brooklyn 10, N. Y.

PSM blushes with its writer.

New Slant on Nova

Sir:

An astronomer recently reported an exploding star and speculated on the reason . . . I have that all figured out. Years ago that dark star was a planet sailing serenely along in a far-distant solar system. One of the inhabitants conceived the brilliant idea of constructing an atomic bomb . . . During his experiment he . . . blew his planet into kingdom come.

LEE MADDOX

Oaktown, Ind.

He was far ahead of us, if you are right.

This **FREE BOOK** Helps..

INVENTORS

TO PROTECT THEIR INVENTIONS

How To
**PROTECT
FINANCE**
and
**SELL YOUR
INVENTION**



MODERN BUSINESS WANTS INVENTIONS

Practical and novel inventions are in big demand today. The opportunity for quick money is enticing. Sales sources are many if your invention has merit. But, be *sure*—before you place your device in strange hands—that it is fully protected. A United States Patent gives you this protection. *The first step toward inventive success always is—and always has been—the application for a U. S. Patent. There is no other way to protect your invention in accordance with the laws of this country.*

MAKE THIS RECORD NOW If you have an invention, and wish to secure it for the future, act at once. Have it dated now and recorded in our office. We will send you this **FREE** Invention Record Form for the purpose. Fill out the Invention Record Form fully describing the nature of your invention. Make a sketch of its main features. Mail it to us and we will record the date it was received in our office. The earlier the date the better your chance of combating rival inventors who may lay claim to your idea later. *Don't delay a single minute in taking this important step. Your whole future may depend upon it. Mail the coupon for our **FREE** Invention Record Blank and New **FREE** Book Today!*

HOW WE SERVE YOU AS REGISTERED PATENT ATTORNEYS The U. S. Patent Office strongly recommends—unless the inventor is familiar with such matters—that he employ the services of a Registered Patent Attorney in the preparation of his Patent Application. We are Registered Patent Attorneys fully qualified to represent you at the Patent Office. We have had long experience in studying hundreds of types of inventions. This gives us the ability to judge your invention and to describe it accurately and convincingly in technical language. It gives us the perception to center arguments upon those details of your invention which, in our judgment, will be looked upon most favorably by the Patent Office Examiner.

Mail the coupon today for our new **FREE** Book, "How to Protect, Finance and Sell Your Invention," and our **FREE** Invention Record Form—maybe this step will pave the way to future security for you and your family. Act Today!

We paint no glowing road to fortune—but if you have an invention . . . if it serves a definite new need . . . if the public accepts it—we can tell you it may provide the security and benefits you are seeking.

McMORROW, BERMAN & DAVIDSON
Patent Attorneys

142-R Atlantic Building
Washington 4, D. C.

FREE

Invention Record

Know How Successful Inventors Protect and Sell Their Inventions

Our new **FREE** Book is the latest volume on Inventions and Patents off the press. It's a book every inventor should have. Mail the coupon today for our book "How to Protect, Finance and Sell Your Invention" and learn these important facts—

- How to know if there is a prior U. S. patent on your invention.
- How to save steps in getting patent action.
- How we prepare your application for presentation to the Patent Office.
- How you may patent an improvement on something in use now.
- How to obtain funds to patent and promote your invention.
- How to find a buyer or backer for your invention.
- How to protect yourself in making royalty agreements.

These and many other inventive facts you'll learn by reading our new **FREE** Book "How to Protect, Finance and Sell Your Invention."

Mail COUPON NOW!
McMORROW, BERMAN & DAVIDSON
PATENT ATTORNEYS
142-R Atlantic Building, Washington 4, D. C.

Send me your new **FREE** book, "How to Protect, Finance and Sell Your Invention," and "Invention Record" form at once. I understand that this request does not obligate me.

NAME..... ADDRESS..... CITY..... STATE.....

JUNE 17 1946

NEW and Ready for you

ALLIED'S 1946 CATALOG

of Radio and
Electronic Supplies

FREE
Send for it
NOW



BRINGS YOU LATEST, finest values in Radio! New receivers, phono-radios, Ham gear, parts, tubes, kits, code apparatus, tools, books, test instruments, public address—all types of equipment. Over 10,000 items. Leading makes. Guaranteed quality. Fastest service from the world's largest and most complete stocks under one roof. Send for your free copy of Allied's new 1946 Buying Guide now. *Save time and money.*

HELPFUL RADIO BOOKS

Radio Formulas & Data No. 37-752... **10c**
Dictionary of Radio Terms No. 37-751... **10c**
Radio Circuit Handbook No. 37-753... **10c**
Radio Builders' Handbook No. 37-750... **10c**
Simplified Radio Servicing No. 37-755... **10c**
Radio Data Handbook No. 37-754... **25c**
ALL SIX BOOKS No. 37-799... **75c**
Parallel Resistance and Series
Capacitance Calculator. No. X37-960... **25c**
R-F Resonance and
Coil Winding Calculator. No. 37-955... **25c**

ALLIED RADIO

ALLIED RADIO CORP.
833 W. Jackson Blvd., Dept. 7-FF-6
Chicago 7, Illinois

Date.....

Send **FREE** 1946 **CATALOG**

Send.....Books Calculator No..... \$.....enclosed
Calculator No.....

Name.....

Address.....

City..... Zone..... State.....

A bursting nova releases 100 quintillion times as much energy as America's atomic bomb.

Tribute from a Scientist

Sir:

... I should like to commend your magazine on ... the text of a recent Voice of Science page. If on this page you can translate the "language of the laboratory" into the "language of the people, you will be performing a signal service ... *Popular Science Monthly* can reach many readers more effectively than all the scientists in America can reach individually. I am sure that other scientists, as well as I, appreciate your co-operation.

BERNARD WEISSBOURD
Metallurgical Laboratory

Chicago, Ill.

To that, PSM is dedicated.

Pictures That Tell Stories

Sir:

I'm a picture reader—I can understand any mechanism and working instructions by drawings or picture illustrations and *Popular Science* has always been noted for its illustrations.

W. B. REPERT

Dunkirk, N. Y.

The Art Department gets up from its drawing boards to take a bow. Reader Repert might like to know that government bureaus, big companies, and teachers also appreciate working drawings that work—and use many PSM pictures.

A Venerable Idea

Sir:

In a recent issue of PSM, a New Yorker said that he would "like to see them make" an overpass truck.

It might be of interest to you and him to know that just such an idea, applied to trains passing each other on the same track, was patented by H. L. Simmons away back in 1895. The patent number is 536,360.

RAYMOND I. TOMPKINS

Richmond, Va.

Index for PSM

Sir:

I'm wondering whether some kind of index booklet couldn't be published annually, giving the contents of the twelve previous issues. This would be a great help to those of us who use PSM for reference.

BOB BAUER

Kalamazoo, Mich.

The Home Workshop Department publishes just such an annual index of its contents, and the issue for 1945 is now available.

AUDELS REFRIGERATION & AIR CONDITIONING GUIDE . . . \$4

New from Cover to Cover—1280 Pages, Fully Illus. Covering basic principles, servicing, operation & repair of household, commercial & industrial refrigeration & air conditioning. A gold mine of essential important facts for engineers, servicemen, users.

AUDELS CARPENTERS & BUILDERS GUIDES—4 Vols. \$6

A practical illustrated trade assistant on modern construction for carpenters, joiners, builders, mechanics and all woodworkers. 4 vols., 1800 pages, 3700 illustrations, flexible covers. Pocket size. Each volume sold separately \$1.50 a vol.

AUDELS AUTOMOBILE GUIDE . . . \$4

A practical quick ready reference book for auto mechanics, service men, operators & owners. Explains theory, construction & servicing of modern motor cars, trucks, buses & auto type Diesel engines. 1540 Pages, fully illustrated, 53 chapters. Indexed. A standard book for mechanics. New fluid drive covered.

AUDELS DIESEL ENGINE MANUAL \$2

A practical, concise treatise with questions and answers on the theory, operation and maintenance of modern diesel engines including General Motors 2 cycle Diesel. 384 pages, fully illus., flexible binding, pocket size. All details plainly brought out, this book is of extreme value to engineers, operators & students.

AUDELS WIRING DIAGRAMS . . . \$1

210 Pages. Illustrated. Gives practical facts on wiring of electrical apparatus. It shows clearly how to wire apparatus for practically all fields of electricity. Each diagram complete & self-explanatory. Highly Endorsed Pocket Companion.

AUDELS PLUMBERS & STEAMFITTERS GUIDES—4 Vols. \$6

A Practical Trade Assistant & Ready Reference, Explains in plain language & by clear illustrations, diagrams, charts, graphs, pictures principles of modern plumbing practice including Marine Pipe Fitting and Air Conditioning. 4 Vols.—1870 Pages—3542 Diagrams. Pocket size. Each Vol. Sold Separately \$1.50 a Vol.

AUDELS SHEETMETAL WORKERS HANDY BOOK \$1

Practical inside information. Fundamentals of Sheet Metal Work. 382 pages, 1 illustrated, 19 sections. Clearly written. Essential & important facts, figures, pointers in everyday language. Ref. Index.

AUDELS SHEETMETAL PATTERN LAYOUTS \$4

Developed by Experts for Sheet Metal Workers, Layout Men & Mechanics. A Practical Encyclopedia in 10 Sections, size 7 x 10 x 2—1125 Pages—350 Layouts—1800 Illustrations. 1001 Key Facts. Fully indexed for ready reference in answering your layout problems. Covers all phases of sheet metal work including Pattern Cutting, Pattern Development & Shop Procedure.

AUDELS ANSWERS ON BLUE PRINT READING \$2

For Mechanics & Builders. Covers all types of blue print reading including ship & airplane. 376 pages, fully illustrated.

AUDELS NEW MACHINIST & TOOLMAKERS HANDY BOOK . . . \$4

Covers modern machine shop practice in all its branches. 5 practical books in 1. New from cover to cover. Tells how to set up & operate lathes, gears, milling machines, shapers, drill presses and all other machine tools. 1600 pages, fully illustrated, 5 x 8 1/2 x 2. Indexed. 5 sections. 1—Modern Machine Shop Practice. 2—Blue Print Reading & How to Draw. 3—Calculations & Mathematics for Machinists. 4—Shop Physics. 5—How to Use the Slide Rule. 60 chapters. Easy to read and understand. A shop companion that answers your questions.

AUDELS MATHEMATICS & CALCULATIONS FOR MECHANICS \$2

Mathematics for home study or reference. 700 pages, 550 illus. Practical mathematics from beginning. How to figure correctly. Easy, correct methods covering a complete review. Ill. & Indexed.

AUDELS HANDY BOOK OF PRACTICAL ELECTRICITY \$4

For maintenance engineers, electricians & all electrical workers. 1440 Pages, 2600 illus. Covers important electrical information in handy form—Marine Wiring, Radio, Principles, Welding. Indexed. A Key to a practical understanding of electricity.

AUDELS RADIOMANS GUIDE \$4

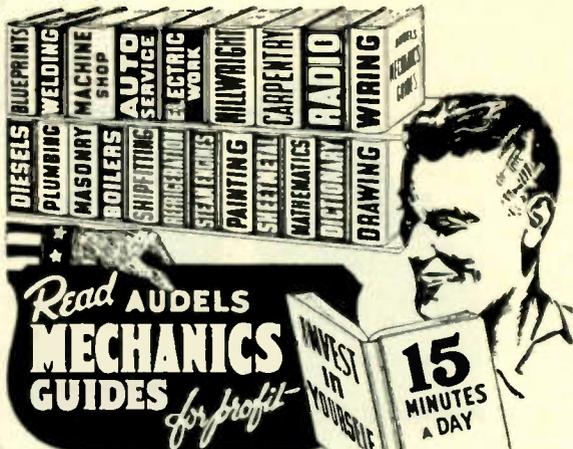
A key to the practical understanding of radio including Frequency Modulation, Television, etc., Aircraft & Marine Radio. For radio engineers, servicemen, amateurs. 172 pages. 400 Illustrations & Diagrams. Photos. Review Questions & Answers, Reference Index. Authentic, clear, concise.

AUDELS ELECTRONIC DEVICES . . . \$2

Tells What You Want to Know About Electric Eye. Easily Understood. Covers photo-electric cells & their applications. Amplifiers, illumination, frequencies, voltage, photocell, tubes, Ohm's Law, wiring diagrams.

AUDELS WELDERS GUIDE \$1

A concise, practical text on operation & maintenance of all welding machines for all mechanics. Over 400 pages, illustrated. Covers all methods of electric and acetylene welding including airplane work.



AN AUDEL GUIDE IS A GOOD FRIEND!

Use the brains and experience of others in these Guides of the Trades. Save time and money with right methods, short cuts, labor saving ideas. CHECK NOW! You can look over any Audel Guide in your home. Start the Easy Payments if satisfied.

CUT HERE MAIL ORDER

THEO. AUDEL & CO., 49 W. 23 St., New York 10, N.Y.

Please mail me for 7 days' free examination the books marked (X) below. I agree to mail \$1 in 7 days on each book or set ordered, and to further mail \$1 a month on each book or set ordered until I have paid purchase price.

If I am not satisfied with Guides I will return them.

- Audels REFRIGERATION & Air Conditioning Guide . . . \$4.
- Audels POWER PLANT ENGINEERS GUIDE 4.
- Audels PUMPS, HYDRAULICS & AIR COMPRESSORS 4.
- Audels WELDERS GUIDE 1.
- Audels BLUE PRINT READING 2.
- Audels SHEET METAL WORKERS Handy Book 1.
- Audels SHEET METAL PATTERN LAYOUTS 4.
- Audels AIRCRAFT WORKER 1.
- Audels MATHEMATICS and CALCULATIONS 2.
- Audels MACHINISTS & TOOLMAKERS Handy Book 4.
- Audels MECHANICAL Dictionary 4.
- Audels AUTOMOBILE GUIDE 4.
- Audels DIESEL ENGINE MANUAL 2.
- Audels MARINE ENGINEERS Handy Book 4.
- Audels SHIPFITTERS Handy Book 1.
- Gueths MECHANICAL DRAWING COURSE 1.
- Rogers DRAWING and DESIGN 2.
- Audels MILLWRIGHTS and Mechanics Guide 4.
- Audels CARPENTERS and Builders Guides (4 vols.) 6.
- Audels PLUMBERS and Steamfitters Guides (4 vols.) 6.
- Audels MASONS and Builders Guides (4 vols.) 6.
- Master PAINTER and DECORATOR 2.
- Audels GARDENERS & GROWERS GUIDES (4 vols.) 6.
- Audels ENGINEERS and Mechanics Guides 12.
- Nos. 1, 2, 3, 4, 5, 6, 7 and 8 complete 1.
- Audels Answers on Practical ENGINEERING 1.
- Hawkins Aids to ENGINEERS EXAMINATION 2.
- Audels ELECTRICIANS EXAMINATIONS 1.
- Audels WIRING DIAGRAMS 1.
- Audels Handy Book of PRACTICAL ELECTRICITY 4.
- Audels ELECTRICAL POWER CALCULATIONS 2.
- Hawkins ELECTRICAL Guides at \$1. each 10.
- Audels ELECTRONIC DEVICES 2.
- Audels ELECTRIC Dictionary 2.
- Audels RADIOMANS GUIDE 4.
- Audels NEW ELECTRIC LIBRARY at \$1.50 a Volume
- Vols. I, II, III, IV, V, VI, VII, VIII, IX, X, XI, XII.

Name _____

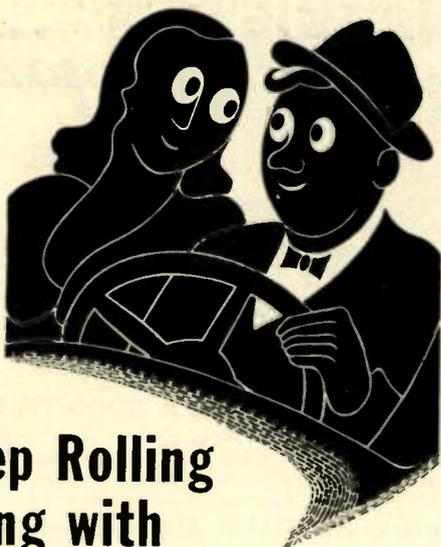
Address _____

Occupation _____

Employed by _____

P.S.M.

AUDEL, Publishers, 49 W. 23 St., N. Y. 10



Keep Rolling along with **PYROIL!**

The insignificant cost of Pyroil is low maintenance insurance on your automobile. Pyroil reduces wear by providing a constant film of lubrication on cylinder walls. It prevents rust and corrosion. It reduces friction wear. It frees away sludges and gums and reduces carbon formation.

Keep rolling along . . . ask your station attendant to add Pyroil next time you stop for gas or oil.

PYROIL FOR AIRCRAFT ENGINES

Use Aircraft Pyroil B for lubricating oil, Aircraft Pyroil A for gasoline.

Manufactured and Guaranteed by Pyroil Company, W. V. Kidder, Founder, 141 Main Street, LaCrosse, Wisconsin.

PYROIL COMPANY

141 Main Street, La Crosse, Wisconsin

I want my car to last and run properly. Please tell me more about Pyroil and how it can accomplish this for me.



Name.....

Address.....

City or Town..... State.....



Jerry, the talking dog, is entertaining hospitalized veterans, by courtesy of the PYROIL COMPANY. Picture of Jerry, sent on request.

Price, 10 cents. Address orders to Book Department, Popular Science Monthly, 353 Fourth Avenue, New York 10, N. Y. Feature articles in Popular Science and other magazines are indexed by subject in the "Reader's Guide to Periodical Literature," on file in most public libraries.

Moon's Whisper

Sir:

Your article on radar to the moon was very interesting, but I think there was an error in the wattage of the strength of the echo. It read "three watts." Most receivers are sensitive to one millionth of a volt. At this rate, without special radio frequency amplifiers, the amperage of the signal would be three. That doesn't make it a feeble signal by any means. I have heard . . . that the signal was close to 9/10 quadrillionths of a watt.

PETE MOE

Roseburg, Ore.

Total power that came back from the moon was three watts, but only a small amount of that power was caught by the receiver. The actual strength of the echo was 9/10 quadrillionths of a watt.

Deferments

Sir:

I found the article, "LOST: A Generation of Scientists," very timely and appropriate. With reference to the essential NACA professional personnel under 26 enrolled in the Air Corps Enlisted Reserve on inactive service, I mention that the War Department will continue them in a reserve category through May 1946, pending action of the Congress on the Selective Service and Training Act. These men still constitute 39 percent of the entire professional staffs at the Langley and Cleveland Laboratories of the NACA.

Legislation to defer young scientists and essential technicians so long as they are engaged in scientific research is necessary to the national interests because of the greatly increased significance of science and technology in warfare.

J. F. VICTORY

Executive Secretary, National Advisory Committee for Aeronautics

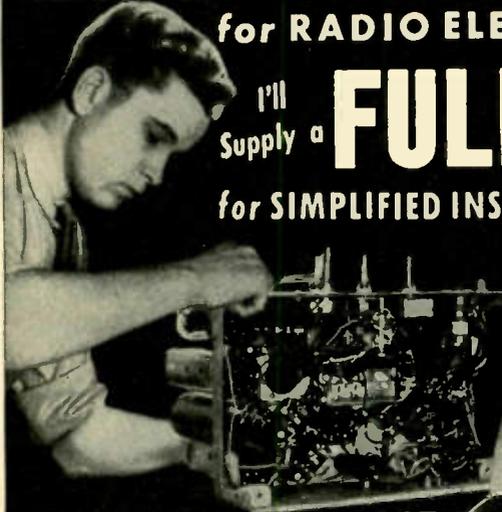
PSM is pleased that the nearly 40 percent of NACA's staff threatened with a call to active duty at the time "LOST: A Generation of Scientists" was written have been reprieved, hopes that Congressional action will continue them in their vital research jobs.

LET ME TRAIN YOU

for RADIO ELECTRONICS & TELEVISION

I'll Supply a **FULL RADIO SET**

for SIMPLIFIED INSTRUCTION — PRACTICE & TESTING



Beginners Learn FAST
START NOW! Big Developments
 Ahead in F. M., Radar, Television

MAKE GOOD MONEY IN
a Business of Your Own
...or a Good Radio Job.



The offer I make you here is the opportunity of a lifetime. It's your big chance to get ready for a wonderful future in the swiftly expanding field of Radio-Electronics INCLUDING Radio, Television, Frequency Modulation and Industrial Electronics. Be wise! NOW'S the time to start. Opportunities ahead are tremendous! No previous experience is necessary. The Sprayberry Course starts right at the beginning of Radio. You can't get lost. It gets the various subjects across in such a clear, simple way that you understand and remember. And, you can master my entire course in your spare time.

Sprayberry wiring procedure to serve for complete, fast, accurate Radio Receiver trouble-shooting. Thus under Sprayberry methods, you do not have one cent of outlay for manufactured Test Equipment.

Succeed As a Radio-Electronician

My training will give you the broad, fundamental principles so necessary as a background, no matter which branch of Radio you wish to specialize in. I make it easy for you to learn Radio Set Repair and Installation Work. I teach you how to install and repair Electronic Equipment, in fact, you'll be a fully qualified RADIO-ELECTRONICIAN equipped with the skill and knowledge to perform efficiently and to make a wonderful success of yourself.

Read What Graduate Says
"One Job Nets About \$26.00"

"Since last week I fixed 7 radios, all good-paying jobs and right now I am working on an amplifier system. This job alone will net me about \$26.00. As long as my work keeps coming in this way I have only one word to say and that is 'Thanks' to my Sprayberry training and I am not afraid to boast about it."
ADRIEN BENJAMIN, North Grosvenordale, Conn.

DON'T PUT IT OFF!

Get the facts about my training—now! Take the first important step toward the money-making future of your dreams. All features are fully explained in my big, illustrated FREE Catalog which comes to you along with another valuable FREE book you'll be glad to own.

FREE BOOKS

"How To Read Radio Diagrams and Symbols"

... a valuable new book which explains in simple English how to read and understand any Radio Set Diagram or circuit. Includes translations of all Radio symbols. Send for this FREE book now, and along with it I will send you another big FREE book describing my Radio-Electronic training.

RUSH COUPON
for BOTH



SPRAYBERRY ACADEMY OF RADIO
 F. L. Sprayberry, President
 Room 5566, Pueblo, Colorado

Please rush my FREE copies of "How to MAKE MONEY IN RADIO, ELECTRONICS and TELEVISION", and "How to READ RADIO DIAGRAMS and SYMBOLS".

Name Age

Address

City State

(Mail in envelope or paste on penny postcard)

MAIL COUPON AT ONCE!

HIGH PAY, PERMANENT JOBS AWAIT
MEN WITH...

DIESEL TRACTOR AND HEAVY EQUIPMENT TRAINING

ASSURE YOUR FUTURE!

Get set now for job and advancement opportunities in this high-pay field. Best jobs go to men who know how. I.T.S. home training qualifies you for better jobs.

**CAN
YOU
Qualify
?**

THOUSANDS OF JOB OPPORTUNITIES!

● In coming years no other field will offer more opportunities for ambitious trained men than heavy construction. Highways, dams, airports, factories will be built! Agriculture, transportation, industry, shipping will forge ahead! Wherever there is building and construction, diesels, tractors and heavy equipment will be used. Experts say thousands of new men will be needed to service, repair and operate this equipment. I.T.S. home training prepares you for these important jobs.

VETERANS ATTENTION!

I.T.S. Home Training
can help you to
BETTER JOBS!
Write for Special Folder

Better Jobs go to Trained Men

I.T.S. home training can help you to better jobs in the Diesel, Tractor and Heavy Equipment field as it has hundreds of others. Higher pay and advancement are yours if you are qualified. Students say nothing has helped them get ahead as much as our practical, easy-to-understand course.

Complete UP-TO-THE-MINUTE HOME TRAINING COURSE NOW AVAILABLE

If you are mechanically inclined or already working in the automotive, diesel, tractor or heavy equipment field you'll want to know all about I.T.S. home training. Whether you are interested in operating, servicing or selling, a few hours study each week with this 52-week, completely modern course will give you a practical and valuable knowledge of all branches of diesel, tractor and heavy equipment. Easy to master while on your present job.

FREE PLACEMENT SERVICE

Qualified I.T.S. students receive free job placement service.

TRAIN AT HOME! IN SPARE TIME

DON'T MISS THIS OPPORTUNITY

Mail Coupon TODAY for
Complete Information!

INTERSTATE TRAINING SERVICE

INTERSTATE TRAINING SERVICE

Weatherly Bldg., Portland 14, Oregon DEPT. PS-66
Please send full information about your Tractor, Diesel and Heavy
Equipment Home Training Course. If veteran, check here

Name _____

Address _____

City _____ Zone _____ State _____

STUDY AT HOME

With An Educational Institution

Men with specialized training win higher positions, insure larger earnings, and are bigger successes in business and public life. Opportunities NOW greater than ever before. Send for our Catalog.

ARTS and SCIENCES

Courses in Philosophy; Education; Letters; Public Health; Medical Jurisprudence; Psychology; Sociology; Physics; Chemistry; Plastics; Geology; Political Science; Theology; Business and Commerce; Accounting; Mathematics; Statistics; Agriculture.

ENGINEERING

Courses in Electrical, Civil, Mechanical, Drafting, Architectural, Steam, Aeronautical, Radio, Structural, Mining, Industrial, Petroleum, Marine, Chemical, Diesel, Automobile, Refrigeration, and Air Conditioning Engineering.

LAW

Complete Professional Law Course includes 20 Hornbook Series college grade textbooks. Courses also in Commercial Law, Patent Law and Medical Jurisprudence.

McKinley-Roosevelt Incorporated, 4610-A B, Sheridan Rd., Chicago 40, Ill.

LAW...

STUDY AT HOME Legally trained men win higher positions and greater success in business and public life. Greater opportunities now than ever before.
More Ability: More Prestige: More Money We guide you can train at home during spare time. Degree of LL.B. step by step. You text material, including 14-volume Law Library. We furnish all terms. Get our valuable 48-page "Law Training for Leadership" and "Evidence" books FREE. Send for them NOW.
LASALLE EXTENSION UNIVERSITY, 417 South Dearborn Street
A Correspondence Institution Dept. 683-L Chicago 5, Ill.

LEARN MONEY-MAKING CARTOONING

IN SPARE TIME — by Easy Picture Chart Method Same Simplified Method that has helped train creators of "Terry & Pirates," "Freckles," "Out Our Way," "Winnie Winkle," "Regular Fellers," "Strange As It Seems," "The Neighbors," and many others. Earn while learning. Send 10c for Picture Chart (to test your ability). Samples of successful students, and full details. (State age.)
Landon School of Cartooning, Dept. 4626, Philadelphia 1, Pa.



SHORTHAND in 6 Weeks at Home

Famous Speedwriting system. No signs or symbols; uses ABC's. Easy to learn; easy to write and transcribe. Fast preparation for a job. Surprisingly low cost. 100,000 taught by mail. Used in leading offices and Civil Service. Write for free booklet. Speedwriting, Dept. 2606-6, 55 W. 42 St., N.Y. 18, N.Y.



Practical Electricity and House Wiring

Discusses common electrical devices, principles of circuits, wires and insulation, grounding, fuses and circuits, wiring methods, planning installations, installing switches, fixtures, etc., wiring houses after they are built, alterations and additions, wiring farm buildings, home repair, etc. 200 pp. 227 illus.

C.O.D. \$2.00 Send Today, Money Back Guarantee Postpaid \$2.00

GATEWAY BOOK COMPANY, Dept. PS-18
32 N. State Chicago 2, Ill.

MONEY for MEN ALL FREE

THE PLASTEX Industry needs manufacturers on small scale and for big production of Lamp and Clock Stand, Art Goods and Novelties in Plastex and Marble imitation. Experience unnecessary. 1/2c material makes regular 10c store sellers. Rubber moulds furnished for speed production. Small investment brings good returns. Big chain store orders now being placed. Ambitious men have chance for real prosperity. Our Free booklet will interest and benefit you.

PLASTER INDUSTRIES, Dept. 2, 1085 Washington Av., New York 56, N.Y.

See

how readily YOU can train at home for BIGGER EARNINGS

in

RADIO ELECTRONICS



FREE KIT PACKET SHOWS HOW YOU CAN GET LOTS OF "LEARN-BY-DOING" RADIO EXPERIENCE AT HOME FROM DEFOREST'S THRILLING RADIO

"Home Laboratory"

133 EXPERIMENTS

DeForest's Kit Packet shows how you can get real Radio experience from the many standard Radio parts furnished you with DeForest's Training. See how you may quickly build Radio Circuits that work... how you may experiment with Photo Electric Cell "Magle"... a 5-Tube Superheterodyne Receiver... a Radio Telephone and scores of other fascinating projects. See how you get actual "shop training" at home to give you the practical Radio experience you need.

VETERANS!

Big things are happening at De Forest's for veterans! See how you can PREPARE YOURSELF without cost for a GOOD JOB or BUSINESS OF YOUR OWN in the vast Radio-Electronic opportunity field.

DeFOREST'S PROVIDES ALL 3 HOME TRAINING AIDS

- A** DeVry Movie Projector and Learn-By-Seeing Movie Film
- B** Actual Radio Parts for working out 133 experiments
- C** 90 lessons prepared under the supervision of Dr. Lee DeForest—the "Father of Radio."

You Also Get EFFECTIVE EMPLOYMENT SERVICE

Upon completing your training, you get the full benefit of DeForest's Employment Service that has helped so many men to get started in the Radio-Electronic field.



DeFOREST'S TRAINING INCLUDES INSTRUCTION IN MOTION PICTURE SOUND EQUIPMENT, FM RADIO AND TELEVISION... RESIDENTIAL TRAINING IN OUR MODERN CHICAGO LABORATORIES ALSO AVAILABLE —ASK US FOR INFORMATION!

E. B. DeVry, President
DeFOREST'S TRAINING, INC.
2535-41 North Ashland Ave., Dept. PS-C6
Chicago 14, Illinois, U.S.A.

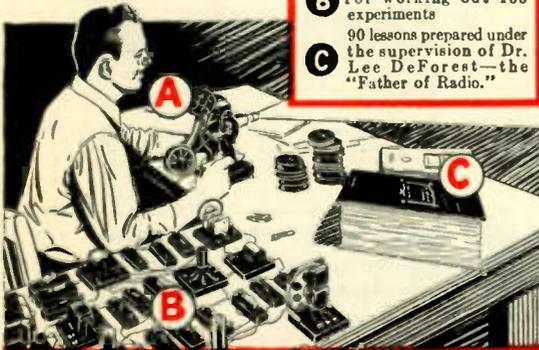
Send FREE RADIO KIT PACKET and "VICTORY FOR YOU!" BOOK.

Name _____ Age _____

Address _____ Apt. _____

City _____ Zone _____ State _____

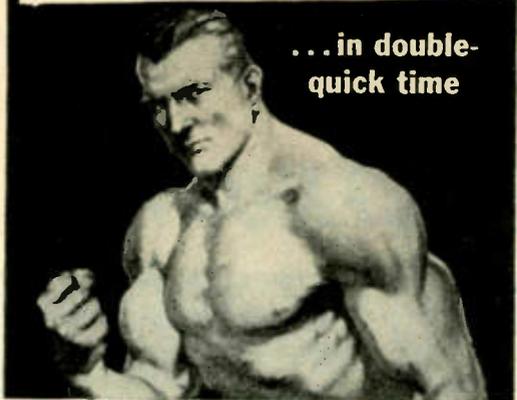
If under 16, check here for special information. If a discharged Veteran of World War II, check here.



DeFOREST'S TRAINING, INC.
CHICAGO 14, ILLINOIS

JUNE 1946 23

"I'll show YOU how to make yourself COMMANDO-TOUGH



...in double-quick time

...OR IT WON'T COST YOU A CENT!"

says *George F. Jowett*

WORLD'S GREATEST BODY BUILDER

Let me prove to YOU that you can put inches of dynamic muscles on your arms! Add inches to your chest! Broaden your shoulders and power-pump the rest of your body. I can do for you what I've done for thousands the world over, including many officers and men now in the U. S. and British Armed Forces!

GIVE ME 10 MINUTES A DAY!

I'll Show You My Secrets Of Body Building

I'll help you learn the "Progressive Power Method" through which I rebuilt myself from a physical wreck to the holder of more strength records than any other living athlete or teacher! No matter how skinny or flabby you are, you can learn my methods right in your own home. Through my proved secrets I show you how to develop your power, inside and out, until YOU are fully satisfied that you are the man you want to be. "The Jowett System," says R. F. Kelly, Atlantic City, Physical Director, "is the greatest in the world!"

**PROVE TO YOURSELF
IN ONE NIGHT!**

Send only 25c for test Course, "Molding a Mighty Arm." Read it the evening it arrives—learn from experience the thrill you can give your muscles!

**SEND FOR THESE FIVE FAMOUS
COURSES IN BOOK FORM**

**ONLY 25c EACH
or ALL 5 for \$1.00**

**BOOK WITH PHOTOS OF FAMOUS STRONG MEN
MAIL COUPON NOW**

FREE



Jowett Institute of Physical Culture
230 Fifth Avenue, Dept. PS-66, New York 1, N. Y.

George F. Jowett: Your proposition looks good to me. Send by return mail, prepaid, the courses checked below, for which I enclose () Include FREE book of PHOTOS.

George F. Jowett
Champion of
Champions

- All 5 courses for... \$1
- Molding Mighty Legs 25c
- Molding a Mighty Arm 25c
- Molding a Mighty Grip 25c
- Molding a Mighty Back 25c
- Molding a Mighty Chest 25c
- Send all 5 C.O.D. (\$1 plus postage.) No orders less than \$1 sent C.O.D.

NAME..... Age.....
(Please print plainly. Include Zone Number.)

ADDRESS.....

14 POPULAR SCIENCE

START YOUR OWN REFRIGERATION REPAIR SHOP!

Exceptional opportunity for men of all ages up to 60 who like to work with tools. Learn to be a service mechanic in REFRIGERATION. Our practical, thorough home training is easy to grasp in your spare hours with a common school education. Learn how to start your own business with \$50.00 worth of tools in garage, basement or small shop. Or take a well paid job in this active field.

FREE Booklet • Write for FREE BOOKLET today.

MECHANICS TRAINING SCHOOL

7217 So. Broadway Dept. S-6 Los Angeles 3, Calif.



LEARN . . . PROGRESS . . . EARN MORE . . . SUCCEED . . .
Your own achievement, popularity, success through music. Learn in your home. Check course: Piano, Violin, Cornet, Saxophone, Clarinet, Guitar, Harmony, Arranging, History. If Juvenile, parent's signature must accompany inquiry. Low cost. Easy Terms. FREE Catalog.

Suite U-390, 765 Oakwood Bl., Chicago 15

UNIVERSITY EXTENSION CONSERVATORY



You can learn plain, rapid writing or fancy ornamental writing for social and business advancement, right in your own home during spare time by my Simplified Method. Write for my free book, "How to Become an Expert Penman," which shows who others have accomplished by taking my Courses. Send 10c for one of my favorite Pen Points and your name with a beautiful flourish bird written on a card. Write today.

T. M. TEVIS, BOX 25R CHILLICOTHE, MO.

TRI-STATE COLLEGE

B.S. Degree in 27 months in Engineering (all branches), Bus. Admin., Acctg. and Sec. Science. 63rd year. School now filled to capacity. No applications can be accepted until further notice. 556 College Ave., Angola, Ind.

WOULD you pay \$50—first \$350 made? Color-illustrated book "500 Odd Successful Enterprises" free! Proven by "Little Peewees." Several hundred

505... Odd ENTERPRISES

RADIO ENGINEERING, Broadcasting, Servicing, Electronics, Aviation, Marine & Police Radio taught thoroughly.

48 weeks' Engineering course equivalent to 3 years' college radio work. Approved Veteran Training. Co-educational. Catalog upon request. Valparaiso Technical Institute. Dept. 503, Valparaiso, Ind.

Thrilling Work COLORING PHOTOS
EASY TO LEARN
Fascinating vocation learned at home by those without aptitude. Thrilling pastime. National method brings out life-like colors. Free booklet.
NATIONAL PHOTO COLORING SCHOOL
1315 S. Michigan, Dept. 136-A, Chicago 5

DETECTIVES

TRAINING—SECRET INVESTIGATIONS—FINGERPRINTS
Easy Method — Short Time. — Rewards.
Home—Travel—Secret Code—Booklet FREE—WRITE
INTERNATIONAL DETECTIVE SYSTEM
1701-P Monroe St., N. E., Washington, D. C. 18

LEARN MEAT CUTTING At Home — In Spare Time

Get into the vital meat industry. Concise, practical Home Training based on 25 years proven instruction methods used at National's famous resident school. Prepares you for bigger pay as Meat Cutter—supervision market manager or more money in your own store. Go as rapidly as your spare time permits. Diploma. Start NOW to turn your spare hours into money. Send for FREE bulletin today. No obligation.
National School of Meat Cutting Inc., Dept. 0-43, Toledo 4, O.

Where will YOU be when the curtain goes up on tomorrow?

TOMORROW'S stage is being set for new developments, new industries, new opportunities. What will be *your* role in this super-production? Will you be one of the successes — or one of those left on the street corner?

In new industries — plastics, electronics, Diesel engines, air conditioning, light metals — and the expanding older ones, the leading roles will go to the men who are *training* for them now.

Many are studying with the famous

International Correspondence Schools. Authoritative, practical I. C. S. Courses are written by successful men for the ambitious "comers" due to succeed them.

I. C. S. has trained thousands of leaders in American industry and business. Its 54 years of experience in vocational education, its 23 Schools, its more than 400 courses are at your disposal.

Pick your place on tomorrow's stage and mark the coupon accordingly. *This* is the day to *act*.

INTERNATIONAL CORRESPONDENCE SCHOOLS



BOX 7661-L, SCRANTON 9, PENNA.

Without cost or obligation, please send me full particulars about the course *before* which I have marked X:

Air Conditioning and Plumbing Courses

- Air Conditioning
- Heating Plumbing
- Refrigeration Steam Fitting

Chemistry Courses

- Chemical Engineering
- Chemistry, Analytical
- Chemistry, Industrial
- Chemistry, Mfg. Iron & Steel
- Petroleum Refining Plastics
- Pulp and Paper Making

Civil Engineering, Architectural and Mining Courses

- Architectural Drafting
- Architecture
- Bridge and Building Foreman
- Building Estimating
- Civil Engineering
- Coal Mining
- Contracting and Building
- Highway Engineering
- Lumber Dealer
- Reading Structural Blueprints
- Sanitary Engineering
- Structural Drafting

- Structural Engineering
- Surveying and Mapping

Communications Courses

- Electronics
- Practical Telephony
- Radio, General
- Radio Operating
- Radio Servicing
- Telegraph Engineering

Electrical Courses

- Electrical Drafting
- Electrical Engineering
- Electric Light and Power
- Lighting Technician
- Practical Electrician

Internal Combustion Engines Courses

- Auto Technician Aviation
- Diesel-Electric
- Diesel Engines Gas Engines

Mechanical Courses

- Aeronautical Engineering
- Aircraft Drafting
- Flight Engineer
- Foundry Work
- Heat Treatment of Metals

- Industrial Engineering
- Industrial Metallurgy
- Machine Shop
- Mechanical Drafting
- Mechanical Engineering
- Mold-Loft Work
- Patternmaking—Wood, Metal
- Reading Shop Blueprints
- Sheet-Metal Drafting
- Sheet-Metal Worker
- Ship Drafting Ship Fitting
- Tool Designing
- Toolmaking
- Welding—Gas and Electric

Railroad Courses

- Air Brake Car Inspector
- Diesel Locomotive
- Locomotive Engineer
- Locomotive Fireman
- Railroad Section Foreman

Steam Engineering Courses

- Boilermaking
- Combustion Engineering
- Engine Running
- Marine Engineering
- Steam Electric Steam Engines

Textile Courses

- Cotton Manufacturing
- Rayon Weaving
- Textile Designing
- Woolen Manufacturing

Business and Academic Courses

- Accounting Advertising
- Arithmetic Bookkeeping
- Business Correspondence
- Business Management
- Certified Public Accounting
- Commercial
- Cost Accounting
- Federal Tax
- First Year College
- Foremanship French
- Good English High School
- Higher Mathematics
- Illustrating Motor Traffic
- Postal Service
- Salesmanship Secretarial
- Sign Lettering
- Spanish Stenography
- Traffic Management

Name _____ Age _____ Home Address _____
 City _____ State _____ Present Position _____
 Working Hours _____ A.M. to _____ P.M. Length of Service in World War II _____

Canadian residents send coupon to International Correspondence Schools Canadian, Ltd., Montreal, Canada.
 British residents send coupon to I. C. S., 71 Kingsway, London, W. O. 2, England.

It's YOUR future—Make the most of it!



Start now to earn the bigger pay in electrical repair

WAS there ever such an opportunity to get started in electrical maintenance and repair—and at top-notch wages? Are you ready—with experience and ability—to cash in on it? Others are getting just the sort of background needed—quick! practical—to handle the great variety of electrical maintenance and repair work TODAY—from this well-known electrical library. You can too!

THE LIBRARY OF ELECTRICAL MAINTENANCE AND REPAIR

5 vols., 1826 pages, 1724 illustrations

Gives you the "know-how" to tackle any wiring or motor job. Five books show you HOW—to install all types of motor and generator units—to inspect and repair motor starters and generators—to diagnose motor and generator troubles—to figure new windings for old cores—DC and AC windings—to test armature windings—test induction motors, etc., etc. One book is full of trouble-shooting charts that show quickly symptoms, causes, specific remedies, etc.

Take the first step toward improving YOUR future—Mail this coupon TODAY

No money down—special price—easy payments—FREE trial

McGraw-Hill Book Co., 330 W 42 St., New York 18, N. Y.
 Send me for ten days' free examination the Electrical Maintenance and Repair Library. If satisfactory I will send you \$1.50 in 10 days and \$3.00 monthly until the price of \$16.50 is paid. If not wanted I will return books postpaid. (To insure prompt shipment write plainly and fill in all lines.)

Name _____
 Home Address _____
 City and State _____
 Company _____
 Position _____ PSM 6-46

START NOW TOWARD A FUTURE IN REFRIGERATION and AIR CONDITIONING

Refrigeration and Air Conditioning are among the giant industries of America. Such industries need men who KNOW. Many men servicing and installing equipment are making large incomes.

Spare Time Training

If mechanically inclined, get the training you need to qualify for experience installing & servicing Refrigeration and Air Conditioning in stores, offices, homes. Then you should have no difficulty getting started in these great industries. As experience, tools and a personal following are acquired; you may find it practical, later, to start your own REFRIGERATION and AIR CONDITIONING SHOP.



Rush Coupon Below Today!

Practical Interesting Training

You'll like our way of training—through capable home-study instruction followed by practice on actual equipment under watchful eyes of seasoned Refrigeration and Air Conditioning men in our shops. You'll get top-rate instructions—the easy way. So get the facts now—FREE of obligation. Write TODAY—SURE!

UTILITIES ENGINEERING INSTITUTE
 1314 W. BELDEN AVE., CHICAGO 14, ILL.

GET VALUABLE FACTS FREE

Please send me the Free FACTS about opportunities in Air Conditioning and Mechanical Refrigeration. I marked the one that interests me most.

Air Conditioning Mechanical Refrigeration

NAME _____ Age _____
 ADDRESS _____
 CITY _____ Zone _____ STATE _____

Learn to Service and Repair ELECTRICAL APPLIANCES

Learn to be a service mechanic on all types of electrical appliances . . . and prepare now for a permanent future. Independence and security, operating a business of your own. You won't have to worry about losing your job when the next depression comes if you have your own electrical appliance repair business. There is always a demand for repair work . . . and it can't be done by a machine. Our practical, easy to learn home-training teaches you how to repair washing machines, vacuum cleaners, stoves, lamps, motors, irons, etc., and how to do house wiring. Also how to start your own business on little capital. Write today for FREE illustrated booklet which will explain in detail. No obligation. No salesman will call.

PACIFIC TRAINING SCHOOL
 7217 So. Broadway, Dept. S-6, Los Angeles 3, California

Learn to MOUNT BIRDS



Tan SKINS, make up FURS

Be a Taxidermist. Double your hunting fun. We teach you at Home. Mount Bldgs, Animals, Fish, Heads, common specimens. Fun and profits. Decorate home and den **MAKE MONEY**. Mount game, tan for others. Big profits in spare time. **WRITE TODAY.** 100 game pictures in **FREE BOOK**. Hunters, get your copy. It's **Now Free**. Send post card. State your AGE. **NORTHWESTERN SCHOOL OF TAXIDERMY** Dept. 339A Omaha, Nebraska

PHOTOGRAPHY

For Today's & Tomorrow's **BIGGEST OPPORTUNITIES**

Nationwide opportunities, sound future career waiting for trained photographers. N.Y.I. graduates winning success from coast to coast. Successful home study courses. Also resident. Write today.

NEW YORK INSTITUTE OF PHOTOGRAPHY
 Dept. 5, 10 West 33 St., New York 1, N. Y.

Correspondence Courses in RADIO and ELECTRICAL ENGINEERING **LOW AS \$25**

ELECTRICAL ENGINEERING. Get good grasp of wide electrical field. Modern. Very understandable. Theory made easy.

RADIO ENGINEERING. Extra fine course in radio, public address, photo-electric work. Trains you to be super-service man, real vacuum tube technician. Tuition ONLY \$25, either course. Deferred payment plan. Services needed readily.

FREE Write for free copies of school catalogs, student magazines, etc.

LINCOLN ENGINEERING SCHOOL, Box 931-S-90 LINCOLN, NEBR.

Learn BAKING At Home

Baking is one of America's high industries in wages. Nearly depression-proof. Thorough basic home course lays sound foundation. If you have aptitude, write for **FREE BOOKLET**, "Opportunities in Commercial Baking." **National Baking School, 1315 Mich. Ave., Dept. 136-A, Chicago 5**

STAMMER ?

This new 128-page book, "Stammering, Its Cause and Correction," describes the Bogue Unit Method for scientific correction of stammering and stuttering—successful for 45 years. **Benj. N. Bogue, Dept. 1886, Circle Tower, Indianapolis 4, Ind.**

DEVELOP THE POWERFUL INFLUENCE FEUCHTINGER Method Guaranteed IN YOUR VOICE

DO IT YOURSELF AT HOME
 Write for the Voice Book - FREE.
 Sent only to those over 17yrs of age
PERFECT VOICE STUDIOS
 Kimball Hall Bldg., 25 E. Jackson, Chicago 4, Studio 136-A





Do You Want an Aviation Career?

Opportunities in aviation are tremendous—CAA and other responsible sources estimate *hundreds of thousands* of new jobs. The best positions will go to trained men. Invest your time now in thorough training at Northrop! Then enter aviation *fully prepared* to take advantage of the best opportunities.



Learn to Be an Aeronautical Engineer

You can now get thorough, practical training in Aeronautical Engineering *quickly*—through the *modern, intensive* Northrop training program. Basic and advanced courses are available. When you are graduated, you are a trained, practical engineer . . . *well equipped to take your place in aviation.*



Or Learn to Be a Master Mechanic

Special methods of presentation of Aircraft and Engine Mechanics (A&E) have been developed for the exclusive use of Northrop students. Your training is supervised by men *actually* in the industry—men who *know today's requirements*. You learn thoroughly every detail of *modern aviation mechanics*.

Learn
Aeronautical Engineering
at Northrop

This is your opportunity to learn modern Aeronautical Engineering at Northrop Field under the supervision of one of the foremost aircraft engineering and research organizations. Training in Aircraft and Engine Mechanics is also available. Complete information can be obtained by sending the coupon.



Enjoy Completely New Training Facilities

You enjoy your training and learn more easily, using modern equipment and facilities. At the Northrop Aeronautical Institute, even the specially designed school buildings are new... and located on mile-long Northrop Field, in the midst of Northrop engineering, research, and production plants and laboratories



Live in Sunny California

Northrop Field is located between the Pacific Ocean and the Sierra Mountains, near downtown Los Angeles and Hollywood. You can enjoy Southern California—ocean surfing and bathing, skiing, all-year tennis, desert and mountain hiking and riding, plays, music, parks and other entertainment.



Veterans Eligible for Benefits

The Northrop Aeronautical Institute has been approved for training Veterans under the provisions of the G. I. Bill of Rights. Veterans attending the Institute are eligible for educational benefits provided by this Bill. A special "priority" reservation is available to those not yet discharged from the armed forces.

DEDICATED TO THE  ADVANCEMENT AND

NORTHROP

AERONAUTICAL INSTITUTE

1525 EAST BROADWAY
HAWTHORNE, CALIFORNIA

TRAINING OF MEN FOR CAREERS IN AVIATION

SEND COUPON FOR FULL INFORMATION

NORTHROP AERONAUTICAL INSTITUTE
1525 East Broadway, Hawthorne, Los Angeles County, California
Please send me your free, illustrated booklet and information, including starting dates and tuition rates, on the training course checked below.

Aeronautical Engineer Master Aircraft and Engine Mechanic (A&E)

(Name)

(Address) (Apt)

(City) (Zone) (State)

Check one: Veteran In Service Civilian

Keep that "TICKING" Car

7 DAYS FREE TRIAL



Every operator and mechanic needs AUDELS AUTO GUIDE.

This book saves time, money and worry. Highly endorsed. It presents the whole subject of auto mechanics:

- 1—Basic principles
- 2—Construction
- 3—Operation
- 4—Service
- 5—Repair Handy Size. Easily understood.

1588 PAGES
1500 ILLUSTRATIONS



NEW FLUID DRIVE, HYDRAULIC SHIFT AND DIESEL ENGINES FULLY COVERED

Over 1500 pages—1540 illustrations showing inside views of modern cars, trucks and buses with instructions for all service jobs.

ASK TO SEE IT—To Get This Assistance for Yourself Simply Fill In and Mail Coupon Today.

4 COMPLETE • PAY ONLY \$1. A MONTH ←

AUDEL, Publishers, 49 West 23rd St., New York MAIL AUDELS NEW AUTO GUIDE for free examination. If O.K. I will send you \$1 in 7 days; then remit \$1 monthly until price of \$4 is paid. Otherwise I will return it.

Name _____
 Address _____
 Occupation _____
 Employed by _____ P. S. M.

AVIATION Career

MAXIMUM TRAINING IN MINIMUM TIME

CAL-AERO TECH TRAINING will add dollars to your pay check all the rest of your life. Specializing in AERONAUTICAL ENGINEERING and MASTER AVIATION MECHANICS since 1929, Cal-Aero Tech training is carefully designed for just one thing—TO MAKE MORE MONEY FOR YOU. An alumni of over 6000 successful graduates proves our career training is unsurpassed.

VETERANS —Write us about Aviation Training, as provided under "G.I. Bill of Rights."



MAIL THIS COUPON TODAY!

Cal-Aero Technical Institute, Grand Central Airport, Glendale 1, California
 Please send full information on Aviation Training FREE—without obligation. Dept. PS-6

Name _____ Birth Date _____
 Street _____
 City _____ State _____

28 POPULAR SCIENCE

Silk Screen Process

A PROFITABLE BUSINESS OF YOUR OWN



We Send You Complete Kit of Supplies
Practice in Your Spare Time

A HIGH PROFIT BUSINESS, OR A THRILLING HOBBY
 Silk Screen Processed signs and displays needed everywhere. A lucrative future for you in the great advertising boom. Easy to do—quick to learn—you may make more than course costs before it's completed... **BOOKLET** with 3-color Silk Screen Processed Cover and samples sent **FREE**... Write now, California School Screen Process, Dept. PSD-646, 2710 So. Spaulding, Los Angeles 16, Calif.

GET INTO REFRIGERATION AND AIR-CONDITIONING

Build your future in fast-growing industry. Prepare for high pay jobs or get into your own business. Resident classes only.

Send ad with name and address for information. **VETERANS** Eligible for training under G. I. Bill. Check here

BOSTON TECHNICAL INSTITUTE
 School of Refrigeration, 4707 Euclid Ave., Cleveland 3, Ohio

Now You Can Lick ANY AUTO REPAIR JOB!

Look up make, model, job in MoToR's AUTO REPAIR MANUAL—and go to work! Complete guide for every model built since 1935. 764 pages; 1000 illustrations; 450 charts; 200,000 repair facts. Index. After 7 days' Free Examination, send \$1; then \$1 monthly for 4 months. 35¢ postage. If not satisfied, return book, pay nothing. **MoToR Book Dept., Desk 2G, 572 Madison Ave., New York 22, N. Y.**

New Catalog

GENUINE U. S. BARGAINS
 Army O. D. Wool Blanket, 3 lbs. \$5.95
 Army Pocket Knife, Scout Style. 2.50
 Pup Tents, Poles and Pegs, Used 4.85
 Mess Kit—Knife, Fork and Spoon, Used 50
 Thousands of other bargains in military, outdoor & sport goods for hunter, farmer, scout. Send 10¢ for 32 page catalog returned with first order.

A and N SUPPLY CO.
 4784 LESTER ST. RICHMOND, VA. EST. 1808

Learn to Write

Begin today. Write now for our Free Book, "How to Become a Good Penman." It contains specimens and tells how others learned to write in spare time. Enclose 10¢ for your name beautifully written and non point suitable for shaded writing. Write today.

THE TAMBLYN SCHOOL OF PENMANSHIP
 N-439 Ridge Building. Kansas City, Mo.

ARTISTS MAKE MONEY

Do you like to draw? Send name, address, age and occupation for **FREE ART TEST**, to find out your ability.

ART INSTRUCTION, INC.
 6146 Art Instruction Bldg., Minneapolis 15, Minn.

LEARN PORTRAIT PAINTING AT HOME

STUART STUDIOS

Under unique Stuart System men and women with no known talent, paint exact oil or charcoal likenesses. Study the evidence in new 31-Portrait Brochure of samples. Many earn while learning. Book is free on request.

121 Monument Circle, Room 286, Indianapolis 9, Ind.

Name _____
 Street _____
 City _____ State _____

If You're Now Working in

ELECTRICITY or RADIO



you need **COYNE'S** New
1946 "Electrical and Radio
**TROUBLE SHOOTING
MANUAL**"

**INCLUDES
OVER
500**

Large Size
Electrical
and Radio
Shop Prints
... How To
Read and
Use Them.

**READ MOTOR DIAGRAMS
AND USE THEM**
Wiring - Schematics - Controls
Air Conditioning - Automobiles
Refrigeration - Electricities
TAP TROUBLE SHOOTING METHOD
AND RADIO TROUBLE SHOOTING
ELECTRICAL SCHOOL, CHICAGO

FREE WITH ... "TROUBLE SHOOTING MANUAL"

With your "Trouble Shooting Manual" I'll include one full year of personal consultation from the Coyne staff—technical advice on any electrical and radio problem. A real help in your daily work. Also FREE! One year's subscription to COYNE'S TECHNICAL NEWS—with latest facts on electrical and radio progress illustrated and explained.

The trouble shooter is the plant's essential man! This practical new 612 page Coyne Electrical and Radio Trouble Shooting Manual shows you how to shoot trouble on motors, appliances, radio and electrical circuits, electrical refrigeration and air conditioning equipment. Covers automotive and diesel equipment, too! Giant 8½ x 11" handsomely bound volume. Includes 500 up to date shop prints with facts on "how to use them"—plus many other features. **Not a text book.** Every subject indexed and covered in practical, down-to-earth language. You don't have to read the whole book for the information you need. Turn to the index—look up the subject you want—and immediately you'll find the facts you need to "trouble shoot."

Examine! Read 7-DAY FREE TRIAL THIS BOOK ON

Send no money. Coyne will send you big new "Electrical and Radio Trouble Shooting Manual" on 7 days' Free Trial to read, examine and use.

If you don't want the "Trouble Shooting Manual" after 7 days send it back and you will owe nothing. The risk is all ours. But remember, this offer is limited—so mail your FREE examination coupon today. Immediate action will also bring you a FREE copy of "Starting and Operating a Profitable Radio or Electrical Shop" as described at the left.

FREE IF YOU ACT NOW!

New Book! "Starting and Operating a Profitable Electrical or Radio Shop." Tells you how to open your own full or part time shop on little capital Packed with money making ideas and information. For a limited time this amazing new book absolutely "FREE" ... just for examining the sensational new 1946 "Electrical and Radio Trouble Shooting Manual" for 7 days at Coyne's expense. Act now—this offer may be withdrawn at any time.

MAIL TODAY FOR 7 DAY FREE TRIAL

H. C. Lewis, Pres., COYNE ELECTRICAL SCHOOL, Dept. A6-R8, 500 South Paulina Street, Chicago 12, Illinois.
O. K.—Send me the new Coyne "Electrical and Radio Trouble Shooting Manual," postpaid. Within 10 days after the book comes I'll either return the "Trouble Shooting Manual" and OWE YOU NOTHING or send \$3.00 and \$3.00 a month until \$9.95 is paid.
FREE (FOR LIMITED TIME) New book "Starting and Operating a Profitable Radio or Electrical Shop" will be sent you with Coyne's compliments for merely examining the "Trouble Shooting Manual" on 7 days' FREE trial.

Name _____
Address _____
Town _____ Zone _____ State _____
Occupation _____

SAVE 10% Send cash price, \$8.95—you save over 10%. Same 7 day Free trial and Money Back Satisfaction Guarantee.

COYNE ELECTRICAL SCHOOL
500 SOUTH PAULINA ST.
DEPT. A6-R8 CHICAGO, ILL.

How To Earn Money as a Writer

Free Book Points The Way To Learning At Home In Spare Time



The demand for writers is creating great new opportunities for people with an urge to write—full time or part time. It's not as hard to succeed as you may imagine. Most famous authors come from ordinary walks of life and learned the slow, hard way through trial and error. But now there's a direct road—Palmer Institute's Home Study Training (Established 1917).

Endorsed By Writers and Graduates

Rupert Hughes, Ruth Comfort Mitchell, Gertrude Atherton, Katharine Newlin Burt and other famous authors and scores of successful graduates testify to helpfulness of Palmer Training. "I'm glad to tell you of the results from my Palmer training. I have received my first check and two assignments from the same people. I am confident of perhaps two more assignments." W. W. S. Pearson, Maryland. "One single article that took me less than a week to write, on my spare time, more than paid for the whole course." Al Rich, Monterey, Calif.

Learn At Home

At home, you too may learn fiction writing, the best basis for all fields—short stories, novels, features, articles, radio scripts. Complete instruction material and individual, professional coaching to develop your own style. FREE book explains how you may enjoy an ideal part time or full time career. Write today—Palmer Institute of Authorship, Established 1917, 6362 Hollywood Blvd., Hollywood 28, Calif., Desk U84.

Palmer Institute of Authorship, Established 1917
6362 Hollywood Boulevard
Hollywood 28, California, Desk U84

Please send me free illustrated book, "The Art of Writing Salable Stories", explaining how the unique features of your training help new writers get started and experienced writers increase their income. This request is confidential, no salesman will call.

Mr.
Mrs.
Miss
Address
City Zone State

ELECTRICAL TRAINING

Intensive 8 months residence course in fundamentals of industrial electrical engineering, including radio, electronics. Prepares for technician, engineering aides. Approved for veteran training, 53rd year. Write for catalog.

BLISS ELECTRICAL SCHOOL
1610 Takoma Ave., Wash. 12, D. C.



DRAW for MONEY!

Be An ARTIST!

Trained Artists are Capable of Earning \$40, \$60, \$75 a Week

It's pleasant and interesting to study Art the W.S.A. way. **COMMERCIAL ART, DESIGNING, CARTOONING** all in ONE complete home study course. No previous Art experience necessary. Hundreds have profited by our practical methods since 1914. **TWO ART OUTFITS** furnished. Full information in **FREE BOOK**, "Art for Pleasure and Profit." Write today. State age.

FREE BOOK gives details

WASHINGTON SCHOOL OF ART,
Studio 136C, 1115 15th St., N. W.,
Washington 5, D. C.

Name.....
Address..... AGE.....
City..... Zone () State.....

TRAIN FOR KEY JOB OR BUSINESS OF YOUR OWN

REFRIGERATION and AIR CONDITIONING

Millions of Older Units Need Expert Service. Big After-the-War Expansion Will Create Even More Opportunities. Approved for Veterans "G. I." Training

A key job—a successful business of your own—you can have either in this vital, war-hit industry. A serious shortage of service-experts exists in every branch. Big post-war boom will open thousands of new opportunities. Get ready for your big chance. We'll give you the practical training you need—at home—and in our big Chicago shops, largest and most completely equipped in the country. No advanced schooling needed. Our unique methods make everything easy to grasp. We've trained thousands. Pay us you go. Quit when you want to. Get the full facts without obligation. Write TODAY.

INDUSTRIAL TRAINING INSTITUTE

2150 Lawrence Avenue, Dept. P2-S, Chicago 25, Ill.

SEND FOR FREE CATALOG

PREPARE NOW
Many Good Jobs
Available in
Government
Civil Service

Prepare yourself for the civil service examinations with the aid of an authentic, well-prepared question and answer book. Send for your copy of our big new FREE catalog listing nearly one hundred helpful books for all types of Federal, State, and City civil service examinations.

NOBLE AND NOBLE, PUBLISHERS, Inc.
72 5th Ave., Dept. CS-3 New York 11, N. Y.

"How to Make Money With Simple Cartoons"

A book everyone who likes to draw should have. It is free no obligations. Simply address

CARTOONISTS' EXCHANGE

Dept. 1446-D Pleasant Hill, Ohio

FENCING World's Finest Sport Exciting Fun—Harmless



Just Out! Healthful, Clean, makes you Strong & Alert. **FREE BOOKLET** (with foil) teaches Quickly—Easily. **HARMLESS** 3 ft. Spring Steel Foils (awards) have Safety Rubber Buttons. Complete outfit, 2 Foils (awards) with hand guards. Free Instructions. Now only \$1.98! Postpaid. Junior Masks only \$3 for two. \$1.69 for one Postpaid.

Mail check or M. O. today. Add 28c for Foreign Postage.

LEE PRODUCTS CO., 1613 L- First Ave., New York 28, N.Y.

LAW

STUDY AT HOME for PERSONAL SUCCESS and LARGER EARNINGS. 97 years expert instruction—over 108,000 students enrolled. LL.B. Degree awarded. All texts furnished. Easy payments. Send for **FREE BOOK**—"Law and Executive Guidance"

AMERICAN EXTENSION SCHOOL OF LAW
Dept. 66-5 646 N. Michigan Ave., Chicago 11, Ill.

Learn PHOTOGRAPHY at Home

Splendid opportunities. Prepare in spare time. Practical basic training. Long-established school. Send for free book, "Opportunities in Photography." No obligation.

American School of Photography, 1315 S. Michigan Ave., Dept. 139-A Chicago 5, Ill.

WINDOW SIGN LETTERS

For Store Fronts and Office Windows. Anyone can put them on. Samples furnished. Genuine gold and silver.

METALLIC LETTER CO., 441 N. Clark, Chicago 10

New Designs in FRANZITE GRIPS



Modernize Your Gun! Improve Your Score!

Most durable grips made. Positively unbreakable! For Colt, Smith & Wesson, Hi-Standard. Originals, Luger & Mausers in a wide choice of beautiful designs in ivory, pearl, walnut, onyx, etc. Low prices, **FREE CATALOG**. Dealers Wanted.

SPORTS, INC., (Mfrs.) 5501 Broadway, Dept. S-6, Chicago 40, Ill.

GET INTO

RADIO

TELEVISION ELECTRONICS NOW!

This amazing new shop instruction system gives you actual experience with a Home Radio Laboratory—part of the

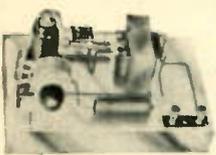


You build this complete, modern super-heterodyne receiver with the equipment that comes with your National Training at no extra cost.

SHOP METHOD HOME TRAINING

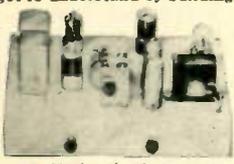
FOR YOU—A REAL HOME LABORATORY IN MODERN RADIO

from one of the world's best established Oldest and Largest Technical Trade School



Your National Training Kits include equipment for hundreds of practical electronic experiments in your own home. You have the

genuine parts for this audio oscillator which you get to understand by building it yourself. You learn modulation, beat frequencies, signal generation by actually building this small radio transmitter with your National shop parts.



Your training outfits from National are made up of the most modern radionic equipment—much of it just out of the experimental laboratory. You learn new ways of handling equipment by modern methods. Get the details by mailing the coupon.

ods. Get the details by mailing the coupon.



NATIONAL TRAINING WINS BIG JOBS

You, too, can share the success of National graduates. Joseph Grulich, Lake Hiawatha, N. J., writes: "My latest offer was for \$5,800.00 as Radio Photo Engineer, but I am doing well where I am, I am deeply indebted to National."

While still a student of National training, E. Wilson of Vallejo, California, writes: "My pay has jumped from \$52.18 a week to \$72.85, and the end is not in sight. I am proud of my National Course."

Joseph Michel, Jr., Granite City, Illinois, writes: "I am enthused with National training. I am now earning \$225 a month as a radio operator and technician and \$20 a week more in my shop at home."

Send the coupon below, immediately. Learn how this **sensationally improved**, practical speed-up training can fit you. In a short time, for the **GREAT BUSINESS OF RADIO**—for the **NEW AND RAPIDLY EXPANDING FIELD OF FREQUENCY MODULATION (F.M.), TELEVISION AND ELECTRONICS**.

This is the thoroughly proved, quick and easy speed-up method used so extensively in wartime training—endorsed by the success of National men everywhere—a system by which you study in spare time—off hours, even minutes right in your home and yet have the **ADVANTAGE OF REAL SHOP EXPERIENCE** to back you up.

Trained Radio Men Wanted

The man who really knows modern Radio is in greater demand today than ever before—not only in Radio proper but in Television and Electronics—in Aviation, Transportation, Communica-

tions. Good jobs are wide open, **WAITING FOR YOU**. In the production, operation and maintenance of modern electronic equipment—in radio stations, in hundreds of industries—in homes, theatres and studios. Good, sound training in this important field is absolutely necessary. And now, National Schools brings such training to you no matter where you live or what you may be doing—not only the fundamental theory but the actual experience that comes with **knowing shop practice and working with real equipment**—demonstrating each step with first-hand knowledge. This is true "learning by doing"—direct from the great shops and laboratories of National Schools where new developments in methods, equipment and applications are constantly going forward.

Only National can offer you such practical training because only National has the plant to back it up. **Sample this training yourself. MAIL THE COUPON FOR A FREE LESSON.**

POSTWAR SUCCESS AND SECURITY FOR YOU

Radio is Big Sound, Well-Established Business. Television is just on the threshold of limitless expansion. When you hang up your uniform—when your war job folds up, will you step out proudly into an essential established industry? Perhaps into a business of your own? Answer these questions by reading the catalog sent you **FREE** from National Schools. Face realities now! Fill out and mail the coupon today.

Check the Job You Now Have With These Opportunities in RADIO

1. Financial Security Radio has grown from \$100 million to \$5 billion in past few years.
2. Limitless Future predicted by over 1,800 manufacturers of equipment.
3. Television promises over half a million jobs alone—experts estimate.
4. Electronics opens wide new fields in home and industrial use.
5. Your Own Business with little or no capital.

Get the details. Use this Coupon

FREE GET THESE 2 BIG BOOKS



NATIONAL SCHOOLS

LOS ANGELES 37, CALIFORNIA EST 1905

MAIL OPPORTUNITY COUPON FOR QUICK ACTION

National Schools, Dept. PS-6
 4000 South Figueroa Street
 Los Angeles 37, California

Mail me **FREE** the books mentioned in your ad including a sample lesson of your course. I understand no salesman will call on me.

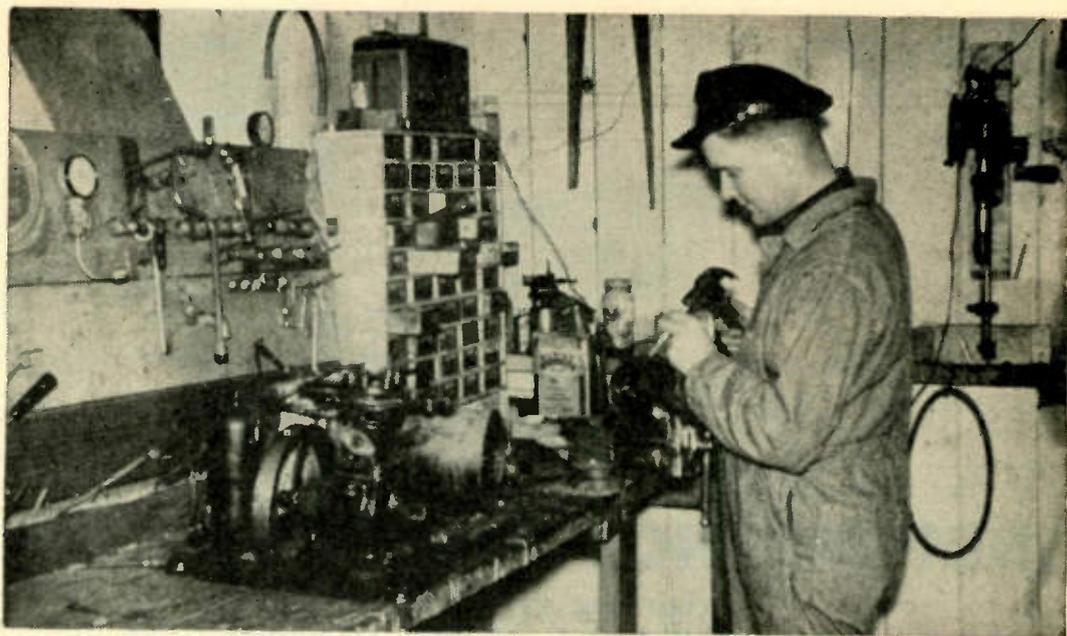
NAME AGE

ADDRESS

CITY ZONE STATE

Check here if veteran of World War II

(Mail in envelope or paste on penny post card)



SO IT NEEDS FIXING

By S. T. CHRISTENSEN

the "Fix-it Man"

"WELL, I guess I'm the fellow to see, for I've repaired thousands of refrigerators (home and commercial both), vacuum cleaners, radios, washing machines, irons, fans, lamps, mangles, motors, etc. In fact, many of my customers call me their "electrical appliance doctor." And "doctoring," I might add has paid me a good substantial income for quite a few years. Funny, in a way, how I got started. Always liked to tinker and by experimenting around I found that most electrical appliances had many things in common. That, regardless of what the appliance was used for, or who the manufacturer was, the basic principles were much the same. From fixing my own appliances to fixing friends' and then for strangers at a fee, seems now to have been but a small step.

What to Charge?

At first, I let the owner decide the charge and, frankly, I was amazed at what I earned per hour. But then, when one figures what initial costs are involved in buying most electrical appliances, one can readily see that spending extra dollars for repairs is well worth while. Before long I was making more in my spare time repairing than from my regular job. The result . . . I went into business for myself. When war came, business boomed, for new appliances were not available.

For a while, repair parts (needed on some jobs) were a little difficult to get. But that

situation quickly adjusted itself and many repair parts were given the high priority rating of AA2. After all, we had to provide for the health and well-being of our civilian population.

The Future Offers

Friends ask me about my future. And, I think I've got a grand one. Age is no handicap in repairing. I have in my files enthusiastic letters from repairmen ranging in age from 18 to 79 years. Now the war is over we are certain to see hundreds of new products on the market . . . products that the average person never dreamt of. These new products and our old appliances are all going to need at some time or other "fixing." Well, I'll still be the fellow to do it. The field open for appliance repairmen is unlimited. I don't worry at all about too much competition.

If You Are Ambitious

To the contrary, I've prepared a complete course, chuck full of simple, easy to understand photos and drawings and written in the same non-technical language as this article. I know the course is good, because I have hundreds of men all over the country writing to me telling me how the course has helped swell their pockets with cash. If you too want to prepare now for your future, I suggest you read the next page and send me the handy coupon."

ADV.



**BIG MONEY
INDEPENDENCE**
*A PROFITABLE
LIFETIME
BUSINESS
OF
YOUR OWN!*

LEARN ELECTRICAL APPLIANCE REPAIRING

PREPARE NOW FOR THE FUTURE

If now employed, start your home appliance repair business NOW in your spare time and be set with a business of your own no matter what happens. You don't need elaborate fixtures or expensive equipment to be a successful repairman. Operate from your garage, basement, vacant store, etc. Work as many hours as you wish—the home appliance repairman is his own boss. It is a profitable occupation for on many types of repairs it is not unusual for a repairman to charge on the basis of \$5.00 to \$6.00 per hour. Don't gamble with your future—learn a trade that will always support you. Remember, as long as electrical appliances are used, there will be a need for electrical appliance repairmen.

If you are at all mechanically inclined—can hold and use tools—then you have all of the qualifications required for becoming a big money earning home appliance repairman. It does not matter if you have not had a great deal of schooling or had previous experience along these lines—**WE WILL TEACH YOU.** Age should be no barrier—nor should any minor physical handicap.

New Course Tells All

Profusely illustrated, our new course shows you in simple, easy to understand language and drawings how to make each repair on refrigerators, vacuum cleaners, washing machines, motors, etc. Explains and gives you a working knowledge of electricity, welding, nickel plating, etc. Shows you how to build the power tools you need and how to solicit and keep business coming to you. Not a theory course but an honest to goodness course written by and used by repairmen the country over. Price of course is so low that the savings on your own household appliance repairs will quickly pay for it. Act now! Mail the handy coupon below today.

Read What Our Students Say About Course

I really believe your course the best investment a mechanically minded man can make.—Claude E. Allen, Indianapolis, Ind.
I have received your Course in Appliance Repairing and I must say I am well pleased with same. I am only sorry I did not have said Course some years ago. I have learned so much more through this course I would not part with it.—Charles Schwarz, Hamilton, Ohio.

The Course in Appliance Servicing arrived a few days ago. Want to take out a few minutes of my valuable time to let you know that this is just what I have been looking for ever since I opened up my Fix-It shop. I must admit that you told the truth when you said that it contains quite a bit more information than I bargained for.—P. J. Bretl, Sebring, Ohio.

I am a mechanic for the Western Union Telegraph Co. Three days after receiving the lessons in refrigeration I earned the exact cost of the course.—Henry S. Lee, Washington, D. C.
I work day times at the shipyard and after 4:00 P.M. I operate from my cellar and garage. I average \$10.00 to \$15.00 clear every day.—Walter Hanby, Brockton, Mass.

GET STARTED TODAY—MAIL THIS COUPON

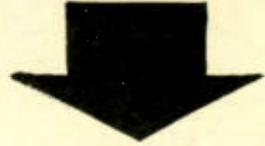
CHRISTY SUPPLY CO.
2835 N. Central Ave., Dept. D-4101
Chicago 34, Illinois

Please send me free illustrated literature about America's Fastest Growing Industry—ELECTRICAL APPLIANCE REPAIRING.

Name.....
Address.....
City..... State.....



WHICH OF THESE *Opportunities* INTERESTS *You* MOST?



● Today, choose the job you want—and prepare for it. Or if you are already engaged in the work you like best, start training now for quicker promotion. Acquire the knowledge that will help you to get ahead faster, make more money and have greater security.

American School, founded in 1897 as an educational institution *not for profit*, can help you to reach your goal just as it has helped others during the past forty-nine years. Check the coupon at right, add your name and address and mail it at once. The school will send you details on its training plan and outline of study prepared by specialists. There is no charge, no obligation, so send the coupon immediately.

CHECK, CLIP AND MAIL COUPON NOW

AMERICAN SCHOOL, Dept. GA46, Drexel at 58th, Chicago 37, Ill.
Without obligation. Please send FREE and postpaid, bulletin and details of the Subjects checked.

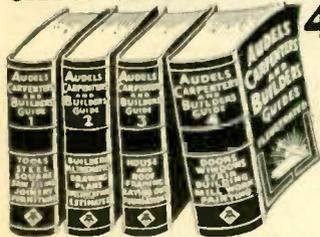
- | | | |
|---|---|--|
| <input type="checkbox"/> PLASTICS ENGR | <input type="checkbox"/> Accounting and C.P.A. | <input type="checkbox"/> Drafting and Design for Men and Women |
| <input type="checkbox"/> Refrigeration | <input type="checkbox"/> Electrical Engr. | <input type="checkbox"/> Radio |
| <input type="checkbox"/> Architecture | <input type="checkbox"/> Electrical-Pract. | <input type="checkbox"/> High School |
| <input type="checkbox"/> and Building | <input type="checkbox"/> Electronics, Industrial | <input type="checkbox"/> Air Conditioning |
| <input type="checkbox"/> Contracting | <input type="checkbox"/> Bookkeeping | <input type="checkbox"/> Mechanical Engr. |
| <input type="checkbox"/> Practical Plumbing | <input type="checkbox"/> Private Secretary | <input type="checkbox"/> Shop Management |
| <input type="checkbox"/> Automotive Engr. | <input type="checkbox"/> Diesel Engineering | <input type="checkbox"/> Tool Making |
| <input type="checkbox"/> Aviation Drafting | <input type="checkbox"/> Surveying & Topographical Drafting | <input type="checkbox"/> Better Foremanship |
| <input type="checkbox"/> Aviation | <input type="checkbox"/> Sheet Metal Pattern Drafting | <input type="checkbox"/> Machine Shop Operations |
| <input type="checkbox"/> Business Mgmt. | | |
| <input type="checkbox"/> Railway Training | | |

AMERICAN SCHOOL

Dept. GA46, Drexel at 58th Street, Chicago 37

Name..... Occupation.....
Address..... Age.....
City..... State.....

AUDELS Carpenters and Builders Guides 4 vols. \$6



Inside Trade Information for Carpenters, Builders, Joiners, Building Mechanics and all Woodworkers. These Guides give you the short-cut instructions that you want—including new methods, ideas, solutions, plans, systems and money saving suggestions. An easy progressive course for the apprentice and student. A practical daily helper and Quick Reference for the master worker. Carpenters everywhere are using these Guides as a Helping Hand to Easier Work, Better Work and Better Pay. To get this assistance for yourself, simply fill in and mail the FREE COUPON below.

Inside Trade Information On:

How to use the steel square—How to file and set saws—How to build furniture—How to use a mitre box—How to use the chalk line—How to use rules and scales—How to make joints—Carpenters arithmetic—Solving mensuration problems—Estimating strength of timbers—How to set girders and sills—How to frame houses and roofs—How to estimate costs—How to build houses, barns, garages, bungalows, etc.—How to read and draw plans—Drawing up specifications—How to excavate—How to use settings 12, 13 and 17 on the steel square—How to build hoists and scaffolds—skylights—How to build stairs—How to put on interior trim—How to hang doors—How to lay floor—How to paint



THEO. AUDEL & CO., 49 W. 23rd St., New York City

Mail Audels Carpenters and Builders Guides, 4 vols., on 7 days' free trial. If O.K. I will remit \$1 in 7 days, and \$1 monthly until \$6 is paid. Otherwise I will return them. No obligation unless I am satisfied.

Name.....
Address.....
Occupation.....
Reference..... P.S.M.

LEARN PLASTICS

GET THIS COMPREHENSIVE, PRACTICAL KNOWLEDGE of Plastics—materials, designing, molding, fabricating, laminating, testing, etc. Plastics Institute's course can be of great value to you in obtaining the kind of a position you want in this growing industry. Send for free booklet now! Approved for Veterans

Plastics
INDUSTRIES TECHNICAL INSTITUTE

NEW YORK CHICAGO LOS ANGELES
122 East 42nd St. 221 N. LaSalle St. 1601 S. Western Ave.

PLASTICS INDUSTRIES TECHNICAL INSTITUTE
Dept. PS6-6, 1601 S. Western Ave., Los Angeles 6, Calif.

NAME.....
ADDRESS.....
CITY..... ST.....

- Veterans: Check for special information.
 If under 18: Check for special booklet.

FREE BOOKLET



OFFERS LOW COST LIFE INSURANCE

Postal Life offers \$1724. in Protection for \$2.00 monthly (age 21). Other Ages in Proportion

THIS PREMIUM HALF PERMANENT RATE Policy Fully Paid-up in 30 years

NEW YORK, Saturday. Postal Life of New York, unique among important Old Line, Legal Reserve Life Insurance Companies, is again offering this special modified policy, already owned by thousands of American families. You pay half the permanent rate until the 6th year; \$2.00 monthly for substantial amounts of Protection, depending on age! \$2.00 monthly pays for \$1754. of life long protection at 20; \$1142. at 40; \$5.00 monthly buys \$3650. at 30, etc. Proportionate amounts at other ages. You pay no premiums after 30 years; policy fully paid-up and in force your entire life.

For your convenience we print below a coupon that can be clipped and sent to Postal Life. Full information, rates, etc., will be sent to you promptly. There is no obligation to buy but we advise immediate action. Life Insurance is vital to your future and your family's welfare. Postal Life Insurance Company, 511 Fifth Avenue, New York 17, N. Y.

Postal Life Insurance Company
511 Fifth Ave., Dept. D-587, New York 17, N. Y.

Mail rates and full details about your "\$2.00-per-month", 30-Payment Life Policy at my age.

Name _____
Occupation _____ Date of Birth _____
Address _____

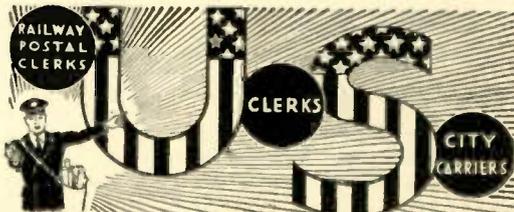
Include P. O. District Number, if any

MAKE MONEY CASTING AT HOME FREE FACTS SENT



Make hundreds of Plaster Casts, quick, easy. Sell output to stores, novelty shops, etc. Enormous profits. No experience. Very little capital needed. Start in basement, garage or workshop. Complete, simple instructions anyone can follow. Start now while merchants are begging for merchandise to sell. Rush.

PLASTIC ARTS STUDIOS, R. R. 5, Dept. 45, Muncie, Ind.



GOVERNMENT JOBS

Start \$1506 to \$2650 Year

Veterans Get Preference
Men—Women

Mail Coupon Today—SURE

Franklin Institute, Dept. R-82
Rochester 4, N. Y.

Slrs: Rush free (1) 32-page book with list of Government Jobs. (2) Tell me how to prepare for one of these jobs.

Name _____
Address _____ Vet? _____

Get into Good Paying AUTO BODY and FENDER WORK



Men 18 to 60. If you are mechanically inclined, start now to learn to become an auto body mechanic and fender repair man. U. E. I. spare time, home-study training combined with actual shop practice gives you sound, basic knowledge of practical methods so you may get the experience which may bring you big pay. Course includes acetylene welding, spray painting, use of hand and power tools.

WRITE FOR FACTS

THOROUGH, RELIABLE TRAINING
Auto body and fender repairing is one of the best profit-makers in any garage or service station. Employment placement service included, or we'll show you how to go about to get started in your own shop. Get the facts FREE today!

UTILITIES ENGINEERING INSTITUTE
1314 BELOEN AVENUE, DEPT. 366X, CHICAGO 14, ILLINOIS

Be Your Own Boss — In Your Own Business

Start at home . . . small capital needed . . . prepare for exciting plastics jobs or Your Own Plastics Business. We teach you Fabrication and Casting right in your own home. All materials furnished. Send ad with name and address for information. VETERANS: Eligible for resident training under G. I. bill. Check here

LEARN PLASTICS

PLASTICS TECH
School of America, Inc.
5200 Euclid Avenue
Dept. S-6
Cleveland 3, Ohio

The SLIDE RULE

And How to Use It

Send for your copy now. Big book, 8 1/2 x 11 in. Cloth Bound, Slide Rule in case in book cover.

Clarkson Publishing Co. Dept. PS-6, 1253 Wabash Ave., Chicago 5

10 INCH SLIDE RULE FREE WITH EACH BOOK

Send for this sensational slide rule book and FREE Slide Rule now. Learn in a few hours to do lightning calculations. Do all problems! Find ratios, percentage, squares, areas, etc. Genuine Mannheim type Slide Rule with A, B, C, D and K scale and Lucite Magnifying Indicator included. Send only \$2.98 for full payment today or order on post card for C.O.D. delivery. Money back if not satisfied. Limited quantity. Rush Order.



WONDERFUL INVENTION—Corrects poor penmanship in few hours. Guaranteed. Helps one get better job. Increases prestige. Write Ozment, 35-B, St. Louis, Mo.



MECHANICAL DENTISTRY AT HOME!

To make Crowns, Plates, Bridgework, etc., for Dentists. Easy practical way to learn mechanical dentistry at home in spare time. FULL EQUIPMENT OF TOOLS AND MATERIALS INCLUDED WITH COURSE. Low tuition. Easy terms. Write for FREE BOOK about this money making profession that is not affected by the machine age.

McCARRIE SCHOOL OF MECHANICAL DENTISTRY
207 N. Broad St. Dept. 851 Philadelphia, Pa.



Learn Profitable Profession in 90 days at Home

MEN AND WOMEN. 18 TO 50—Many Swedish Massage graduates make \$50, \$75 or even more per week. Latex full time incomes from doctors, hospitals, sanatoriums, clubs or private practice. Others make good money in spare time. You can win independence and prepare for future security by training at home and qualifying for Diploma, Anatomy Charts and 92-page Illustrated Book FREE—Now! THE College of Swedish Massage, Dnt. 670G, 100 E. Ohio St., Chicago 11, Ill.

ANALYZE HANDWRITING

Qualify for Certified Grapho-Analyst Degree. New uncrowded, fascinating field of service. Gratifying earnings reported by graduates in Employment, Credit, Social Service, Police and Judicial and Entertainment fields. Others have developed profitable private practice, full or spare time, as Personal Problem and Vocational Counselors. Send for 3000 word test lesson and Grapho-Analyst FREE.

FREE

ADDRESS A. I. G. A. Inc. 126 NOEL, MO.

BIG MONEY NOW IN LIQUID MARBLE

THREE wonderful new opportunities for your own big money-making business—regardless of your age, sex, or previous experience!

- 1. LIQUID MARBLE.** Make beautiful artificial Marble Slabs. Pour from liquid state. Glazed or unglazed. This marble may be mottled, veined, multi-colored or left in original snow-white state. The color is actually a part of the marble! Does not fade or wear away. Liquid Marble is unsurpassed on kitchen or bathroom walls. Easy to make and install.
- 2. PLASTIC FLOORING.** May be made in any color or combination of colors. Gives a lifetime of wear. Dustproof, Soundproof, Verminproof. Resilient to the tread. Lay out solid from wall to wall or in pattern design of various shaped blocks.
- 3. FLEXIBLE MOLDS.** For plaster casting. Make your own moulds for few cents each. \$1.00 in raw materials will make up to \$25.00 worth of finished goods. We furnish names of buyers. Write now for FREE information about our **BIG THREE** money-making opportunities! Get in on busy season just starting. Send penny postcard or letter. No obligation.

COMPO-TEX, Box 786-G, ST. LOUIS 1, MO.

Get Ready QUICK

FOR A REAL FUTURE!

ELECTRICITY
HUNDREDS
OF BRANCHES

Your Choice
of
**2 GREAT
FIELDS**

"Learn-by-Doing"
A FEW
WEEKS AT
COYNE

OR **RADIO-
ELECTRONICS-
TELEVISION** etc.

(for Either Course)

Student Finance Plan

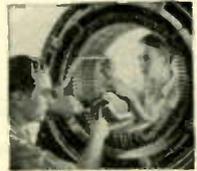
Prepare for the future with ALL AROUND TRAINING in a field that offers steady work with a real future. Come to COYNE in Chicago and be ready in a few weeks from now! If you are short of money, I'll finance most of your tuition and you can pay for it after you graduate.

Train on Actual Equipment!

Whether you've had previous experience or not, makes no difference at Coyne. You do real work on full-size equipment in my shops. 47 years of success.

ELECTRICITY

Practical training in Many Branches. Big future in Power Plant Work, Motors, Armature Winding, Home and Factory Wiring, Appliances, Refrigeration, Maintenance, Illumination, etc. Electricians are in demand everywhere—lifetime job service without change. Many earn while learning. Send for **BIG FREE BOOK** with dozens of photos of my shops.



RADIO-ELECTRONICS

A great field now, even greater growth ahead. Here at COYNE you're trained for Construction, Testing, Trouble-Shooting on Radio Receivers, Public Address Systems, Sound Picture Units, FM, Photo-cells, Television, etc. My training is quick, easy, practical. Many Coyne trained men own well-paying radio businesses of their own.



VETERANS Coyne also is equipped to train those who qualify for training under the G. I. Bill of Rights. Check Coupon

INDUSTRIAL ELECTRONICS and Electric-Refrigeration

This training means additional opportunities. Training in these subjects now added to our Electrical or Radio course.

MAIL COUPON FOR FACTS!

See how I make it EASY for you to get ready NOW. Check course you prefer and rush coupon to me for full details. FREE. No obligation—no salesman will call. Do it TODAY. We also have facilities for men with physical disabilities due to war or other causes. Check coupon for details.

**H. C. LEWIS, Pres.,
COYNE ELECTRICAL SCHOOL
500 S. Paulina St., Dept. A6-73H Chicago 12, Ill.**

Send me your **BIG FREE BOOK**—for the course checked below. Also full details of your Student Finance Plan.

- Electricity Radio-Electronics
 Send G. I. Bulletin Physical Disability

Name.....
Address.....
City..... State.....



GET INTO CARTOONING!



Learn to cartoon! Big pay! Easy, enjoyable work! Cartoon Course, Gag Course, Anatomy Course & Business Course full of plans, markets, ideas. Drawing set and criticisms. All one low price. Rush card for details. Hartman Studios, 2438 W. St., Lincoln 3, Nebr.

ACCOUNTING

STUDY AT HOME for C.P.A. and BIG PAY Accounting opportunities with 42 year old school. No previous training needed. Texts furnished, EASY PAYMENTS. Send for FREE BOOK. MacCORMAC EXTENSION SCHOOL Dept. 6-C, 1170 E. 63rd St., Chicago 37, Ill.



Do you want

- ➔ .. to go to College?
- ➔ .. or to enter a Profession?
- (Such as Accounting, Architecture, Nursing, Dentistry, Teaching, Social Work, Osteopathy, Beauty Culture, Optometry, Embalming, Chiropody, Law, Medicine, etc.)
- ➔ .. or get an Office Position?

To get anywhere, you practically MUST finish High School FIRST. You can complete our simplified High School Course in SPARE time at home, as FAST as your time and abilities permit. Equivalent to resident school work—prepares you for college, pre-professional examinations, business, industry. Standard texts furnished. Diploma. Credit for H.S. subjects already completed. Single subjects if desired. Low tuition, easy terms. American School, Chicago, est. 1897—endorsed by educators. Finish your high school education NOW. Write TODAY!

High School Course at Home

Many finish in 2 Years

- American School, Dept. HA-46, Drexel Ave. at 58th St., Chicago 37**
- Gentlemen: Send me FREE information covering special training in subjects checked below. No obligation on my part.
- | | |
|--|--|
| <input type="checkbox"/> High School Course | <input type="checkbox"/> Diesel Engineering |
| <input type="checkbox"/> Electronics, Industrial | <input type="checkbox"/> Drafting and Design for Men and Women |
| <input type="checkbox"/> Architecture and Building | <input type="checkbox"/> Plastics |
| <input type="checkbox"/> Automotive Engineering | <input type="checkbox"/> Private Secretary |
| <input type="checkbox"/> Business Management | <input type="checkbox"/> Mechanical Engineering |
| <input type="checkbox"/> Electrical Engineering | <input type="checkbox"/> Aviation |
| <input type="checkbox"/> Elec. and Gas Refrigeration | <input type="checkbox"/> Salesmanship |
| <input type="checkbox"/> Air Conditioning | <input type="checkbox"/> Radio |
| <input type="checkbox"/> Railway Training | |
- Name.....
Address.....

Now! Get **COPIES** of Anything—in a Jiffy! . . . Right in your own office! New low-cost, error-proof method saves time, typing, hand-copying, drafting and checking.



AMAZING NEW UNIT—

The **APECO PHOTOEXACT**

Copies anything written, typed, printed, drawn or photographed—even if on both sides!

Photo Copies \$55 Copies up to 11" x 22"

Also continuous cabinet models for prints of any length, up to 42" wide.

Quickly, Easily copy **LETTERS, BLUE PRINTS, PICTURES, CONTRACTS, VALUABLE PAPERS, FINANCIAL DATA, CHARTS, CLIPPINGS, MAPS** (over 100 others)

Now, make copies of anything written, typed, printed, drawn or photographed—even if on both sides! Photocopies made at 1-a-minute speed—for less than the price of a phone call! No darkroom or technical knowledge needed. Anyone can operate APECO—"America's Most Widely Used Photocopy Equipment." Get full information, TODAY!

MAIL COUPON NOW for this **FREE BOOK**



AMERICAN PHOTOCOPY EQUIPMENT CO., 2849 N. Clark St., Dept. HCU66, Chicago 14, Ill.

Send without obligation, your 20-page illustrated book on Photocopying and its saving in time, money and labor.

NAME.....
COMPANY.....
TITLE.....
ADDRESS.....
CITY & STATE.....

INVENTORS

Do Not Delay

Have you ever been startled by seeing a successful article on the market, and exclaimed—"Why, I invented THAT 5 years ago—I didn't think it valuable enough to Patent!"

The Patent Laws were intended for the Protection of the Inventor, and the Inventor who slumbers on his Rights may wake up to find someone else reaping the reward that could have been his.

Write NOW for Information and Record of Invention form FREE. RANDOLPH & BEAVERS. Registered Patent Attorneys, Columbian Bldg., Washington, D. C.

PERSONALIZED SERVICE — REGISTERED PATENT ATTORNEYS

RANDOLPH & BEAVERS

905-L Columbian Bldg., Washington, D. C.

Please send me full particulars on Patents, fees, etc., and "RECORD of INVENTION" form—FREE.

Name.....
Street.....
City..... State.....

LEARN AT HOME TO MOUNT BIRDS



Animals, Heads, Fishes, Pets; to TAN. Be a Taxidermist. Profit and FUN.

Hunters, save your valuable TROPHIES. Mount ducks, squirrels, everything. Learn to TAN for leather and furs. Wonderful HOBBY. Have a HOME MUSEUM. BIG PROFITS mounting for others. INVESTIGATE NOW.

FREE BOOK With 100 fine game pictures. NOW absolutely FREE. Write TODAY.

Send Postal TODAY for FREE BOOK. State AGE. N. W. SCHOOL OF TAXIDERMRY, Dept. 339-A, Omaha, Neb.



LAW

STUDY AT HOME for PERSONAL SUCCESS and LARGER EARNINGS. 37 years expert instruction—over 108,000 students enrolled. LL.B. Degree awarded. All texts furnished. Easy Payments. Send for FREE BOOK—"Law and Executive Guidance"

AMERICAN EXTENSION SCHOOL OF LAW Dept. 66-5, 646 N. Michigan Ave., Chicago 11, Ill.

LEARN MASTER MACHINIST MECHANICAL DRAFTING

Expert training on Lathes, Milling Machines, Shapers, Grinders, etc.—Mechanical Drafting. Blueprint Reading and Designing. Allied shops are completely equipped and modern. Approved for G. I. Training Days, Evenings.

ALLIED SCHOOL OF MECHANICAL TRADES 1332 South Michigan Avenue • Chicago 5, Illinois



BUILDING HUMAN STATURE

"I grew 6 inches in a year through following instructions given in "BUILDING HUMAN STATURE," says the younger man at left. "Now I am a head taller than my father"

If you wish you were taller send for FREE outline of this remarkable book loaded with practical information.

CARILLON BOOKS, Dept. 19, Boerne, Texas.

IS YOUR MIND ASLEEP?

Amazing THINKING-ALPHABET helps Thousands. Free Folder. Write Frank Tibolt, Ph.D., 21A Phila. 20, Pa.

DO YOU

WANT a permanent business profession of your own? Then become a foot correctionist. Earnings of men and women in this greatly needed profession run as high as \$50.-\$100. weekly after a few weeks home training—not medical or chiropony—easy terms, no further capital needed, no goods to buy. 51st year. Write for free booklet.

Stephenson System of Foot Correction, 62 Back Bay, Boston, Mass.

KIDNEYS MUST REMOVE EXCESS ACIDS

Help 15 Miles of Kidney Tubes Flush Out Poisonous Waste

If you have an excess of acids in your blood, your 15 miles of kidney tubes may be over-worked. These tiny filters and tubes are working day and night to help Nature rid your system of excess acids and poisonous waste.

When disorder of kidney function permits poisonous matter to remain in your blood, it may cause nagging backache, rheumatic pains, leg pains, loss of pep and energy, getting up nights, swelling, puffiness under the eyes, headaches and dizziness.

Kidneys may need help the same as bowels, so ask your druggist for Doan's Pills, a stimulant diuretic, used successfully by millions for over 40 years. Doan's give happy relief and will help the 15 miles of kidney tubes flush out poisonous waste from your blood. Get Doan's Pills.

INVENTING -FOR PROFIT!

If you have an inventive turn of mind, write for free 28-page booklet explaining how the Institute of American Inventors is helping inventors pre-test the profit possibilities of proposed devices to fill today's unprecedented demand for *useful* new inventions.

INSTITUTE of AMERICAN INVENTORS
Dept. 3, 1926 Eye St. NW, Washington 6, D. C.

PATENTS AND TRADE MARKS
C.A. SNOW & CO.
Registered Patent Attorneys Since 1875
Write for free Book and "Certification of Invention" form
427 SNOW BUILDING, WASHINGTON 1, D. C.

INVENTORS
WITH GOOD INVENTIONS!
Should write us without delay for FREE BOOKLET. Protective Disclosure Form and facts about The Inventor's Most Logical Markets. Patented. Unpatented inventions, all kinds. Cash, Royalty, needed by specific manufacturers. If your invention is for sale, write today for full particulars. A Post-Card will do! Address:
THE INVENTION REPORTER
4C-11106 South Longwood Drive Chicago 43, Illinois

PATENT YOUR IDEAS NOW TO OBTAIN A PATENT
SEND FOR FREE BOOK
Written by Former Member Examining Corps (1922-24) U.S. Patent Office.
CARL MILLER, Registered Patent Attorney
Former Member Examining Corps U. S. Patent Office
Wentworth Bldg., Dept. 56-C, New York - Bond Bldg., Dept. 56-C, Washington, D. C.

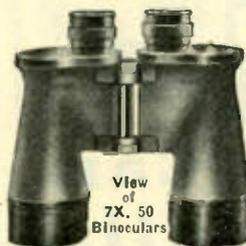
WAR SURPLUS
Lathes, Milling Machines, Drill Presses, Sawing equipment, Motors and thousands of miscellaneous items. Also information on Helicopters, Steeper Rollers, Graders, Tractors, Power Saws, Chainsaws, Welders, Jet Impulsion for Cars and Tractors etc. RUSH name for free literature.
THE WAYNE ENGINEERING CO. Dept. 1001 Greenville, Ohio

NEW ART BOOK
MAKES FIGURE DRAWING EASY
The new, revolutionary Block-In system of free hand sketching makes figure drawing so easy that even the beginner will be amazed at how easy he can learn to draw. Book contains a wide assortment of lovely artists models beautifully photographed. Published in 2 volumes. Only \$1.50 each. Mailed in plain, red wax wrapper. No C. O. D. or stamps.
ACME BOOK SERVICE, Dept. S-2, 5 Frankforts St., N. Y. 7, N. Y.

ART INSTRUCTION COURSE and DRAWING KIT
Complete \$1.00
Complete \$1 Lesson Art Course, which explains step-by-step and shows with over 900 How-to-do-it sketches and Illustrations. How to draw: Caricous, Portraits, Figures, Animals, Posters, Advertising, and Commercial Art, Illustrations, Lettering, Anatomy, Details, Curlicues, Comic Strips, etc. Together with Drawing Pad, 3 Art Pencils, Art Eraser—also a MANIKIN for posing and drawing; and a Triangle and French Curve which you can trace, mount and use.
If you can write, you can learn to draw!
Amazing Bargain: draw. Here's everything you need to start! Send only \$1.00 (for C.O.D. plus postage) for Book of Art Instructions and the complete outfit of Drawing Supplies. Money Back Guarantee. Write NOW! Knickerbocker Pub., 120 Greenwich St., Dept. B, New York

MICROSCOPES SUPPLIES-ACCESSORIES & SCIENTIFIC INSTRUMENTS
Beck & Co. NEW & USED LEITZ SPENCER BUSH & ZEISS BOUGHT & SOLD EXCHANGED REPAIRED Send for FREE LIST
MEDICAL AMATEUR
NATIONAL SCIENTIFIC INSTRUMENT CO. 119 CHAMBERS ST. NY 7

WAR BARGAINS in LENSES and PRISMS



NOW! MAKE YOUR OWN BINOCULARS!
Complete Set of LENSES and PRISMS from Navy's 7X, 50 Model
Save up to \$150.00!

Here's an unusual opportunity to secure a fine set of Binoculars at a tremendous saving of money. Build them yourself with all of the very same optics contained in the Navy's 7 Power Glasses. Or you can construct a Monocular (1/2 a Binocular) in which case exactly one half quantities of the Binocular Components will be furnished. All Lenses and Prisms are in near perfect condition. Lenses are cemented and have the new low reflection coating. Complete assembly directions included for either project.

- Stock #5102-N Near Perfect Binocular Set... \$25.00 Postpaid
 - Stock #5103-N Near Perfect Monocular Set... \$12.50 Postpaid
 - Sorry! No more machined sets of 7X. 50 Binocular Metal Parts. We do have unmachined left and right body and cover plate castings... but no other parts.
 - Stock #820-N... \$2.50 Postpaid
 - 35MM KODACHROME PROJECTING LENS SET**—Consists of 2 Achromatic Lenses for projecting, plus 2 Condensing Lenses and piece of Heat Absorbing Glass with directions.
 - Stock #4029-N... \$3.10 Postpaid
 - POLARIZING FILTER**—Diam. 73 mm. Perfect condition.
 - Stock #637-N... \$3.00 Postpaid
 - TANK PRISMS**—90-45-45 deg. 5 3/4" long, 2 1/4" wide, finely ground and polished.
 - Stock #3004-N Silvered Prism (perfect)... \$2.00 Postpaid
 - Stock #3005-N Plain Prism (perfect)... \$2.00 Postpaid
- We have literally millions of war surplus lenses and prisms for sale at bargain prices. Write for Catalog "N"—Sent Free! Satisfaction Guaranteed • Order by Stock No.

EDMUND SALVAGE CO.

P. O. AUDUBON, NEW JERSEY

REFRIGERATION AIR CONDITIONING approved GI training
MODERN SHOP TRAINING
TRAIN WHERE THE ARMY TRAINED IN THE SHOP OR AT HOME
This new, fast growing industry needs trained men now! It's fascinating work—easy to learn in our big shops—or train at home on special assignments and finish with practical intensive shop training. C.I. approved for home study, too. Same course and instructors from Army Training program attests the thoroughness and professional level of this long established Institute in modern refrigeration and air conditioning.
STUDY AT HOME IN YOUR SPARE TIME FINISH IN OUR BIG SHOPS
LEARN BY DOING—WORK ON REAL MACHINES
Proven training methods and expert instructors get you into the heart of this work immediately. Work with tools on actual machines right from the start. It's practical, interesting and it gives you the "know-how" and the "know-why" that distinguishes C.T.I. graduates in the field today. Investigate this opportunity now! Certificates issued.

FREE BIG 16 PAGE BOOK OF VITAL INFORMATION
Tells you the true facts... gives you vital information on CTI approved training.

RUSH COUPON TODAY FOR FULL DETAILS

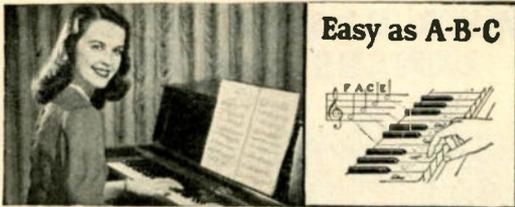
ACT NOW!
LEARN IN YOUR SPARE TIME AT HOME

Commercial Trades Institute, Dept. S-26
209 W. Jackson Blvd., Chicago 6, Ill.

Without obligation, please send me the facts. Let me judge for myself the opportunities and post-war security this training offers.

Check here if interested in GI training.

Name.....
Address.....
City..... State.....



Easy as A-B-C

If You Can Read English

You can learn music without a teacher

• Yes, if you follow our clear, home-study instructions only a half hour each day, you should soon be playing simple melodies. Easy as A-B-C! No tedious scales. You learn to play real tunes by note right from the start! You go from simple melodies to more advanced pieces. And sooner than you ever dared hope you're thrilled to find that you can pick up almost any popular number and play it by note. Study any instrument you like for less than 7c a day!

If interested send for Free Booklet and Print and Picture Sample. See how easy it is to learn music at home without a teacher this easy short-cut way. U. S. School of Music, 86 Brunswick Bldg., New York 10, N. Y. Please send me Free Booklet and Print and Picture Sample. I would like to play (Name Instrument).

FREE BOOKLET

Instrument..... Have you Instrument?.....
Name..... (Please Print)

Address.....

Flash! Amazing Opportunities NOW Open in these practical money-making trades watch and clock repairing



LEARN AT HOME—IN YOUR SPARETIME

Prepare for a happy future of prosperity, security... and get a big-pay job now. Fascinating, high-grade occupation. You can EARN WHILE YOU LEARN. Excellent field for part-time work at home.

COMPLETE COURSE IN HOROLOGY

Thorough self-instruction training in American and Swiss watches, clocks. Special sections on alarm clock repairs. New, practical LEARN-BY-DOING instruction method. Learn QUICKLY, easily. No previous experience necessary. Watchmaking is basic training for aircraft instrument work, and other scientific precision jobs.

Amazing LOW PRICE MONEY-BACK GUARANTEE Get into this fast-growing field NOW... big opportunities... don't delay. Mail coupon below for FREE information. There's no obligation.

locksmithing and key making

COMPLETE UP-TO-DATE COURSE

How to pick locks, de-code, make master-keys, repair, install service, etc. New, self-instruction lessons for every handy man, home-owner, carpenter, mechanic, service station operator, fix-it shop, hardware dealer, gunsmith.

53 EASY ILLUSTRATED LESSONS

Bargain Price! Satisfaction guaranteed or money back. Write now... no obligation!

Free Details—Mail Coupon Today!

NELSON CO., Dept. 2F01, 1139 S. Wabash Ave., Chicago 5, Ill.

Please send me—FREE and without obligation—illustrated Success-Catalog containing information about the course (or courses) I have checked below. No salesman will call.

Watch and Clock Repairing. Locksmithing and Key Making.

NAME.....

ADDRESS.....

CITY..... STATE.....

Mows and Trims Lawns



In One Simple Easy Operation
8¼ Lbs.



Save Time and Labor with a **MONTAMOWER**

New model. New type metal handle has special device to adjust cutting height. Drive shaft now mounted on free rolling, factory lubricated, and sealed ball bearings. No tired backs or aching arms. 8¼ lbs. of live precision made mechanism that first gathers, then cuts smoothly a clean 16" swath through grass, dandelions, spike grass and weeds. No noise or clatter. As modern and efficient as your electric razor. Cuts right up to walls, fences, trees or posts; leaves no fringes to be trimmed by hand. Cutters are self-sharpening. Built to last many years. Many thousands in use. Sold direct from factory. Costs little. Write at once for guarantee information and literature.

MONTAMOWER DISTRIBUTING CO.
834 Keeler Bldg. GRAND RAPIDS 2, MICHIGAN

Eye-GLASSES BY MAIL
16 Days Trial



Write Today for Free Catalog. Send no Money
ADVANCE SPECTACLE COMPANY
537 South Dearborn Street, Dept. SP-6, Chicago, Illinois

FALSE TEETH

KLUTCH holds them tighter

KLUTCH forms a comfort cushion; holds dental plates so much firmer and snugger that one can eat and talk with greater comfort and security; in many cases almost as well as with natural teeth. Klutch lessens the constant fear of a dropping, rocking, chafing plate. 25c and 50c at druggists... If your druggist hasn't it, don't waste money on substitutes, but send us 10c and we will mail you a generous trial box. © I. P. INC.

KLUTCH CO., Box 4694-F, ELMIRA, N. Y.

Say You Saw It In POPULAR SCIENCE

SET UP YOUR OWN BUSINESS

NEW A.B.T. Challenger

Everyone likes to handle a pistol—constant play — enormous returns.

Write For Quantity Prices
JOBBER WANTED **PRICE \$65.00**

Rake Coin Machine Exchange
609 Spring Garden Street, Philadelphia 23, Pa.



BOY IT'S KEEN! "G-BOY" REPEATING CAP PISTOL

A REAL METAL
RAPID FIRING



ACTUALLY SMOKES ON FIRING
HAS LOUD EXPLOSIVE REPORT

Looks and feels like an Automatic "45." It's made of strong lightweight aluminum with a plastic "Pearl" handle. It's easy to reload. Send check or money order for immediate shipment—express charges collect. (Smallest order \$1.00. No C.O.D. orders).

\$1.95

Gun Only
Box of 5 Rells Caps only .15c
7 Boxes . \$1.90

GENUINE COWHIDE HOLSTER FOR FAMOUS "G-BOY" GUN. \$2
UTILITY STORES, 117 S. Wabash Avenue
DEPT. FF-28, CHICAGO 3, ILLINOIS

MEN AND WOMEN!

Has your war work given you
an idea for a patentable

INVENTION?



An "invention" doesn't necessarily have to be a complicated, technical mass of machinery... most inventions are the outgrowth of an "idea" that someone had to do something better, faster or cheaper. It's possible that you've figured out a gadget... or an improvement on a machine... that will help someone do it "easier, faster, cheaper."



MAYBE YOU CAN CASH IN ON IT!!

The only difference between you and a successful, money-making inventor may be that he went ahead and DID SOMETHING ABOUT IT! Most professional inventors turn their inventions over to a reliable Registered Patent Attorney whose trained staff is equipped to secure a strong patent for the inventor with the greatest possible speed and at a minimum of expense. When you hold a patent you have the right to exclude others from making, using or selling your invention for a period of 17 years... which means that no one can cash in on your invention without your permission, no manufacturer can make money on it without buying your patent or paying you a satisfactory royalty unless he wishes to risk a suit in court. Furthermore, most manufacturers refuse to consider an invention for commercialization unless the inventor has first filed for his patent. Don't let the fact that it may be a simple invention bother you... remember the paper clip, nothing but a twisted wire... but today, it is an almost indispensable piece of office equipment.

NEARLY A HALF-CENTURY of
Potent Experience--At your Service!

NOW is the time to use your initiative! Your first step, which costs you nothing and doesn't obligate you... is to write TODAY... right now... for our two big books, 64 pages of facts and information, which tell just how to go about getting a patent; how to market it; what kind of sketch or model is needed; how to make a proper disclosure; 115 mechanical movements; etc. Do you want to cash in on your invention? It's UP TO YOU!



VICTOR J.
EVANS & Co.

Merlin M. Evans

REGISTERED PATENT ATTORNEY

MAIN OFFICE: 140-G MERLIN BLDG.
WASHINGTON 6, D. C.

Please send me your books, "Patent Protection" and "How to Sell an Invention" without cost or obligation:

NAME.....
ADDRESS.....
CITY AND STATE.....

WAR SURPLUS BARGAINS



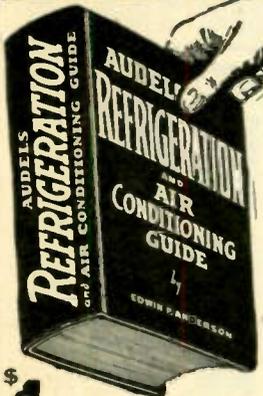
BRAND NEW PARACHUTES, 5' 8" in diameter, about 36 sq. feet cloth area, heavy shroud cords, direction control, quick opening attachment. Packed in a 4' x 15" heavy metal container. These white cloth parachutes can be made into wonderful beach umbrellas, women's blouses, children's play tents, etc. Container has many uses, including cemetery flower urn, which is what you definitely will need if you would be foolish enough to jump with this parachute! Sent POSTPAID for only \$1.50, up to the 4th Zone only (800 miles from Phila.) Balance of U.S.A. \$2.00 POSTPAID. All Foreign \$3.00. We offer this special to put you on our mailing list, and include our latest illustrated catalog which is just off the press, and will also send supplement sheets listing new merchandise when received. Listed are binoculars, welding cable, heavy machinery, German gun sights, lanterns, camera tripods, lenses, etc. In fact, hundreds of bargains.

CONVERSION OF GOVERNMENT SURPLUS CO.

3 S. Strawberry St. Phila., 6, Pa.

JUST OUT! NEW FROM COVER TO COVER

AUDELS REFRIGERATION and AIR CONDITIONING GUIDE



4 Books in One! Covering:
Basic principles, Servicing, Operation, Repair of
1—Household Refrigeration
2—Special Refrigeration Units
3—Commercial & Industrial Refrigeration
4—Air Conditioning Systems
A gold mine of essential important facts for ENGINEERS, SERVICEMEN & USERS.

A Good Book is a Good Friend! Here you have at your fingers' ends a Complete Library in ONE VOLUME, the necessary data you have been looking for on: MODERN UNITS, SYSTEMS & MACHINES, REFRIGERANTS, including Freon, Lockers, Water Coolers, Quick Freezing & Air Conditioning Systems.
1280 Pages, 46 chapters all Fully Illustrated & Indexed for Ready Reference.

ANSWERS YOUR QUESTIONS
Get This Information for Yourself.
Mail Coupon Today. No Obligation
Unless Satisfied. ASK TO SEE IT.

4 COMPLETE • PAY ONLY \$1. A MONTH ←

AUDEL, Publishers, 49 W. 23rd St., New York 10, N.Y.
MAIL AUDELS NEW REFRIGERATION GUIDE for free examination. If O. K. I will send you \$1 in 7 days; then remit \$1 monthly until price of \$4 is paid. Otherwise I will return it.

Name.....
Address.....
Occupation.....
Employed by..... P.S.M.

W A R SURPLUS BARGAINS

SENSATIONAL VALUES FOR QUICK LIQUIDATION

BOMB PARACHUTES



Of fine white nylon fabric 5 x 8 feet in diameter with split seam for directional dropping. Designed for dropping fragmentation bombs, emergency rations, etc. Each packed in a metal container. Weight 6 lbs. No. R-162 Each only **\$1.95**

AIR CORPS PLASTIC FLASK SETS



Two handy, transparent plastic flasks with canvas case. Used by the U. S. Air Corps. Holds any kind of liquid. Each flask measures 4 1/4 x 8 1/4 inches. Has clamp-on top plus screw cap. Fine for use on camping trips, picnics, etc. Weight 1 lb. No. R-179—Set only **\$1.49**

POPULAR RECORD ASSORTMENT



This assortment of 50 records includes current dance, race, blues and hillbilly selections. These records have been used in juke boxes—but all are guaranteed perfect and playable. No two alike. Many famous name bands and artists included. Shipped express collect only—no exchanges, trades or refunds at this low price. Wgt. 28 lbs. No. A-303—50 records **\$9.04**

NEW SATCHEL POUCHES

Brand new shoulder type duffel bag luggage. Ideal for school books, lunches, etc. Measures 11 x 12 inches. Of heavy canvas duck with taped edges. Weight 2 lbs. No. X-113 Each **\$1.69**



DIRECTIONAL COMPASS



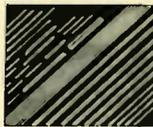
For all outdoorsmen, boy scouts, etc. Liquid type, free acting and accurate. Gives direct reading. Tells you immediately what direction you are traveling. Plastic body measures 3 1/2 x 1 1/4 inches. Has waterproof compartment for matches. No. R-206 Each only **\$1.49**

BOOBY TRAP FIRING PIN



Consists of trigger and trip arrangement with cord for remote firing control. Has powerful spring action. Ejects a pencil 8 to 10 feet. Has many uses such as burglar alarms, etc. Brand new. No. R-178 Each **49c**

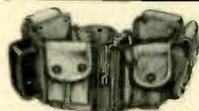
DECORATIVE CHROME STRIPS



For your car, boat, furniture, etc. Highly polished chrome finished strips with clinched ends for flush mounting to any surface. The 3 pound kit provides approximately 43 pieces in lengths from 4 inches to 3 feet and 1/4 to 3/4 inches wide. Wgt. 4 lbs. No. R-224—3 lb. Assort. only **\$2.00**

MESS KITS

Regulation Army Mess Kits. Ideal for campers, boy scouts, etc. Slightly used but guaranteed perfect. Two pieces. Folding handle. A-116—Each **69c**



GI POCKET BELTS

Of heavy canvas. Adjustable waist size. Each with 5 pockets and metal recoll fitting. Brand new. Fine for hunt. No. R-206 Each only **98c**

7-LB. EXPERIMENTERS PARTS ASSORT.



A "gold mine" for the radio serviceman. Hundreds of valuable radio parts, new radar and electronic parts and sub-assemblies, coils, resistors, screw machine parts, etc.—worth many times this low price. A-308—7 LBS. **\$1.79**

CANTEENS, CUPS & COVERS

Regular U. S. Gov't issue canteens. Plastic screw top chained to body. Slightly used. A-117—METAL BODY Each **69c**



A-118—PLASTIC BODY Each **69c**
A-109—Canteen Covers. New. Each **69c**
A-119—Canteen Covers. Used. Each **35c**
A-120—Canteen Cups. Used. Each **25c**

MICROPHONE BUTTON

Brand new! For experiments in radio, electronics and other electrical apparatus. Used to telephone, amplifier and telephonic work. Diameter 2 1/4 inches. New. A-512—EACH **98c**

AMMUNITION BOX

Fine for storing valuables carrying lunches, etc. Of heavy gauge 7 1/2 x 1 1/4 inches. Fireproof. Hinged lid with folding handle. Olive drab finish. Used, but perfect. Shipping wt. 4 lbs. A-525—EACH **25c**



PLASTICS—LUCITE AND PLEXIGLAS

In sheet form. Good workable sizes. Transparent. For costume jewelry, etc. Easy to work and polish. Shp. wt. 6 lbs. A-280—5 LB. ASS'T. **\$4.75**

CATALAN—ASS'T. COLORS

Extruded shapes, rounds, half rounds, etc. Easy to machine. Furnished in assorted colors, shapes and lengths. Shp. wt. 6 lbs. A-281—5 LB. ASS'T. **\$4.75**



U.S. Govt. BOLO KNIFE

Extra heavy. For farm, home or jungle use. Blade of Gov't formula cutlery steel. Walnut riveted handle. 3 1/2 inch blade, 10 1/2 inch blade. You'll find hundreds of uses for a Bolo knife. Blade will take and hold a keen cutting edge. Wt. 2 lbs. A-112—with Army Sheath **\$4.95**
A-212—Leather Sheath. extra **\$1.50**



PUP TENTS

Regulation Army Pup Tent of durable, brown canvas. Used, but in good condition. Fine for campers, outdoorsmen, boy scouts, etc. Grand Xmas gift for children. Wgt. 8 lbs. A-1—Tent Only **\$3.95**
A-110—Tent, new **\$7.95**
A-101—Ropes, wooden poles and stakes, or above. Per set **\$1.00**



BIG SHIPS BELLS

Purchased from U. S. Maritime Comm. Measures 10 inches high, 9 3/4 inch flare. Big 6 inch clapper. Weight 15 lbs. Fine for farms, clubs, estates, etc. All new. Shp. wt. 10 lbs. A-941—ONLY **\$9.85**

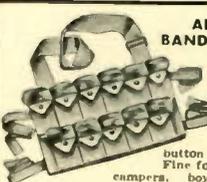
MEDICAL STERILIZER



Consists of alcohol burner and sterilizing tray in hinged metal case 1 1/2 x 1 1/2 x 2 1/2 inches. Burner may be used separately. Bright nickel finish. All brand new. A-125—Each **98c**

CAVALRY SPURS

Genuine wishbone type cavalry spurs. Nickel plated brass. A-102, Pair... **98c**
A-103, Spur straps per set of... **50c**



ARMY BANDOLIERS

Of the heavy khaki. Big 8 roomy pockets with button fasteners. Fine for hunters, campers, boy scouts, etc., also for shop work in carrying small parts, etc. Material alone is worth this price. Shp. wt. 1 lb. 11 Pocket Type No. **49c** | 5 Pocket Type No. **29c**
129 EACH | 110 EACH

ORDER DIRECT FROM THIS AD

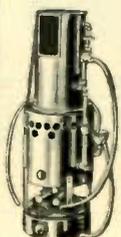
Values galore! Hundreds of hard-to-find items for home, shop and outdoors. Make remittances by money order, bank draft or personal check. Send 25% deposit on C.O.D. orders. No C.O.D.'s on orders for less than \$5.00. Include sufficient postage on parcel-post orders—any overage will be promptly refunded. All quotations F.O.B. Chicago. Used items and materials are guaranteed serviceable and as described. Your money back if not more than satisfied.

BIG ILLUSTRATED CATALOG FREE

STARK'S

Dept. PS54E
509 So. State St.
CHICAGO 5, ILL.

STILLS



Distill your own water with one of these fine portable stills. Purchased from the Gov't. Completely self contained. Has 1 gallon capacity; output 1 1/2 gal. per hour. Fitted with genuine Coleman double burner stove. Operates 5 to 7 hrs. on one filling. Heat output 20,000 BTU's. Stove alone is worth this price. All new and guaranteed. Instr. included. Weight 109 lbs. No. 206 **\$59.50** Each.

POPULAR SCIENCE

Classified Opportunities

Save time - Save Money



Classified Ads only 50c per word per insertion, payable in advance. Minimum ad 10 words. To be included in July issue copy should be in our office by May 29th. July issue on sale July 1st.

POPULAR SCIENCE MONTHLY—351 FOURTH AVE.—NEW YORK CITY 10

1 ADVICE

DRUNKENNESS is a disease which responds to treatment. Medical skill plus human sympathy prove successful with liquor and drug cases. 60 years experience. Write for free booklet. P. S. Nelson, The Keeley Institute, Dwight, Ill.

ATOM Bombed Nagasaki, 15 photographs \$1.00. Free particulars. Makins Pictures, 538 1/2 Washington, Bremerton, Wash.

UNLIMITED Opportunities Ahead! "How to Get a Better Job" may help your post-war planning. Information free. Joseph Weber, 8652 So. Francisco, Chicago 29, Ill.

STOP Cigarettes or Alcohol Habit Broken Quickly, Pleasantly, Permanently. Through New Scientific Drugless Formula. Send \$1.00. No other cost for complete instructions. Address: Psychogenic Science, Box 402, Canton 1, Ohio.

PERSONAL Adviser—Confidential, domestic, marital, educational, religious, general; by professionally trained, B.S., M.A., M.Ed., none less than \$3.00, none more. Box #114, Gap, Pa.

TO The Sick: "Vitalence"—Drugless healing through the spoken word. Speak your ill's away. Write for free details. Cedric S. Moore, 1313 S. Union, Kokomo, Indiana.

2 ADVERTISING

FINKLE knows mailorder advertising! Nationally known writer guarantees powerful letters, literature, selling campaigns. Big, positive results! Postcards ignored. Pinkle Advertising, 1201 1/2 South Ogden, Los Angeles, 35, Cal.

ADVERTISE 24 words, 40 Newspapers \$3.50. List Free. Advertising Bureau, 4515-P Cottage Grove, Chicago 15.

"HOW To Write Advertising," Absolutely Free! Dudley Bunn, 126-PS Lexington Ave., New York 16.

ADVERTISING Placed everywhere lowest rates. Reliable guidance on publications, expert assistance on ads without charge. Newspaper, magazine, mailing-list, rate-book free. Chicago Advertising Agency, 20-MP West Jackson, Chicago 4.

ADVERTISING Service—For men going in business. Put our experience in merchandising and advertising back of your products. Write Van De Mark, 1107 Times Star Bldg., Cincinnati 2.

WHOLESALE: Blades, Aspirins, Laces, and others. Free Price List, Dempsey V. Neunlist II, 912 N. McLeansboro, Benton, Ill.

SPEEDY mailing, 500,000 classified names and addresses on stickers. Classified Personal Adv., 7 Chestnut St., Waterloo, N.Y.

24 WORDS in 64 Weeklies \$4.96. J. Darnell, 730 Hays, Jackson, Tenn.

ADVERTISING. Poetic and rhyme form. Attractive. Number of rhymes unlimited. If interested write: S. Nye, 210 E. Union Ave., Bound Brook, N.J.

ADVERTISING: Placed in any publication, anywhere. Write for mail-order rate sheet "P". LeGrand Adv. Agcy., (Established 1923) Floral Park, N.Y.

TOP-Notch Advertising—free particulars. Productive Advertising Service, 852 E. 34th St., Brooklyn 10, N.Y.

GET—Advertising Tips on selling by mail. Contains Valuable Information, on mail order business, Price \$1.00. A. H. Allen, 2335 Arapahoe St., Denver 5, Colorado.

SALES-Letters-Written. Master Copies \$10.00. Box 5991, Cleveland, Ohio.

PROFITABLE Advertising in the South. Rate Bulletin Free! Alabama Advertising Agency, 216 Exchange Bldg., Birmingham 3, Ala.

5 AGENTS WANTED

LICK After-war layoffs; Start own business; home, office. Booklet describing "Collection of 127 Tested Plans" free. Elite Co., 220 Grand St., New York.

GOOD Paying Business Silvering mirrors, plating autoparts, reflectors, bicycles, bathroom fixtures, etc., by late method. No tanks or shop required. outfit furnished. Free Booklet, Gunmetal Co., Ave. G, Decatur, Illinois.

EXCELLENT Sideline for Printing Salesmen. Decalomania Name Plates in small quantities. Also, make money applying Inkrals on Automobiles. Free Samples. "Ralco", X-184, Boston (18), Mass.

FREE Water and our concentrates makes flavors, lotions, shampoos, 72 products, labels, bottles furnished. Qualco, F-20030 Russell, Detroit.

FREE! Latest Issue Opportunity Magazine. Salesman's Guide, Inspiring, constructive. Shows how to earn money selling for others or in your own business. Hundreds postwar opportunities. Send name and describe what you have sold or are selling. Illustrated copy sent Free. Opportunity Magazine, 620 N. Michigan, Dept. 18, Chicago 11, Ill.

WAR Honor Scroll. All branches of service represented, 12 by 16. Space provided for name and photograph. Truly beautiful. Agents make big money. Sample 25c. E. Condon, Dept. 9, Upper Darby, Pa.

90c PROFIT each \$1 sale. Sell permanent mothproofing solution to housewives, stores, agents. Experience unnecessary. Postal brings details. Kinford, Wayne 4, Penna.

MAGIC cleaner and laundry soap deal. Hotter than a firecracker. Big profits. Sample Free. Uco, 5007 Irving Park, Chicago.

JUST Out! History of World War II. Huge volume. Popular price. Authentic text. Official Photographs. Big profits. Riverside Book Co., Iowa Falls, Ia.

START Your Own Business on our capital. Always your own boss. Hundreds average \$6,000 to \$25,000 annual sales year after year. We supply stocks, equipment on credit, 200 home necessities. Selling experience unnecessary to start. Wonderful opportunity to own pleasant, profitable business backed by world wide industry. Write Rawleigh Co., Dept. F-U-PSC, Freeport, Ill.

SELL Greeting Cards, Display Signs, Pictures, Books, Novelties. Big Profits. Bulletin Free. Ellico, 432 North Wells, Chicago 10.

AMAZING New Zipper Shoe sells on sight. Big profits for salesmen. Leads line 200 splendid styles. Territories open. Get Free Sample Outfit. Write Mason Shoe, Dept. M-339, Chippewa Falls, Wis.

GOLD Lacquered Window Sign Letters. New Folds—Styles—Absolutely Beautiful. Free Samples. Atlas, 7941 Halsted, Chicago.

FAMOUS Picture—four colors, 500,000 sold. Permanent opportunity. State experience. Sample print Free. Our Flag Sales Corp., Dept. C-1064, Excelsior Springs, Mo.

NO Summer Slump in magazine sales! Make money year 'round taking new, renewal orders from neighbors, friends. Helps Furnished. Free catalog. Write McGregor Magazine Agency, Dept. PS-6, Mount Morris, Ill.

200 MONEY Making Deals. Plans, Rare formulas, Schemes. Folio Free. Formico Co., Box 572, Dayton, Ohio.

SELL, full, part time. Individualized belt buckles, tie holders, cap badges. Thousand emblems. Service plaques. New lightning adding machines. Details. Hook-Fast, PS, Roanoke, Va.

MAKE cleanup selling perfumes, toiletries. Distributors' prices on request. Long profits. G. Behm Sales, 3635-J, Roosevelt, Chicago 24, Ill.

100% PROFIT on famous, popular Pines Birthday, Christmas, and all-occasion Greeting Cards. Wonderful 12 to 24 Card, boxed assortments sell on sight for \$1.00. Write today for information and Extra Bonus Distributor's Plan. S. Pines, Box 32, Flushing, N. Y.

LUMINOUS pictures that glow in the dark. Large manufacturer wants factory representatives; wonderful new item; fast seller; free sample. Madison Mills, 303 Fourth Ave., N.Y.C.

SELL full, part time. Individualized belts, buckles, cap badges, tie holders. Thousand emblems. Every veteran prospect. Fast profits. Repeats. Write today special outfit offer. Hook-Fast, PS Box 1425, Providence, R. I.

CHRISTMAS Cards, Agents Wanted—31 Deluxe Box Ass't. Also 3 Box Ass'ts. with name printed. A. B. Plateless Co., 392 Broadway, New York 13, N.Y.

IMMEDIATE Profits! Take orders for our new amazingly beautiful lifetime laminated Plastic Reproductions of any snapshot or negative. A genuine opportunity to build an interesting, profitable business without investment. Write now for details. Gotham Products Co., Dept. A, 215 E. 149th St., New York 51, N.Y.

HIGHEST Quality double edge blades. \$1.35 per 100. Send 10c for sample pack. Peaberry Products Co., Dept. P.S. 524 Porter St., Phila. 48, Pa.

AVAILABLE exclusive territory. Distribute thru dealers Flasho, powder auto cleaner-polish. Particulars and sample free. Langdon Co., 4614 Prospect, Cleveland, Ohio.

POPULAR SCIENCE OPPORTUNITIES

UP to \$1.00 hr. plus grand prizes selling new silver polish. Requires no rubbing or polishing. Sells on sight. 25c coin brings pkg. and details. Mrs. Nickell, Rt. 1, Box 456, Bend, Oregon.

AGENTS! Earn big money, selling personalized soap with names and designs that will wash off. Sells on sight. Particulars free. The D. & P. Sales, P.O. Box 1471, Dept. M, Uniontown, Penna.

BIG bargains for big profits. Over 100 sensational values. Men's used suits \$2.00, pants 35c, topcoats \$1.25, overcoats \$2.00, shoes 20c. Experience unnecessary. Free wholesale catalog. Superior, 1250-FA, Jefferson, Chicago 7.

PICTURES For Framing. Samples and Lists 10c. Curtis, Box 1916-B, Denver 1, Colorado.

SELL "Petite Picture Notes." Something really different in greeting cards. Sample free. Dunbar Cards, New Brunswick 2, N.J.

500 SALESMEN at once to sell Spa-Saver Clothes Rack \$2.95 and plastic Change-celver \$4.50. Write for folders and price set-up. H. & H. Products Co., Arkansas City, Kans.

FASCINATING year 'round income building plan. Take easy orders from friends, fellow workers, church organizations for 10 fast selling greeting card assortment. Sell \$1.00 each—cost you 50c up. Extra bonus. Experience unnecessary. Request foremost \$1.00 All Occasion box on approval and free Correspondence Notes samples. Special Offer. Bluebird Studios, Dept. 17-H, Fitchburg, Mass.

SILVER Plating Liquid. Simply Rub-On with a cloth. Cleans Silverplates. Polishes, one rubbing. Puts on genuine 1000 Fine silverplate. Renews silverplated ware like new. Silverplates onto brass, copper, bronze, etc. Lating finish, won't come off. Sales representatives wanted. Details free. NuProcess Products, Dept. 228, Aurora, Ill.

WE pay you \$25 for selling fifty \$1.00 assortments Birthday. All Occasion cards. Tremendous demand. Sell for \$1.00—your profit 50c. It costs nothing to try. Write for samples. Cheerful Card Co., 174 White Plains, N.Y.

BIG commissions—selling to stores celluloid Pricing Tickets, metal shelf moulding. To restaurants, menu covers, signs. C. Pricing Press, 124 White St., New York 13, N.Y.

BUILD Year Round Lifetime Business, sell everyday necessities to stores, institutions, industrial plants, homes, etc. Easy repeats. Excellent profits. Great cooperation. Become territory distributor. Investigate. Lytle Supply Co., Ave. 12, Fredericksburg, Ohio.

GREETING CARDS, Gift Wrappings, Correspondence Notes, Stationery, Novelties, 4154E Fifth St., Philadelphia 19, Pa.

SALESMAN, Sideline of liquid cleaners and specialties now available. Sold in gallon barrel lots only, for general commercial use. All inquiries given individual attention. Allied Enterprises, P.O. Box 236, Dowagiac, Mich.

SUBSCRIPTION solicitors keep 90c of every \$1.00 collected. P.O. Box 371, New Orleans 9, La.

LUMINOUS Paint (Shines in Dark). Profitable seller to millions. Agents send 25c for profitable folio and Luminous color sample. Address, Lite-Saver, 97B, Saybrook, Conn.

AGENTS—Demonstrators, \$150 a day possible. Embossium transforms handwriting into beautiful gold-silver raised lettering for cards, stationery. Cost 20c sells \$1.00. Sample writing—literature 13c, Embossium kit 60c. Western Chemical, Salem, Oregon.

TREMENDOUS profits, history World War II, 1100 pages. Distributors, agents, jobbers wanted at once. Schlake, Bl27 E, Third, Cincinnati 2, Ohio.

AGENTS—300% profit selling gold colored window letters; stores and offices. Free samples. Metallic Letter Co., 437 N. Clark, Chicago.

AGENTS—Big Money for Men, Women, boys, girls—selling gorgeous night-glowing Orchids. Gardenias; perfect imitation real flowers; last for years; all the rate for wear on hair or clothes. Write for wholesale prices. Marney's, Dept. S-1, P.O. Box 581, Ogden, Utah.

\$3 FIRE Extinguisher sells wholesale or direct. "Fire Killer", Zone 1, Syracuse, New York.

SELL our effective Suntan Lotion during summer Tans without burn. Ideal sideline. Excellent profits. Bonny Fair, 53 State, Boston, Mass.

SALESMEN and dealers wanted for new fast selling household item. Nothing like it on the market. Send 25c for sample postpaid. F. R. Espling, Box 704, North Hollywood, Calif.

VETERANS \$2 Brings 20-25c Toys & Sell Selling Circulars. Clear \$15 a day. Nick Hogan, 801 N. 15th St., Philadelphia, Pa.

BUILD permanent income with Sure-Fire Repeater. New Scientific treatment returns gray hair to natural color without dyes or capsules. Fills long felt want of Antiques of men and women. Sold under money back guarantee. Liberal proposition to experienced sales representatives. Write quickly. Mayco Products Co., P.O. Drawer 4125-A, Orlando, Fla.

EASY Profitable Sales, Consumer, Retailer. Inexpensive Fire Extinguisher, FI-Rout, Box 1154, Paterson, N.J.

EX-O-LENE! Most powerful gasoline stretcher! Easy sales! Big profits! Distributors wanted! Information free. Thermopowerful, Peoria 4, Illinois.

WOULD you pay 3¢—first \$350 made? Color-illustrated book "505 Odd, Successful Enterprises" free! Proven! Work at home, office. Expect something odd! Pacific, 262-S Drake, New Rochelle, N.Y.

WRITE today for prices on our Tonics, Herbs, Liniments, Ointments, Tablets, Soaps, Vitamins in Liquid or Tablet form: Anything and everything you need at lower prices. Celtona Medicine Co., 1016 Central Ave., Cincinnati 2, Ohio, Dept. P.S.

SELL Electric Testers—Neon Bulb, two needle point terminals tests Electric Irons, Toasters, Spark Plugs and Cables—Fuses, Armatures, Condensers, etc.—Radio Frequency, Grids, Circuits, Hundred Uses. Send 50c for Sample—One dozen on handsome display card \$3.60. Gulf Sales Co., 226 Carondelet St., New Orleans 12, La.

\$1.00 BRINGS \$5.00 to \$25.00 clear profit. New kind concentrated merchandise and coupon deal. Write Kohnn, 506 W. 45th, Chicago 9.

EASY Profitable Sales, Consumer, Retailer. Inexpensive Fire Extinguisher. FI-Rout, Box 1154, Paterson, N. J.

HARMONICAS \$10.80, \$19.60 dozen. Harmonica Wholesales, 11 E. Centre Street, Baltimore 2, Md.

WONDER Silver Plating Liquid. Applied with cloth. Deposits permanent silverplate on all silverware, brass, bronze, zinc etc. Good carded item for stores. Wonderful demonstration. Big Profits. Full details by mail. Wonder Products, 1265A Broadway, New York 1, N. Y.

6 AIR CONDITIONING & HEATING

DEALERS and Installation men to sell and install gas conversion burners. Large profits. Peerless 4320, Sheridan, Lincoln 6, Nebr.

HEATING Equipment gas and oil burners, furnaces. Reliance. Box 122, Lincoln 6, Neb.

7 AMERICAN POLICE JIU JITSU

DEADLY Judo—Fiercest fighting technique. Complete course (186 photographs.) Particulars free. Variety House, Box 46-AF Wall Station, N.Y.C.

8 ANTIQUES, RELICS, INDIAN GOODS

SWORDS, rapiers, daggers, pistols, armor; Illustrated catalog. 50c. Robert Abels, 860½ Lexington Ave., N. Y.

BUY unpainted plaques, statuary, etc. Decorate; sell locally. Good profits. Small cost. List free. Artists' brushes, paints, instruction books available. Pioneer, Box 394-PS6, Austin, Minnesota.

BIG Illustrated Catalog. Guns, swords, Japanese and Nazi Relics, cartridges, 50c. Bellport Gun Shop, Dept. A, Bellport, N.Y.

4 FINE perfect Ancient Arrowheads \$1.00. 4 perfect tiny bird arrowheads, \$1.00. List Free, Lear's, Box 569, Galveston, Texas.

441 ANTIQUE Firearms: 5,000 Bargains: Rifles, Coins, Fossils, Indian Relics, Carabines, Cartridges, Minerals, Antiques, Catalog #10 with Photographs, 25c. Helke, Wenona, Ill.

9 ASTROLOGY

FREE! 3 Questions Answered with Solar Horoscope. Send birthdate 25c. Professor Golliday, L-1514 Long, Columbus, Ohio.

COMPLETE Astrological Horoscope sent daily for one year—\$2.00 (bills). B. Morgan, M.A., 8801 Grand River, Detroit 4, Mich.

10 AUTHORS SERVICE

I WANT New Writers to cash hundreds of checks for \$1 to \$100, offered each month. The easiest way to write for pay. No previous experience necessary. Send for Free details. No obligation. Saunders M. Cummings, Box 609-S, Colorado Springs, Colo.

HOW To Write and Where To Sell Short Stories. Instructions with surprise gift \$1.00. Writer's Service, PS-1514 Long, Columbus, Ohio.

11 ARCH SUPPORTS

BIG Profits Manufacture custom arch supports. Julius Corssen, 2636 Geyer, St. Louis 4, Mo.

12 AUTOMOBILES

RACING Car performance for all cars. Increase power, speed, pick-up. Special "Custom-built" equipment. Write Lee Motorcraft, 1412-B Great Northern Bldg., Chicago 4, Ill.

AUTOMOBILE Racing Book. Fifth Edition—Revised. Tells how to build dirt track bodies, frames, engines. Records, superchargers, rules, formula, plans, stock conversions, roadster racing, fast Fords, \$1.00 postpaid; \$1.15 C.O.D. Ray Kuns, Department 274, Madisonville, Cincinnati, Ohio.

SEE Our Ad under motorcycles for Midget Car bargains. Midget Motors Directory, Athens, Ohio.

FREE 1946 List Photos, Racing cars, drivers, Photographer, Midland Park, N.J.

CUSTOMIZE your automobile. Illustrated new restyling ideas, instructions, specific model changes by simple methods, \$1. Speedwheel, Box 723-C, Arcadia, California.

OFFICIAL Pictures Indianapolis Motor Speedway 500 Mile Speed Classic made by Official Speedway Photographers. Beautiful packet 26 pictures, each 4½x6½ inches, only \$1. Contains famous winning cars, darling drivers, spectacular crashes, track scenes. This year's winner included, Tower Studios; Official Speedway Photographers; Department A: 5454 E. Washington St.; Indianapolis 1, Ind.

BUILD speedy Midget track racer from castoff parts! Plans, specifications, construction information, \$1.00. Motor Supply, Box 1682-CS, Toledo, Ohio.

"500 MILE" Indianapolis Automobile Racing History Book, just printed. Complete history detailed year by year results every Indianapolis race since 1909. 320 large pages over 2000 illustrations, drawings, photographs describe foreign, American racing automobiles. Photographs world's famous drivers. View in your arm chair every mile of every event at 10c a race average cost. Complete book Postpaid \$3.50. De Luxe Edition bound attractive red Du Pont Fabrikoid \$8.00. Limited number available hurry! Clymer, Dept. B62, 2125 W. Pico, Los Angeles 6, Calif.

POPULAR SCIENCE OPPORTUNITIES

FLOYD CLYMER'S Popular Automobile Books: Motor History of America, complete authentic book American automobile development \$3.00 Motor Racing With Mercedes-Benz, complete Europe Grand Prix Racing Book \$2.00 Ab Jenkins World's Record Book \$1.50 Sir Malcolm Campbell's World's Speed History Book \$2.00 Modern Steam Automobiles Background \$2.00 Power and Speed, wonderful book \$2.50 Sample copy English Autocar 50c. All books Postpaid. See our advertisement under Motorcycles. Clymer, Dept. B61, 2125 W. Pico, Los Angeles 6, Calif.

AUTOCAR, English Automobile Magazine. Interesting advertisements, articles on foreign cars. Sample copy 50c postpaid. Clymer, Dept. B64, 2125 W. Pico, Los Angeles 6, Calif.

13 AUTO SUPPLIES & EQUIPMENT

HAVING Car Trouble? New, Used, guaranteed auto, truck parts save money. Transmission specialists. Describe needs; immediate reply. Victory, 2930 1/2 N. Western, Chicago 18.

BUG Screens—For Car, Truck or Tractor. Freewar Made. Highest Quality State Make, Year Model, \$1.25 value, 50c each. Postpaid. Allen Co., Clinton, Mo.

AIR Compressor outfits, complete with quartz size spray guns, less motors. Use your own 1/4 Horse Power Motor. Limited Quantity. Write for details. Box 172, North End Station, Detroit 2, Michigan.

GRILLES for most all cars. Meyers Auto Parts, 820 Dryades, New Orleans, La.

AUTO parts for all autos and trucks. Trans. motors, differentials, fenders, carburetors. Also Body Parts. Security Auto and Truck Parts, 1941 BP Eddy, Chicago 13.

MUFFLER manual. Convert easily to Hollywood, Laguna, Westwood, duals, etc. Includes construction details, regulations, diagrams. Postpaid \$1. Meliotone, Box 723C, Arcadia, Calif.

NOW, Water-Vapor Injection. More power. Eliminates knock, carbon etc. Installs 10 minutes, \$2.50. Rad-Ar Products, 140-27 169 St., Springfield Gardens, L. I.

PRE-WAR truck tubes most without repairs. All sizes at O.P.A. ceiling. Money-back guarantee. Tire Shop, 120 Orange Ave., Suffern, New York.

MAXIMUM performance economy, proper heat range, spark plugs, all engines except aircraft, 45 cents each prepaid. State make, model, thread size, fuel used, refund guarantee. Sparky, Box 1522, Jackson, Miss.

CARBURETOR repair kits for most popular cars. State year, make, model, carburetor, for particulars. Carburetor Service, 600-B LaPrairie, Ferndale 20, Mich.

1000 MOTORISTS needed to make gas saving test. Up to 30% savings. For trial test offer write Vacu-matic Carburetor Co., 7617-1280 W. State St., Wauwatosa, Wis.

OIL Pumping Motors—Brought Back to Normal without Ring Job. Write for Particulars. Joe Mullner, Box 3102, I. St. Paul, Minn.

SURPLUS reliable used tires guaranteed repairs. O.P.A. Ceiling 600 x 16 \$6.65, 650 x 16 \$8.05, 700 x 16 \$9.15, 750 x 16 \$11.50. 1-piece quality tire rimlers all passenger sizes below ceiling \$2.00. Pre-War used passenger tubes all sizes water-tested \$1.50. Tire Shop, 120 Orange Ave., Suffern, N.Y.

14 AUTO TRAILERS

BUILD your own Trailer! Save Money! Have every feature you want! Plans for House, Sport, Camp and Utility trailers. Catalog describing 9 models 10c. (15c in Canada and overseas) Jim Dandy, Box 125-B, Wausau, Wisconsin.

15 AVIATION

AIRPLANES, gliders, crackups, located everywhere, some probably near you. Send 25c for Directory, giving owner's price, name and address. (35c by first class mail). Used Aircraft Directory, Athens, Ohio.

WIND Direction Indicator, Remote Indicating, Electrically operated, Airport, Recreation or Club. Morse Engineering Co., Fullerton Bldg., St. Louis 1, Mo.

PROPELLERS—All types—fit any motor. Airliner 3 blades for sleds—boats. Illustrated literature, arcooil motor conversion 50c. Prompt delivery. Standard Aircraft, Ft. Worth, Texas.

AERONAUTICAL engineers will give expert help on amateur or professional problems. Aero Lab, Box 342, Los Altos, Cal.

JET Propulsion Experiments. Now Principle to drive boats, bicycles, model helicopters. Circular on plans. Rush name. Houston Maupin, Tipp City 54, Ohio.

JET Propulsion Enthusiasts! It's here! Rocket propulsion for models. Tested! Proven! Not theoretical! Booklet with complete plans, instructions, etc. Card brings free particulars. Marwood Co., 3033 E. 92, Seattle 5, Wash.

PROPELLERS for ice-snow sleds, air boats. Literature 5c. Banks Propellers, R.F.D. 7, Ft. Worth, Texas.

AIRPLANES—Used \$125 up. Engines, wings, parts. Send 25c for Hst. Aircraft, 2300 W. Flagler, Miami 35, Fla.

CUBS, Wacos, Taylorcrafts, Aerocas—\$125 and up! Big new Catalog, 25c. Lists these and thousands of other sensational airplane bargains. Some are "easy to repair" crackups. National, Box 1682-CS, Toledo, Ohio.

AIRPLANE Jettison Gasoline Tank Streamlined Ten Foot Six by Two Foot Four 165 Gallon Twenty Gauge Terne Coated Steel. Ideal For Making Boats. Bob Sleds, Midget Auto, Etc., price \$10.00 per Tank or \$7.50 per Tank. Quantities of five or more. General Truck Sales Inc., 205 Market S.W., Grand Rapids, Mich.

FLYING Caps! Khaki, long bill, prepaid \$1.10. Helmets, Army OD, \$1.50. Goggles, Army Clear Lens, \$5.95. Airplane compasses, \$15.00. Electric lanterns, hand-head type with batteries, \$2.75. Army headphones, \$1.95. Army throat mikes, \$1.95. Flying suits, boots, jackets, life rafts, books. Aero Parts Supply, Municipal Airport, Houston, Texas.

JET Propulsion circular sent builders, bikes, aeroplanes. J. Byrum, Buffalo, Okla.

17 BATTERIES, GENERATORS, ETC.

MIDGET Magnetic Motor. Flashlight cell operates. Parts complete, plus illustrated instructions 30c Postpaid. Eltro, 171D, Deer Park, N.Y.

18 BLUEPRINTS AND PLANS

HOW To Build A Box Kite. Complete plans, instructions, 25c stamps or coins. Zeis, 728 Lesley, Rockford, Ill.

TOY Plans with photographs—build Doll Cradle and Bed, Animated Circus Windmill, Electro-magnet Derrick, Full Scale. Fully detailed, 50c each, \$1.00 for all. Production Engineering, 408 City Hall Bldg., Rockford, Ill.

"BLUEPRINT Reading Made Easy"—ready reference book for reading any type blueprint. 596 pages, 463 pictures. Formerly \$8.95, now only \$1.98. Popular Science, Dept. 66-C, 353 4th Ave., New York 10, N.Y.

19 BOATS, OUTBOARD MOTORS, ETC.

FULL size, cut to shape boat patterns, blueprints. 7 1/2—38 feet. Illustrated "Build a Boat" catalog, 10c (coin). "How to Build Boats" book, \$1.00. Cleveland Boat Blueprint Co., Dept. A-17, Cleveland, Ohio.

10' OR 15' Folding Kayak Plans \$1.00. Foldcraft, 4015-R Oketo, Chicago 34.

MARINE Power—Easily convert any Ford motor (domestic and foreign) with Osco parts and kits. Complete catalogue 25c (coin). Osco Motors Corp., 2020 E. Orleans St., Dept. P, Philadelphia 34, Pa.

"BOAT-In-A-Bag" \$19.75. Imagine an inflatable, collapsible, portable rubber boat folding into package 13" by 15" by 3" weighing 10 lbs. Inflated size 40" x 66". Complete with carrying case and hand paddles, only \$19.75. Ask for Boat #1F. Other sizes at \$24.50, \$39.50, \$49.50, \$54.50, \$59.50, \$69.50, \$79.50, \$89.50 depending upon type and condition. New pneumatic life preserver belts 98c. Write for circular or order from this Adv. Karl Ort, Dept. F8-9, York, Penna. Dealers wanted.

FORD Marine Conversions. Catalog 10c. Lehman Manufacturing Co., Dept. A, Newark 2, N. J.

BOAT Trailer plan \$1.00. Palboats, 179 Ocean St., Lynn, Mass.

SKIFF—"Fishing & Hunting" plywood, cartop. Easy built with our complete blueprints and instructions. \$3. Outdoor Sports Co., Box 808-A5, Milwaukee 10, Wis.

FISHING Boat plans. Simple to build, 12' rowboat or 15' outboard-rowboat, \$1.00. Strachan Boat Shop, Howard 3, Kansas.

KAYAK Blueprints, deluxe models—catalogue 10c. Viking Kanoes, Merrick, N.Y.

OUTBOARD Motors Services. Parts new, used. Racing and Service all makes. Mantel's, 1311 Morris, Saginaw, Michigan.

20 BODY-BUILDING COURSES

BAR-BELLS, Dumbbells, Exercise equipment. Courses, Special offers! Free booklet. Good Barbell Co., Reading, Pa.

BURBELLS! Catalog! Bur Barbell Co., 319 Orient Way, Lyndhurst, N.J.

BARBELLS, Dumbbells, Extra Plates. Write Burgo, 1008 Grandview, Dallas, Texas.

22 BOOKS, PERIODICALS, ETC.

EDUCATIONAL Books sold cheaply or rented for small fee. Books bought. Money back guarantee. 4,000 Bargains. Catalog Free. (Courses Bought). Lee Mountain, Piskah, Alabama.

100,000 POST-WAR Jobs abroad—South America, China, India, Burma, Japan, Russia, Malaya, Hong Kong and where to apply now. Post-war U. S. participation in world reconstruction and trade demands thousands of American-trained mechanics, salesmen, technicians, engineers, foremen, laborers and business representatives—every trade needed. Our 15,000 word copyrighted forecast compiled from business, professional and government sources—lists over 200 big U. S. firms with foreign interests, gives job information, salary brackets, contract tips, application letters, passport information, climatic conditions, etc.—vital facts for your immediate application. \$1.00. Return for refund in 7 days if not satisfied. Pacific Industrial Research Bureau, 202-D Studio Building, Portland 5, Oregon.

MAGAZINES (back dated)—foreign, domestic, arts, Books, booklets, subscriptions, pin-ups, etc. Catalog 10c. (re-funded), Cicerone's, 863 First Ave., New York 17, New York.

FREE Booklet—"The Truth About Jesus. John C. Meek—P.O. Box 512—Baltimore 3, Md.

BIG Profits Taking Subscriptions For All magazines. Agents Confidential Catalog listing over 2500 periodicals and complete starting supplies Free. Pines Subscription Agency, Flushing, N. Y.

GOOD "Used" self-instruction educational books on all subjects bought, sold, rented, exchanged. Satisfaction guaranteed. Complete information and 100-page illustrated bargain catalog Free! Write—Nelson Co., Chicago 5.

MENTAL Calculation. Solve problems mentally and accurately. Short method solution to problems guaranteed accurate. Send for "The Trick of Mental Calculation." \$1.00 Postpaid. Kal-Q-Lations, P.O. Box 1232, Milwaukee 1, Wis.

HERBALISM—Complete Course in 2 volumes. 1000 recipes. Particulars free. Home Service, Forestville 3, Va.

POPULAR SCIENCE OPPORTUNITIES

GLAMOUR Photographs. Sample 10c. Baringer, 1242 Lilac Place, Los Angeles 26, Calif.

FREE bargain catalog for adult book buyers. Kasson, Box 134 Madison Square Station, New York City.

"A MANUAL For Men." Let this unique and unusual system of Physical Development and Mental Control create a New Vital Personality for you. \$2.00. Or send stamp for free descriptive folder. D & W Books, Box 601, Long Beach, Calif.

FREE Copy "Pre-Dix-It" (Patented) Monthly, Compendium, Nichols, Box 85, Waltham 54, Mass.

NATIONAL Geographic Magazines, 1888-1948. Any issue. Periodical Service, Box 327-B, Swarthmore, Penna.

EXTRAORDINARY Books; Instructive; Fascinating; Revealing! F. Hall, Box 4, Maywood, Ill.

READ The Scientific Forum, new Pacific Coast bimonthly magazine, for discussion of electronic, atomic, gravitational problems, etc. Two sample copies \$1. 1621 South Grand, Los Angeles 15, Calif.

MAGAZINE Export Sales Co., 2084 First Ave., New York 29, N. Y. Over-issue popular American Magazines and Pocket-Size Books, Comic, Screens, Fashions, Pictorials, Romances, Pulps and many others. Export Only.

"ATOM of the Solar System" Illustrated explanation of Atomic Phenomena in terms of the universe \$1.00. William-Fredrick Press, 313 W. 35 St., N. Y. 1.

BOOKS, (out-of-print, new, used) quickly supplied, many 35c bargains. Catalogue. Mid-West Book Service, 18870 Marx Ave., Detroit 3, Michigan.

"WHOLESALE Catalog and Directory" 10c. Bargains Galore. Roy Stafford, 961 1/2 N. Jefferson, Indianapolis 1, Indiana.

"MARK of the Antichrist." Book of Prophecies. 50c. William-Fredrick Press, 313 W. 35 St., N. Y. 1.

"RADIO For The Millions"—practical book. Complete instructions for building 78 radios, phonographs, other sets. 192 pages. 648 pictures. Deluxe edition, \$1.98. Popular Science, Dept. 66-C, 353 4th Avenue, New York 10, N. Y.

WHAT Every Mason wants. We have Masonic books for Blue Lodge, Chapter, Commandery Scottish Rite and Shrine. Our rituals are used the world over. Send for our free catalog of books and rituals for Masons, Odd Fellows, Knights of Columbus, etc. Eza A. Cook, Publisher, Inc., P. O. Box 796-RMY, Chicago 90, Ill.

"FIX It Yourself"—home repair book. How to fix appliances, furniture, plumbing, etc. 256 pages, 163 pictures. \$1.49. Popular Science, Dept. 66-C, 353 4th Avenue, New York 10, N. Y.

TECHNICAL Books, largest list, Edwards, 324 N. 18th, Quinoy, Ill.

MY Personal Record For Graduation. Beautiful bound book for High School and College graduates. Keep permanent record of your education and all future records. \$2.00. Moneyorder, 232 N. Mariya Ave., Baltimore 21, Md.

ADULT Books, Catalog and Sample, 10c. Oudemans, Box 1840, Cleveland 6, Ohio.

TRADE Magazines—Business-Vocational. Division. Current single copies—all fields over 700 different publications to choose from. Free price-list; Directory of 3342 periodicals, each with complete address; Classified as to field covered, year established, frequency of issue and domestic and foreign subscription rates \$1.00. Commercial Engraving Publishing Co., 345 North Ritter, Indianapolis 1, Ind.

BOOKS You'll Prize! Catalog Free. Carndon, Box 643-C, Ann Arbor, Mich.

JOIN new Technical Book Club—free! Members receive current literature, guidance on all book problems, premiums. No obligation. All technical, scientific, homecraft, farming, sports, etc. Specify subject for free information. Modern Technical Book Co., Dept. M28, 55 W. 42nd St., New York 18.

"RUTHBELLA" Journal by Antero Sansicchi; First Edition \$5.00. Free confidential Reading List. Lonely Hour Books, 309 3rd, Fallsides Park, N. J.

A Rational View of Life—\$1.00. Benjamin Seibert, Urbana, Ohio.

BUY Wholesale Thousand Articles. Catalog. Directory. Other Valuable Information. 10c. Latashaw, Sunnyside -C, Indianapolis, Ind.

ADULT Books, 25c Five—\$1.00! Free Book-ologues! Hirsch, Spring Valley 3, N. Y.

FLOYD CLYMER'S Popular Motor Books. See classified advertisements under Automobiles, Motorcycles.

BOOKFINDERS! (Scarce, out-of-print, unusual books) Quickly supplied. Send wants. Clifton, Box 1377ps, Beverly Hills, Calif.

LONELY Hour Books—send for confidential Reading List. Poets Corner Press, 308 3rd, Fallsides Park, N. J.

FURNACE melts all metals. Ideal for small business or home workshop. Built cheaply from scrap material. Free details. Aladdin Laboratory, 9655-C St., Oakland 3, Calif.

23 BUILD IT YOURSELF

BUILD Concrete Block Machine, Vibration and hand operated types, Easy, inexpensive. Sell blocks, build home, garage barn at low cost. Free details. Horne, 206 W. Wilder, Tampa, Fla.

BUILD beautiful swings that rich people buy, blends with any landscape. Sure-Seller, Big profits. Templates, plans \$3. Big John, Lafayette, La.

HOUSE Building problems answered by expert, send question with pencil sketch and \$1.00. L. Post Construction Estimator, Box 1225, Clearwater, Fla.

WHEELS for your own construction of wagon, scooter, racer, wheelbarrow and bicycle trailer. Drawings 25c each, 8x2" and 10x1.75" all-metal wheels with puncture-proof tires and ball bearings. \$2.25 per 8" wheel, \$3.25 per 10" wheel. F.O.B. Akron. Send orders to Jim Brown's Toy Co., 868 East Tallmadge Ave., Akron, Ohio.

BUILD your home yourself! Inexperienced? Years showing beginners. Sound construction only. Your labor saves up to 60%! Valuable circular 25c. Only the original bears this name: William Jackson, A.B., 1713 Howard, Port Huron, Michigan.

CONCRETE Mixer efficient inexpensive from oil drum hand operated plans \$2.00. Anthony Mitkos, 8802 Corwin, St. Louis 21, Mo.

WIZZ Electric Motor, Assemblies in a jiffy. Flashlight cell operates. Parts complete, plus illustrated instructions 30c Postpaid. Eltro Co., 1718, Deer Park, N. Y.

BUILD concrete block machine, mixer. Electric weed cutter, flame weeder blueprints 50 cents each. Nichols Equipment Co., Purvis, Miss.

MAKE parts yourself, for your hobby with machine or hand tools in our shop, or have us make them. Send specifications for estimate, or visit us 6 P.M. to 10 weekdays, 10 A.M. to 5 Saturdays. Craftsmen Shop Service, 233 Calyer St., corner of Oakland St., Greepoint, Brooklyn 22, N. Y.

COPYRIGHTED Blueprint and Instructions make your lawnmower a gasoline powered machine. Send \$1.00 to Easyway Systems, 284A State Park Drive, Bay City, Mich.

BUILD Concrete Block Machine. Plans \$3.00. Max Cox, Box 230, Springdale, Ark.

BEAT the Heat! Build efficient, inexpensive air-conditioners to suit any space. Ideal for homes, stores, offices. Drawing, instructions, \$1.00. Imperial, 10237-A McQuade, Detroit 6, Mich.

BUILD Electric Blueprinter Plans, \$2.00. Nichols Equipment Co., Purvis, Miss.

INEXPENSIVE Jigsaw; circle saw; plans 25c each. Jeffery, 2214 Wolcott, Flint, Michigan.

WHEELS for your own construction of wagon, scooter, racer, wheelbarrow, and bicycle trailer. Drawings, 25c each. 8x2" and 10x1.75 all metal wheels with Puncture proof tires and ball bearings. \$2.25 per 8" wheel, \$3.25 per 10" wheel. Send Orders to Jim Brown's Toy Co., 868 E. Tallmadge Ave., Akron, Ohio.

JEGSAW—build production machine of hardwood, auto parts. Make toys, inlaid pictures. Photographs, detailed plans, complete instructions. 25c (coin). Bruvold, Hebron, North Dakota.

BUILD Automatic Electric Hot Water Tank. Copyrighted Plans \$1.00. Marwood Co., 3033 E. 92nd, Seattle 5, Wash.

WELDER for farm or home. Uses house current. Inexpensive. No windings, motors, transformers or liquids required. Build in an evening. Plans \$1.00. Frank's Projects, D22, Box 555, Louisville, Ky.

SEE page 253 advertisement headed "From Hawaii—You'll Love It!"

BUILD Your home as a hobby. No rent. No mortgage. Save 50%. Use spare time. No special skill required. Amazing facts sent free. H. C. Lightfoot, Civil Engineer, Richboro, Penna.

24 BUSINESS OPPORTUNITIES

COLORGLAZED Concrete Pottery made without molds. New, low cost, patented method. Cemetery products, monuments, tiles, floors, etc. Basement leaking. Other money-making projects. Booklet, details free. Men only. National Potteries, Ferguson Falls, Minnesota.

GOOD Paying Business Silvering mirrors, plating autoparts, reflectors, bicycles, bathroom fixtures, etc., by late method. No tanks or gun required, outfit furnished. Free Booklet, Gunmetal Co., Ave. E. Decatur, Illinois.

START Home business making statuary, plaques, art goods, pottery, garden furniture, artificial marble flooring, liquid marble. Make flexible molds yourself. Amazing profits. Polner free. Creative Publishers P86, Winnetka, Ill.

\$25 WEEKLY working two hours daily. No canvassing. No Manufacturing. Lycks, Box 2471, Cleveland 12, Ohio.

MOLD-MAKING, Plaster casting, Money-making Business. Literature Free. Kemio, Park Ridge, Illinois.

MAIL Order Business course shows you how to make money, spare or fulltime. Teaches professional mail order technique—not penny-antching schemes. Fascinating 100-page illustrated Success-Catalog Free! Write—Nelson Co., Dept. 4-01, Chicago 5.

BOOKKEEPERS—Operate Your Own "Dollar-A-Week" Bookkeeping & Tax Service. Full or spare time. Details free. Ellis, Box 203, Cedar Grove, N. C.

137 PLANS to make money; local, mail-order. Particulars free. Elite Co., 220-A Grand St., N. Y.

YOUR own business. Big profits, very small capital. National organization teaches, helps, supplies everything. Interesting service business. Big demand. Everywhere. Americlene, 211 N. 7th St., St. Louis 1, Mo.

ONLY \$1.30 yearly, operates office under your own name. Co-operative Offices, 126 Lexington Ave., New York.

LIQUID Marble; snow-white, multi-colored. Glazed. Unusual. Composition. No Flooring. Lifetime wear. Any color. No priorities. Flexible molds. Plaster casting. Get into the big money now. Full information given free. Write—Compo-Text, Box 786-F, St. Louis, Mo.

LEARN Shell jewelry manufacturing. Complete, simplified home instruction course, beautifully illustrated, shows 45 styles pins, earrings, brooches, sprays, hair ornaments. Includes pearlizing, dyeing, gilding, glow-in-dark methods. No tools needed! Learn-earn within a week. Only \$1 postpaid, including wholesale prices of all raw materials. House of Gifts, Box 4550-AS, Coral Gables, Fla.

POPULAR SCIENCE OPPORTUNITIES

AT Home—Your own manufacturing business; making popular \$1.00 novelties. Cost you 3c to 15c. Everything supplied. Write So-Lo Works, Dept. F-601, Cincinnati, Ohio.

START Mallorder Bookshop—Everything furnished; publisher cooperation. 25c brings booklet, exclusive setup, samples, exciting ideas. General Publications, Ossining 1, New York.

MAKE Big Money. Exceptional Opportunities. Real Money Makers. Free Particulars. Turner, 5675-B Lannoo, Detroit, Mich. \$5,000 YEARLY Possible, selling books by mail. Distributors proposition. Nichols Publishers, Box 831, Pine Bluff 3, Ark.

MECHANICALLY Inclined Men—Own and operate general Appliance Repair shop. Complete, illustrated course shows you how. Welding, Refrigeration, Motor repair. How to get business, etc., all phases covered. Free literature. Christy Supply, Dept. 764, 2835 N. Central Ave., Chicago.

RECAST old batteries into new. Latest achievements. Battery Laboratories, Minneapolis.

BIG money in Plastics at Home. Free details. Anderson, 311M George St., Toronto, Ontario.

"10,000 ALASKA Fishing Jobs." Alaska's largest industry regularly employs thousands of men and women in seafoods production. Possible earnings up to \$5,000 in few weeks. Authentic 7,000-word copyrighted report gives job information, union requirements, sample application letter, names and addresses over 40 Alaska fisheries. Newest edition includes similar information on California, Oregon and Washington fisheries. Vital facts for immediate application in a permanent industry. \$1.00. 7-day refund privilege. Pacific Industrial Research Bureau, Dept. PS-9, 202 Studio Bldg., Portland 5, Oregon.

START a mallorder business in spare time. Details free. Monarch, 38-B Jefferson, Auburn, New York.

SPECIALTY Manufacturing, the big money business that can be operated anywhere, start on a very small capital; we supply dependable formulas and complete instructions; get interesting Free booklet, "Money-making Opportunities in Specialty Manufacturing." Howard Robinson, Ph. G., 1300-B S. Ohio St., Sedalia, Mo.

TYPEWRITER Repairing—Original Course—Simplified Home Study. Weber Typewriter Mechanics School, Box 269, Osborn, Ohio.

WHOA Now! Business Opportunities. Start a spare time Mail Order Business. Send for "Dollar Tips", plus "Progressive Mail Trade", 52 page magazine. Your copies are ready. Send today. Only 25c (coin) Postpaid. The Rampud Co., Box 1857, Denver 1, Colorado.

BE Your Own Boss, lets tell you how. Postal brings facts. Hip's Mail Service, 6550 Oleatha, St. Louis 9, Mo.

LIQUID Marble—Colorful, glazed Molded, brushed, sprayed! Composition floors, Rubberlastic Molds, Plastic Homes. Particulars free. Marbleizing Service, Edwardsville, Illinois.

MANUFACTURE Costume Jewelry At Home For Profit. Hobby, Therapy. Free Wholesale Supply Catalogue. Instructions. Florida Supply House, Bradenton, Fla.

WELDING is growing day by day. Good business to enter Now. Get this 400 page nationally known book on welding. Simple instructions, many illustrations and photographs. Complete "Know how" information given by recognized experts. Send \$1.00 for this wonderful book and complete details how to earn home and shop welding outfit. You learn and earn. Magic Welder Mfg. Co., 193 MS Center St., New York City.

"How To Make Simple Molds and Plaster Plaques." Profitable Business or Hobby! Instructive booklet 25c. Plastercraft, 1406 East 43rd St., Cleveland 3, Ohio.

ELECTRICAL Appliance Repair. Open your own shop. Learn house wiring; electric motors, vacuum cleaners, washers, etc. Complete illustrated course shows how. Free booklet. Pacific Training School, Dept. AS-1, 7217 S. Broadway, Los Angeles 3, Calif.

BE Independent. Start a business of your own and enjoy financial freedom. Little or no cash required. 3c stamp brings full details. W. M. Drexler, 258 Broad, Newark 4, N. J.

DO it yourself! Thousands strangely richer! Permanent security! Easy, lifetime, tremendous mallorder work! A Better Living wants you! Honest! Airmail dollar. (Seal Envelope.) Results or refund! ZigZag Corporation, Box 101-X Guatemala, Central-America.

FINEST Quality Liquid Molding Rubber—Sample mold Free. "Better Rubber makes Better Molds." \$3.00 quart, \$10.00 Gallon. W. Wolley, 115-B Donald, Peoria, Ill.

If you would like to make \$5,000 yearly in an easily learned office business of your own, send for free details immediately. G. E. Cole, Pres. Syracuse 2, N. Y.

EXTRA Profits 50 to 75% Home Mail Order Business. Details Free. Campbell Service, 1626 E. 75, Cleveland 3, Ohio.

NEW air curing liquid rubber to make molds for plaques and statues. Our repeat orders speak for themselves. Apex Plastic Products, 1740 Estes Ave., Chicago, Ill.

MOULDS made to order—send your moulding problems to us. Average cost \$3.00 to \$5.00. Mass production setups \$5.00 and up. Mail us your model and we will build the rubber mould. Also new models and moulds. Vallance Art Products, 1873 E. 70 St., Cleveland, Ohio.

AMAZE others. Add columns instantly. Add faster than adding machine. Free details. Maths Institute, Box 633, Mobile 4, Ala.

SYNTHETIC Latex with Neoprene base for making flexible molds! Quick drying! Quart \$2.00, Gallon \$5.95. Full instructions. Plastercraft, 1406 E. 43rd St., Cleveland 3, Ohio.

FREE Literature—Tested Money Making Business Ideas. Kelly, 1080-D Casgrain, Detroit 9, Mich.

20th CENTURY Opportunity. capitalize your ability, no selling or canvassing just common sense and will power for financial independence. Write today. Barry, 87 Central Ave., White Plains, N. Y.

SEND details of your business for free inclusion in business directory here. MVL, Box 3742, Johannesburg, South Africa.

NAMES, Fresh Productive, Inexpensive. Buyers, Opportunity Seekers. Professional. Most any class names \$5.00—1,000. On Perforated Gummed Sheets. Write Dixie, King, N. C.

METAL—Plate Baby-Shoes. Complete, Illustrated. Metalloids, Box 8087, Dormont, 16, Pa.

GOT \$24,500 using 'schemes' from "Schemer" Magazine. Alliance, Ohio, 48th year, \$1.00; four samples, 30c.

10c BRINGS You lots of mail! Money making ideas, publications, home work plans. Yearly listing. Gardenville Publishers, Gardenville 2, New York.

MAIL Order Opportunities. Read oldest Trade Journal. Copy 25c. Mail Order News, Somerville 47, N. J.

YOUR Big mail order opportunity—No time has ever been as good as right now. Get your start right. Let me show you how, what to sell and who will buy. Big profits, easy work at home. Write, H. S. Smith, 3139A S. Mabbett Ave., Milwaukee 7, Wis.

TYPEWRITER Repairmen urgently needed. Earn \$40 to \$50 weekly spare time. Our easy to learn home study course teaches how to repair typewriters. Write for free information. Houston Typewriter Repair Service, P.O. Box 5357B, Houston 12, Texas.

PLASTICS Directory lists wholesale and retail dealers in thousands of items, materials, molds, machines, equipment, supplies. \$1. Plastics Digest, 3937R Tracey, Kansas City 4, Mo.

ACHIEVE Wealth! Authenticity Guaranteed \$1,000! Send for explanation. Katcher, 186 Rutledge St., Bklyn. 11, N. Y.

PROFITABLE Mailing Service Business. Quarter (refundable) brings Success Booklet. Al Riegel, 1111 Harrison, Phila. 24, Pa.

FELLOW Workers—Down with Bosses—Start own business—Be Independent—Booklet describing 137 Tested Plans, free. P. Padney, 307 York St., Jersey City, N. J.

RUBBER Moulds for casting novelties. Latex for making Moulds. Use thoroughly tested and approved products. Eastern Latex Laboratories, Box 153, Mattapan 26, Mass.

LATEX for making flexible rubber moulds. Thoroughly tested. No shrinkage. Complete instructions with each order. Stoneham Rubber Co., Box 244, Stoneham 80, Mass.

START coin machine route. Buy new machines. Immediate delivery. Prices \$35.00 to \$25.00. Write for circular. Webb Distributing Co., Dept. P60, 6S, Kedzie Ave., Chicago 12, Ill.

MAKE and Mold genuine plastics. Forty worksheets with 70 illustrations explain simple home and shop methods—processes. \$1. Free circular. Plastics Digest, 3937D Tracey, Kansas City 4, Mo.

PROFITS—Barrains buy everything wholesale, our classified guide shows how 10c. Box 12-B, Oaklandon, Indiana.

FREE hot water from sunshine. Build Solar Systems. Big money. Virgin territory. No competition. Write for details. Miami Solar Water, Box 175, Dept. A, Coral Gables, Fla.

OPERATE Name List Business By Mail. Full or Spare Time. Details Free. R. A. MacAndrews, 8 Buick St., Calais, Maine.

QUICK Money! "Repairing Car Batteries." At home, Easy too. Write, Batterymen, 901 South Avenue, Grand Junction 1, Colorado.

HANDY Men—Earn money home operating Community "Fix-It" Shop. Write, Stafford, 708 Rawlings, Carbondale, Ill.

SIX Mail Order Magazines, All Different. 16 to 72 pages each. Full of Money Making Information 25c. Kraft, 3114-S2 Walnut, Chicago 12, Ill.

WONDERFUL opportunity for person interested in Part-time wholesale dealer-ship. Veterans preferred. Write for application. Danco Distributors, 3933 "D" St., Detroit 16, Mich.

CLUBS—Individuals—Veterans—Investigate. Real money making plan. Box 627, Lynn, Mass.

CASH in every mail. Send 25c for 40 page book. Formula, Box 301, Hamilton, Ohio.

START a clock shop while clock repairing is booming. Our easy to learn home study course with pictures and illustrations teaches you how to repair all kinds of clocks. Information free. Houston Clock Shop, P.O. Box 5086B, Houston 12, Texas.

SPLendid New Opportunity to get into legitimate Mail Order Advertising and Selling. Start small, expand rapidly. "How" booklet 10c. Kraft, 3114-S6 Walnut, Chicago 12, Ill.

MAIL Order Business can be your future. Same as hundreds advertising in this and other publications. "How To Build Your Own Mail Order Business"—noted Specialist's 10,000-word Treatise—shows how to make it pay on small-capital-start, 25c postpaid. Satisfaction guaranteed. Maupin & Maupin, LaFayette 3H, Indiana.

POPULAR SCIENCE OPPORTUNITIES

HEALTH First! New Drugless Method. Dynamic techniques; quickly learned. Results Unbelievable. Big earnings operating a "Health Conditioning Club". Metabolic. B9128-C, Sta. S., Los Angeles.

MAKE "WonderLink" Jewelry. Profitable sideline! Free details. Trial 200 links and instructions, \$1 (refundable). Plastic Works, 712 Kimball, Danville 2, Ill.

COLOR Concrete with Chemicals. Big money making Hollywood style pottery, birdbaths, without moulds. Washing-wells, stucco-rock, benches. Marbling, cement water-paint. 10c brings sample, literature. Pictures. Hollywood Cementcraft, 8530 Wonderland, Hollywood 46, California.

LIQUID Rubber for making flexible molds. Literature and Sample free. Chaney, 1130 E. 16th St., Jacksonville 6, Fla.

BEAT Inflation. Clothes and groceries from local merchants. No selling. Use spare hours at home. Complete seven point plan \$1. R. Blair, Box 225, Zeeland, Mich.

BIG money silvering mirrors. Easiest method, best results. Rumfeld, 5716 Junius, Dallas, Texas.

OWN A mailorder paper products business. Sell envelopes, tags, bars, boxes, by mail, wholesale. Tremendous demand. Steady profits. No capital necessary. Write Omaha Envelope Service, Dept. 146, 4721 California, Omaha 3, Nebraska.

TREMENDOUS profits mailing literature. Dealers information 3c. Generalprints, East Orange, N. J.

THINK of it! How would you like to become a Millionaire in three years? Yes, it is possible. By saving only \$1.00 a week. The most Astonishing Plan that was ever conceived. An investment that is Guaranteed against any loss, and no risk whatsoever. Your money returned Dollar for Dollar in three years. This Plan is based upon Proven Financial Principles and Approved by the most Conservative Financiers. It defies contradiction! It challenges criticism! The Plan that will "Electricity" the world. Send only \$1.00 for attractive colored booklet giving complete details, or send only 25c for large folder giving more information. It is Positively Guaranteed to be exactly as represented or your money will be refunded. United Profit-Builders, 305 West 8th St., Dept. 2-M, Los Angeles 14, Calif.

TYPISTS, start full or part time business at home addressing envelopes, stickers, etc. Complete authentic information 50c. Gaunt, 3521J Broadway, Chicago, Ill.

JIGSAW Owners: Square foot of Plywood Yields \$46. Write, Woodarts, K-48, Bridgewater, Mass.

DISTRIBUTE Vitamins, Minerals, Health Books, Concentrates, Free Catalog. National Products, Portland 2, Oregon.

QUICK, sure Money, Tested, Annie Blain Flavors, Geo. S. Parker, New Brunswick, N. J.

START your own business! But first get the facts—facts that will help you get started and facts that will help you avoid costly mistakes. Our complete reports give you such information as: capital requirements, advertising, location, profits, etc. Each complete report is available for \$2.00. Send for a report on the business listed below that you would like to start. Auto Laundry, Beauty Salon, Summer Camp, Sporting Goods Store, Gift Shop, Bookstore, Overnight Cabins, Tea Room, Taxi Business, Restaurant. Mr. Jackson, Research Dept., Box 483, Westfield, Mass.

MAKE Plastic Jewelry. Free information. Attler Comp., 23-60 29th, Long Island City 5, New York.

MAKE flexible molds! Cast plaques, novelties, bookends! Free sample! H. Tooker, 630-R Chestnut, Hamilton, Ohio.

FORGE Ahead: Enter mail order's most profitable business through entirely new arrangement. Small starting capital. Request particulars of Special Setup with Sales Guarantee, by letter. Mention, if Veteran, Enterprises, Dept. 312-A, 5345 Harper, Chicago 15.

BRONZE baby shoes! Big profits! New field! Details free. Write Opportunity Center, Box 349, Long Beach 2, Calif.

MAKE Money Anywhere. 64-page book gives 300 mailorder plans; business ideas, secrets; formulas—25c. Moneyback Guarantee. R. John, Box 1651D, Milwaukee.

NEW tested mail order plans. Details free. Boucher, Box 1391, Yakima, Wash.

FIREWORKS! Firecrackers! Torpedoes! Free Catalog. Mackay Specialties, Box 441-A, Mackay, Idaho.

A PROFITABLE business of your own with glow in the dark products. Sample 10c (refund). Progressive, 2160 Bleeker, Brooklyn 27, N. Y.

EARN Up to \$2,000 year, inventing simple items for special cash markets. Ideas only. No patents. Hendrickson, Argyle 8, Wis.

ADVERTISING Simplified, earn big pay. Learn in 3 months or money back. Introductory offer \$1 postpaid. Young Publications, Kent 4, Ohio.

POCKET up to 40% of Nationally Advertised price. Radios, Household Appliances, Sporting Goods, etc. Buyers' King, Landover, Md.

START Right. Develop successful, Profitable Mail Business. Free Literature. Jay Peterson, Box 752-A, Minneapolis 1, Minn.

RAISE fish worms small capital, big profit. Picture with instructions Three dollars money order. H. W. Patton, 1769 Old Shell Road, Mobile 17, Ala.

OPERATE profitable home mail order business. Small investment. Details free. The Tower, 800 Tower Ave., Hartford, Conn.

FACTORY repaired Shoes, Army, Others, Wholesale Retail \$1.95 pr. Photo on Request. "Gadgets", Box 28W, Jackson Heights, N. Y.

UNPAINTED Wall Plaques, Bookends, Novelties. 100 Assorted \$3.45, 30 Diff. "Samples" \$1.00. Illustrated list Free. Oman, 642 Broadway, St. Paul 1, Minn.

SMALL Capital Starts Your Own Advertising Agency. At Home in Spare Time. Complete Operation Exposed. No Stock or Equipment. Opportunity For Large Earnings. Stamp Brings Folder and Proof, S. Sander, Box 4907-A, Philadelphia 19, Penna.

STOP! Don't throw it away. There could be a fortune in your attic or cellar. Fascinating particulars 25c. Research Enterprises, P.O. Box 5296, Highlandtown, Baltimore, Md.

YOUR own business. Complete plans, supply sources, Formulas, Show You How Easily. Only 50c. Louis Greenblatt, Box 2452-FS, Paterson, N. J.

WOULD You like shot at \$20,000 on investment of \$807? Maybe you've already heard of Colorado's fabulous oil boom. I'll look after everything for you for small percentage of profits; 30 years experience. Write today. Dyer, 1835 Champs, Denver Colorado.

MEN Women, start own business, home, office; no peddling; little or no investment. Folder describing collection of 137 plans free. Saunders, Box 246, Ambridge, Penna.

ESTABLISH Modern Mail Order Business. Special dealers proposition. Complete information on request. Dee Hill, Pilot Mountain, North Carolina.

MIDGET Motion Pictures: Material, "details" how make, use, sell. \$1.00. Midgmore, 5922, Hollywood 28, Calif.

\$200. Weekly possible. Several hundred successful men give you Priceless Information in book 101 Ways To Be Your Own Boss. You too can start a Prosperous Business of your own now with Small Capital. Book prepaid one dollar bill. Satisfaction or refund. Lewis Service, 22 Liberty St., Poughkeepsie, N. Y.

OPERATE profitable Home Mail Order Business. Details free, Robert Haney, Mather, Wis.

WOULD you pay 3%—first \$350 made? Color-illustrated book "506 Odd, Successful Enterprises" free! Some offer occasional "day off." Work home. Expect something odd! Pacific, 262-R Drake, New Rochelle, N. Y.

METALLIZE Baby Shoes! Learn this money-making business from nationally recognized consultant. See Kushner Ad Page 285.

CAST bookends and novelties. We furnish rubber molds and buy your unfinished castings. Free information. Mold Craft Industries, Manheim, Pa.

INCORPORATE in Delaware. Many advantages. Free details. Corporation Fiscal Company, Inc., Delaware Trust Building, Wilmington, Delaware.

FREE booklet describes 137 tested money making plans Home or Office. Sem Tem Service, 24 Wall St., Norwalk, Conn.

PROFITABLE Home Business—Cast Plaster and "Marble" Novelties and Statuary. Formulas, Instructions—\$1.00. Standard Products, P.O. Box 5822, Dallas, Texas.

BOOKKEEPERS: General ledger and tax report experience. Operate permanent, profitable accounting service for the smaller business. Part or full time. Simplified method. Write now! L. A. Bell, 1402 West 26th Street, Cleveland 13, Ohio.

MALE Bookkeepers, Accountants everywhere earn big money posting journal entries spare time at home. For details write National Bookkeeping Service, Porter Bldg., Room 402, Kansas City, Mo.

50,000 JOBS Abroad—send \$1.00 for list. Many U. S. Firms with Foreign Interests and Complete Information Concerning Job Applications. Research Bureau, P.O. Box 71, South Gate, California.

SELL By Mail, Particulars Free. Write Frank J. Arts, 10695 Harding Drive, Toledo 9, Ohio.

BE Your Own Boss. Invest \$17.50 for tools and make up to \$150.00 weekly regrooving tires for used car dealers. Write Ideal Tire Groover Co., New Hudson, Mich.

GUARANTEED Income! Grind Lawn mowers. Instructions \$1.50. Mowers, Janesville, Wis.

WHY Job Worry? Learn Electro-Plating. Interesting, Highly Paid Business. Postcard Brings full details. Free. Plater Hyde, Dept. SC, P.O. Box 176, National City, Calif.

START Health business by mail small investment. Burke, 1345, Robson, Vancouver, Canada.

WHAT Makes You Think You Couldn't Sell By Mail? We're Doing It, Happily! New! Different! Exclusive! Alive with Money-Making Opportunity. Full Particulars Free. Investigate! Compare! The What-To-Do Shop, Box 1082, Tacoma, Wash.

OPERATE profitable Mail order business on \$5 capital. Information Free. Robert Taylor, 65 W. Gt. Miami Blvd., Dayton, Ohio.

HARDWARE Business is one of the most interesting and profitable of them all. Be independent. You can start your own retail store with small investment and no previous experience. 18,000-word copyrighted booklet tells you how. \$1.00 postpaid. C. R. Divan, P. O. Box 325, Santa Monica, Calif.

\$4.97 PUTS You in business. Write, Midwest Drug Co., Dept. 5, Columbus 15, Ohio.

SELL by mail. Books, courses, popular specialties! Big profits! Write Albert Wilcox, P.23, Nicholls, Georgia.

LIQUID Marble—make in any color. Soundproof Plastic Flooring. Flexible molds. Cast novelties, plaques, statuary. Big Money, your own business. Free information. Write, Bing Products, 88-BP Broad St., Boston 10, Mass.

GO into rug and upholstery cleaning and mothproofing business. Extra double profits selling these two professionally used products to stores and homes. Russell-Johnson Co., Clarkfield, Minn.

BABY Shoes Preserved. Complete Instructions. Exclusive Rights. M. E. Watson, Bellefontaine, Ohio.

MAKE Strange new plastic ic pound. Makes durable, attractive floors, walls, roofs. Build for half. Bays Laboratory, Oklahoma City 9.

POPULAR SCIENCE OPPORTUNITIES

25 BUSINESS SERVICE

GOOD "Used" self-instruction educational books on all subjects bought, sold, rented, exchanged. Satisfaction guaranteed. Complete information and 100-page illustrated bargain catalog Free! Write—Nelson Co., Chicago 5.

MAIL forwarded 25c. Postcards mailed 15c. Personal and business representation. St. Louis souvenirs 25c. 50c. Beautiful Photobook. \$1.00. Multicolor Folder 35c. Mail Service, Box 1784, St. Louis, Mo.

LET us know your wants, Thriftmaster, Box 61, Times Square Station, N.Y. 18.

TO Whom It May Concern: We will represent you in the principal cities of the United States: Alaska; Brazil; Canada; Cuba; Greece; Hawaii; Mexico; Newfoundland; Panama; Philippines; Puerto Rico; South Africa and Sweden. Personal or business assignments \$1 per hour. James W. Farley, Citizens Bldg., Cleveland 14, Ohio. Note: Would appreciate hearing from someone who wishes to enter this business in your city. Will send you assignments immediately. References exchanged. State qualifications.

26 CAMERAS, PHOTO SUPPLIES

HAVE You a camera. Improve your hobby of photography and learn how to make better pictures. Write today for our latest book catalog and sample copy of American Photography, containing articles and pictures by the world's foremost writers and photographers. Camera House, 603, 353 Newbury St., Boston 18, Mass.

PHOTOGRAPHY for pleasure or profit. Learn at home. Practical basic training. Long established school. Write for booklet. American School of Photography, 1315 Michigan, Dept. 1742, Chicago 5.

CASH! Spot cash for cameras, lenses, binoculars, movie and still equipment. Send full description for prompt cash offer. Over 36 years of dependability. Bass Camera Co., Dept. SP, 179 W. Madison St., Chicago 2.

USED Camera Directory, Box 1031-K, Canton, Ohio—lists hundreds of War-Bargain Used Cameras—35mm, Speed Graphics, Kodaks, Rolleiflex—many others. Send 25c for latest issue.

"PHOTOGRAPHY For Fun", 50c. Free catalog. Stone, Lunenburg 55, Mass.

BASS Says: Trade Cameras? For 36 years Bass has satisfied thousands everywhere! Finest equipment available. Always Satisfaction Guaranteed Or Your Money Back! Bass buys 'em, trades 'em. Bass Camera Co., Dept. SP, 179 W. Madison St., Chicago 2.

PICTURES from everywhere. Build priceless collection of worthwhile prints. Exchange with camera enthusiasts everywhere. Beginners or advanced workers. All sizes—subjects. Bi-monthly bulletin. Years registration \$1.00. Information free. Photographic Exchange Club, 1206-A New York Ave. N. W., Washington 8, D. C.

FALCON. The Outstanding Miniature Camera with carrying case \$4.35 postpaid. Miller's, 6108 Irving Park, Chicago 34.

ADVANCED amateurs anticipating opening business, amazing details. Photographer, Midland Park, N.J.

FILM! High speed, Five rolls, eight exposures, postpaid: No. 127 \$1.45; 120 \$1.75; 620 \$1.75; 116 \$2.00; 616 \$2.00. Artex Film, Union, New Jersey.

FOR Immediate Delivery Cameras and Equipment: Movie Cameras, Projectors, Still Cameras, Enlargers, Lenses, Screens, Printers, Trays, Film, Paper, Chemicals, Reflectors, Drivers. Complete stock of Dark-room Equipment and Hundreds of Other Photographic Items. We pay highest prices for used cameras and equipment. Send for Free New Big Catalog. Flash Photo Sales, 30 W. Washington St., Dept. M1, Chicago 2, Ill.

PHOTO Finishers, \$15 per thousand cash paid for empty spools 127, 120, 620, 116 and 616. Write stating quantities available. Howard West, 3 W. 42nd St., New York 18, N.Y.

CAMERAS. New candid model. Good lens. Takes 16 pictures on 127 film, \$3.35. With camera order, 127 films 27c—limit dozen. Projectors, new "Excel" 16mm, A.C. Motor Driven, complete \$15.50. All Postpaid. Photo-Craft, Box 470-R, Jamaica 1, New York.

FILMS? Fresh? Dated 1948. Outdoor type, 127—\$4.00 Dozen, 120 or 620 \$4.81 Dozen, 116 or 616 \$5.41 Dozen. Postpaid. "Camera-man" 542X 6th Ave., New York 19.

27A CANDY MAKING

MEN—Women—"Everybody Likes Candy". Learn to manufacture professionally at home. (Our 35th Year). Ragsdale Candies, East Orange, N. J.

30 CARTOONING, SIGN PAINTING, DRAWING AIDS

CARTOON Courses—22 Easy Lessons, 200 figure sketches, 25c coin postpaid. Snack-Pack Co., 32 E. Georgia, Indianapolis 4.

CARTOONING. Draw comic characters instantly. Complete charts, instructions. \$1. Felix Studio, Box 337, Duluth, Minnesota.

"CARTOONS and Drawing," (31 lessons), 50c! Free Catalog. Stone, Lunenburg, 1, Mass.

"HOW to Make Money With Simple Cartoons." A book everyone who likes to draw should have. It is Free; no obligation. Simply address Cartoonists' Exchange, Dept. 1446-C, Pleasant Hill, Ohio.

CARTOONISTS Attention! Book of nearly 300 cartoon markets, addresses of places to sell your cartoons. Only \$1.00 postpaid. William Lewis, P.O. Box 42, Butters, North Carolina.

ARTISTS, Students. Newest books courses, supplies. Bargain lists free, Art Book Shop, Arnold 2, Mo.

SIGNS Made easily. Instructions and ten sets modern alphabets, numerals, patterns. Sizes up to eight inches. All for \$1.00. Co-operative Business, Box 638, Chicago.

CARTOONISTS Magazine, Lessons, Plans, Markets! 25c Coin. Hartman, 2436 W. Lincoln, Nebr.

MAKE Signs, letters, stencils, 9 complete alphabet pattern sets, 3 complete numeral pattern sets and catalog \$1.00. Sign Letter Distributors, P.O. Box 101, Mineola, N. Y.

31 CHALK TALK-STUNTS

CHALK Talks. Laugh Producing Program \$1.00. Illustrated Catalog 10c. Cartoonist Balda, Oshkosh, Wisconsin.

33 CHEMICALS AND APPARATUS

LABORATORY Supplies at Wholesale Prices: Chemistry, Biology, Physics. Catalogue, 10c. National Scientific Co., 2204 W. North Ave., Chicago. Established 1908.

WINN'S New Idea Champion Chemical-Kits, Apparatus—Outfits and Supplies for Students Home Experimenting. (Established 1931). Send 10c for catalog. John H. Winn, 124 W. 23rd St., Dept. 612, New York, N. Y.

LUMINOUS Paints will glow in dark. Six colors. Fairmount Chemical Co., 136 Liberty St., New York City 6.

NEW 36 Page chemical apparatus order book. Complete line of chemical glassware, apparatus and chemicals. Send 10c for this book. Standard Science Supply Co., 1232 N. Paulina St., Chicago.

STUDENTS' Laboratory Supplies. Send 5c for catalog. Mel-Glo Chemical Co., 258 Fourth Ave., Brklyn, N.Y.

CHEMISTS—Chemical questions answered. Formulas, Analyses, Minerals. Platos, 28 Erwin Place, New Britain, Conn.

LABORATORY supplies, chemicals, glassware, apparatus. Lowest prices. Pamphlet free. Meyer Scientific, 76-A Willoughby St., Brooklyn 1, N. Y.

CHEMISTS, Inventors, Home Experimenters: Laboratory Glassware made per your specifications. Write Glasstube Products, 185 Acacia Ave., Hawthorne, Calif.

GOVERNMENT surplus bargains! New hand-operated, high-speed centrifuges. Free circular. Kokomo Laboratory Supply, 1518 W. Walnut, Kokomo, Indiana.

CHEMICALS and apparatus for industrial, analytical, and private laboratories. Complete supply service for correspondence school students. Send 3c for catalog. Dept. M-26, Biological Supply Co., 1176 Mt. Hope Ave., Rochester 7, N. Y.

HANDBOOK and apparatus for Industrial Experimenters. Hundreds of experiments: Illustrated: 50c. Experiment Booklet, 15c. Chemical Catalog, 5c. Reading Scientific Co., Reading, Pa.

FREE Catalog: Chemistry, mineralogy, biology, optics. Tracey Laboratories, Evanston, Illinois.

CHEMICALS, Equipment, Books, Etc. Special Offers Free. Hallmark Technical Supply Co., Jamestown, New York.

CHEMICAL Experimenters Supply Catalog 5c. Colonial Chemical Co., Brockton 28, Mass.

CHEMISTS supply catalog 5c. Arc Chemical Co., 1910 Arthur Ave., Bronx, N. Y.

CHEMICALS, ounce quantities, apparatus, catalog 5c. Fleischer's Laboratories, Everett 49, Mass.

36 COIN COLLECTING

FREE! Foreign coin, banknote and Coin Collectors' Illustrated Catalog to approval service applicants, Send 3c postage. Tatham Coinco., Springfield-050, Mass.

LARGE Genuine Ancient Roman Coin, \$1.00. Twenty different coins, 15 countries, \$1.00; 50 different coins Allied Nations \$5.00; 40 different coins defeated nations \$5.00. Lists Approvals. Delmonte, 40 W. 18th St., New York 11.

10 INDIAN Head cents, different dates also price list, 40c. Schultz, 1053 1/2 Richwood, Cincinnati, Ohio.

25 DIFFERENT Coins \$1.00. Harry Eisholz, Box 9014B, Pittsburgh 24, Pa.

25 DIFFERENT Foreign Coins \$1.00. Royal Coin Co., 40 Province, Boston 8, Mass.

WILL Pay \$10.00 each for certain Lincoln pennies! Indianheads \$50.00; Dimes \$1,000.00, Catalogue 10c. Federal Coin Exchange, 7-PS, Columbus, Ohio.

HIGHEST Prices I pay for gold, silver, copper coins and Notes. Write, C. J. Dochku, 3523 E. Thompson St., Phila. 34, Pa.

TWENTY Different Finely Selected Coins, \$1.00. Oddehon, Box 482, St. Louis, Mo.

GENUINE Confederate bills; 5 different, only \$1.00. DuBose, Box 993, Atlanta 1, Ga.

441 ANTIQUE Firearms—5,000 Bargains: Rifles, Coins, Fossils, Indian Relics, Carabines, Cartridges, Minerals, Antiques. Catalog #10 with Photographs, 25c. Heike, Wenona, Ill.

\$5. to \$500 EACH paid for hundreds of Old or Odd Coins. Send Ten Cents for Illustrated Coin Book, 4 x 6. Guaranteed Prices, 40 years in business. Get Posted. Coin Exchange 2, LeRoy, N. Y.

QUICK Service; reasonable prices. United States catalog 10c. Foreign catalog 10c. Ben's Coin Shop, 72 W. Washington, Chicago 2, Illinois.

TWENTY different Indian head cents \$1.00, price lists 3c. E. Walton, 7 Water, Boston 9, Mass.

POPULAR SCIENCE OPPORTUNITIES

38 CONSULTING ENGINEERS

ENGINEERING Service: complete plans, research, design (Electrical, Civil, Mechanical) at a price you can afford. Write for free estimate, William H. Jacques Associates, Consulting Engineers, Zobel Bldg., Red Bank, N. J.

42 DETECTIVES

DETECTIVES—Work home—Travel. Experience unnecessary. Write, Wagoner P-125 West 86th, N. Y., N. Y.

DETECTIVE Training, Phillips Secret Service, 1917-C North Kenneth, Chicago 39, Illinois.

43 DOGS, BIRDS, PETS, RABBITS

A LIVING with Rabbits and Cavies. Markets Waiting. Magazine 10c. Book describing twenty breeds and magazine 25c. Book and magazine (monthly) one year 50c. Address Small Stock, Dept. 5, Pearl River, N. Y.

ANGORA Rabbits—Valuable wool! Giant chinchillas—luxurious two-tone fur! World's most profitable rabbits. Raised anywhere. Finest pedigreed breeders supplies. Illustrated literature free. Grinsteads, Edwardsville, Illinois.

GUARANTEED Giant Chinchilla Rabbits. Prolific, Profitable. Most valuable fur. Markets furnished. Details Free. Willow Brook Farm, R16, Sellersville, Pa.

RAISE Moneymaking Angora Rabbits. Wool \$14.50 pound. Plenty markets. Particulars free. White's Rabbitry, Lawrence, Kansas.

ST. BERNARD Pups: Champion sire! beautiful beauties. Franklin Young, R. 3, Riverhead, Long Island, New York.

RAISE Guinea Pigs. Make money at home. Big demand. Booklet free. Taylors Cavy Farm, Hapeville, Ga.

GUINEA Pigs—easily raised profitable pastime. Big Demand Low feeding cost. Small investment. Details 25c. Guinea Pig Farm, s-3456 W, 116th St., Chicago 43, Ill.

YOUNG Homer and King Pigeons \$1.50 a Pr. Jewel Game Farm, Danville, Ill.

USEFUL beautiful Collie-shepherd pups \$12. Paul Schultetus, New Liberty, Ill.

MAKE your living plucking Angora rabbits. House of Angora, Springfield, Ill.

RAISE Diamond Seal Rabbits. We pay \$25 to \$50 each. Literature 10c with Hutch plans \$1. Automatic cleaning, feeding, watering, 31 Drawings, Hansens Rabbitry, 1347 Miller Ave., Salt Lake, Utah.

45 DRAFTING INSTRUMENTS

SAVE on drafting materials. Free catalog. Draftsmen's Supply Co., 32 North Wells, Chicago 6.

DRAFTSMEN — Architects — Engineers. Kleenzeit Drafting Powder guarantees you cleaner drawings, sharper lines, better prints. 25c box, \$2.40 dozen. Coates Specialties, 821 Zack St., Tampa 2, Fla.

46 DRAWING & ART SUPPLIES

ARTISTS' brushes, paints, instruction books available. List free, Pioneer, Box 394-PSA6, Austin, Minn.

47 EDUCATIONAL AND INSTRUCTION

GOOD "Used" self-instruction educational books on all subjects bought, sold, rented, exchanged. Satisfaction guaranteed. Complete information and 100-page illustrated bargain catalog Free! Write—Nelson Co., Chicago.

MATHEMATICS: Key To Success. Learn by New Home Study Methods. For trades or professions. Also reviews. State Education and kind desired. New Home Study Methods, P.O. Box 51, Flushing, N. Y.

PSYCHOLOGY teaches about mind. Biology teaches about body. Bio-Psychology teaches about powers of mind over body. Use powers subconscious mind. Select proper vocation. Grow. Broaden education. Develop personality. Control emotions. Succeed. Correspondence. Dept. P, Taylor School of Bio-Psychology, Chattanooga 1, Tennessee.

U.S. Government Jobs! \$1506 to \$2650 year. Many examinations in next few months unusual opportunity! Prepare immediately at home. Full particulars Free. Write today, Franklin Institute, Dept. R26, Rochester, N. Y.

USED Correspondence Courses, Educational and Technical Books, Bought, Sold, Rented, Catalog Free. Educational Exchange, Henagar, Ala.

GOOD Jobs and a Sound Substantial Future await you in hotel and institutional field. Men and women—all ages—needed for well-paid positions that offer color, excitement, ever-new and fascinating duties. Record-breaking travel means even greater opportunities for trained men and women in hotels, clubs and institutions. Lewis School receiving calls for managers, assistant managers, stewards, hostesses, purchasing agents and 55 other types of important positions! From coast to coast there are important positions that offer splendid opportunities for advancement in a business where you are not dropped because you are over 40. Previous experience proved unnecessary! No need to leave your job to qualify. A good grade school education, plus Lewis Training qualifies you at home. In spare time. Our National Placement Bureau helps to place you—and our amazing Certified Job Plan—actually certifies you will "make good" when placed. Write today for Free book! Veterans: This course approved for Veteran's training. Lewis Hotel Training School, Room HO-2768, Washington 7, D.C. (First and only School of its kind—now in its 30th year.)

ACCEPT Jesus Christ as your Saviour today and keep the ten commandments. Free Bible course, Voice of Prophecy, Box 55, Los Angeles 53, Calif.

BECOME a Doctor of Psychology or Metaphysics. Teach secret of contentment, happiness. Win degree of PsD or MsD. Solve mental worries. Free book. College of Universal Truth, 5153-A N. Clark, Chicago.

FOR an extremely profitable lifetime business, operate a Collection-Credit Bureau. Easily learned. Write: Cole & Associates, Syracuse 2, New York.

CLINICAL Laboratory Technicians in great demand. We train you in your spare time. In your own home. You can practice while studying. Write for free catalogue. Imperial Technical Institute, Box 973-B, Austin 5, Texas.

HYPNOTIZE Anyone. Secrets revealed. Learn psychotherapy. Exciting hypno-analytic experiments. Stop smoking, drinking, insomnia, stuttering, nail-biting, nervousness. \$1.00 postpaid. Mohr, 71-01 35th Ave., Jackson Heights, N. Y.

MEDICAL Hypnotism and Suggestion—Lessons in Hypnotism and Suggestive Therapeutics Postpaid 30c. Kirk Sales, Box 84, Wellington, Ohio.

EARN \$25.00—\$50.00 or more. Change your future with a \$5 bill. C. D. Jorg, P.O. Box 882, Oakland 4, Calif.

SOUTHERN Winter hotel positions. Beginners instruction courses. Write Lee Hotel Institute, 7 Water St., Boston.

LEARN plane trigonometry better than others. Read Master Method Instructions. Wonderful ideas, 12 mimeographed sheets; \$1. guaranteed. J. Ziembad, 6123 Orchard, Dearborn, Mich.

LEARN Piano Tuning. Prepare for Career in fascinating profession. 5000, year easily earned. Real security, pleasant easy work. No profession paying so well can be mastered so quickly. Natural Aptitude, desire to get ahead chief requirements. Prospectus and full information on request, Harmony School of Piano Tuning, Box 582, Harrisburg, Pa.

LEARN Blueprint Reading—quickly, easily—visual method by Oscar Schuster, Lockheed Manufacturing Engineer who trained thousands; complete postpaid \$1.00; refund guaranteed if not satisfied; send check or money order to Institute Modern Technics, 7904 Santa Monica Blvd., Los Angeles 46, Calif.

AMAZE with supermemory! Facts, figures, names stick like burrs. Write B-18, Thor Books, Box 1210, Chicago.

BOOKKEEPING Course—\$1.00. Spradlin Sales, 224 N. L., Fort Smith, Arkansas.

LOCKSMITH Course. Lock-picking, key-fitting, etc. \$1.00 prepaid. Miller's Key Shop, Canadian, Texas.

BECOME Professional Acrobat! Free Health Booklet! SB, Knoff, Pawaukee, Wis.

NEGATIVE retouching. Learn at home in your spare time. Do studio work, free lance or produce better pictures for yourself. Details free. Santos School, Dept. L, 308 W. Washington, Chicago 6.

WHO? Me? Succeed? Thinking-Alphabet helps thousands. Tibolt, 42A, Phila. 20.

BE A Detective—Send for price list of self-instructional course at reduced prices. Perkins Publications, 300-C Brandeis Theatre Bldg., Omaha, Neb.

FOOD sanitation. Learn for profit, protection. Certificate awarded. Free details. Institute Sanitary Science, 2385-B Edgewater, Los Angeles 28, Calif.

KNOW—"How to Drive Smoothly". Save yourself from accidents. Develop ability and confidence easily from illustrated, tested self-instructions. Excellent for Learners. \$3.00 Postpaid. The Brown Driving System, Box 105-S, Hill Station, Harrisburg, Pa.

UNSCRIPT Universal shorthand Alphabet free. Textbook 25c. Guaranteed Success \$5.00. Jesse L. Cook, Bartow, Fla.

POWERFUL Mental Telepathy. Practical. Free literature. Elgin, 912 Benton, Nashville 4, Tenn.

49 ELECTRICAL SUPPLIES & EQUIPMENT

ELECTRIC Pencil: Writes—Engraves all Metals. \$1.00 postpaid. Beyer Mfg., 4515-C Cottage Grove, Chicago 15.

NOW—Repair your own electrical appliances with Chanite Self-welding, Electrical Heatink, Element Flux, Instructions, delivered, price \$1.00. Stick Form 25c each \$2.00 dozen. Chanite Sales Company, 914 South Main, Fort Worth, Texas.

ELECTRIC Fans? Make your own. 16 in. correctly balanced Aluminum Fan Blade 1/2 in. Bore. Ideal on any size motor 1/8-1/3 h.p. \$3.50 18 in. all welded guard adjusted to fit 4 stops on motor \$3.00. Adjustable floor standard, 4-8 Ft. height, rigid, sturdy \$9.00. Table Standard, universal, fits any motor base. \$3.75. Prepaid anywhere U.S. 25% deposit on C.O.D. shipments. Dealers write, Ted Riseman, 1481 N. 3rd St., Springfield, Ill.

ELECTRICAL Appliance Repair. Open your own shop. Learn house wiring; electric motors, vacuum cleaners, washers, etc. Complete illustrated course shows how. Free booklet, Pacific Training School, Dept. AS-2, 7217 S. Broadway, Los Angeles 3, Calif.

BROKEN—Burned out Electrical Heating elements quickly repaired. Use new amazing Nichrocut Paste, simply overlap ends and turn on current. Family size \$1.00 bill. Satisfaction guaranteed. Armstrong Mfg., Box 861-Y, Minneapolis, Minn.

KITCHEN exhaust fans, duct work made to order—attic fans 6-ft. pedestal fans complete less motors—Bruce Industries, 418 Castleton Ave., S. I. 1, N. Y.

POPULAR SCIENCE OPPORTUNITIES

PISTOL Flashlight—Beautiful, plastic flashlight looks like real gun. Shipped postpaid \$1.00. Myers Chemical Co., 2134 Flatbush Ave., Brooklyn 10, N. Y.

KILNS, Electric, with Pyrometers three sizes Factory Guaranteed. Also Pouring and Press Pottery Molds. M. Fred Kegler, 59 North Wales, Pa. Distributor.

50 EMPLOYMENT SERVICE

GOOD Jobs Obtainable in Latin-America. High Salaries. Interesting Booklet, 6c. Vallesm, New York 13.

INTERESTED Foreign employment? Thousands Jobs throughout world. Names and addresses of 200 firms with sample application \$1.00. "We search the world" Wonder-World Research Bureau, Box 731, Gladewater, Texas.

51 ENGINES, MOTORS, ETC.

WINDING Data, listing 228 motors, single and three phase, \$1.00. Motor Data, Box 7631, Kansas City 3, Mo.

COMPARE our catalogue on engines & 10c. Howard-P3, 2417 N. Ashland Ave., Chicago 14, Ill.

CASH for Gasoline Engines, any condition. 1/2 H.P. up. E. Ferris, 1421 Spencer, Ferrisdale, Mich.

MOTORS AC-DC 110 Volt ball bearing 1500 RPM precision built adaptable for thousand uses. Very compact power unit in a small housing. Send \$3.00 no extra charges. Dupery Co., 1360 Fifth Ave., N.Y. 29, N. Y.

150 AMPERE generator for welding \$47.50. Extra flexible cable, 8 ft. lengths \$2.75. Other bargains. Butler Electric Company, 1885 Milwaukee, Chicago 47.

52 FARMS, OTHER REAL ESTATE

OZARK Lands for all purposes. Actual River frontages. 5 acres \$90.00 and upwards. Free list and literature. Hubbard, 424F Minnesota Ave., Kansas City 4, Kansas.

GOOD Farms — Ranches, Washington, Minn., Montana, Idaho, Oregon, North Dakota. Dependable crops, favorable climate. Write for literature, lists describing typical postwar farm opportunities. Specify which state. J. W. Haw, 120 Northern Pacific Ry., St. Paul 1, Minn.

OZARK farms. Large list free. E. Frank, Mountain View, Mo.

STROUT'S Green Farm Catalog—over 1300 bargains—Maine to Florida, west to California, Oregon & Washington. Write Today for this big Book. Mailed Free. Strout Realty, 255-ZB 4th Ave., New York 10, N. Y., 7 So. Dearborn St., Chicago 3, Ill., 463 So. Spring, Los Angeles 13, Calif.

HOMESITES—\$450 Convenient payments. California's finest Garden Spot. On Morro Bay's scenic Shores. Wonderful fishing, hunting, boating. Fertile soil, soft water, temperate climate, congenial community. Free Literature. Richard Otto 6560-Z Hollywood Blvd., Hollywood 28, Calif.

CHOOSE A Good Farm in Canada! Information about excellent opportunities in farms to fit your needs and capital will be sent to you promptly. State your preferences in size and kind of farm, and in what province you are interested. Address inquiry to H. R. Cresswell, Canadian Pacific, Montreal.

FLORIDA lands on easy payments. R. W. Stewart, Inverness, Florida.

VERY Cheap Homes, Lands, ranches, in the beautiful, healthful, fertile Ozarks. Large list and free literature. Write, Barnsley, Ozark, Ark.

OZARK Magazine for homeseekers. Year, \$1.00. Free list farms and resorts. Farmfinders, 111-B, Eureka Springs, Ark.

MINNESOTA, Wisconsin, lake, river, lots, acres. Lowest prices, terms, Lotco, 3505 So. Hope, Los Angeles 7.

FERTILE South-American Lands obtainable Free. Homesteads Plantations, 25,000 acre Ranches. Interesting Literature, 10c. Vallesm, New York 13.

A SIX Room House, \$2800.00 Complete. Ready for You to Move in. See ad on page 253.

55 FIELD GLASSES, TELESCOPES, ETC.

COMPOUND Microscopes easily made. Perfect lenses and instructions. 50X \$1.00, 200X \$2.00, 400X \$3.00. Instructions alone 10c. Carl Jamer, Manorville, N. Y.

TELESCOPES, microscopes, binoculars, lens kits. Catalog free. Brownscope Co., 24 West 45th St., N. Y.

BUILD Your Own Reflecting Telescope Copy of Instructions 10c. Catalog Free. Mayfloor, Katonah, N. Y.

PORRO Prisms 1 1/2" x 1 1/2" oval face. Manufactured by world-famous opticians for army and navy 8 x 50 binoculars. Rejected for slightly chipped edges. Outstanding bargain! 30c ea., 4 for \$1.00 postpaid. No c.o.d. Remit with order. Ross, 70 W. Broadway, New York 7, N. Y.

TELESCOPES, Real 17 power telescopes \$3. Send \$1 deposit. Balance C.O.D. United, 2309-G Lawrence, Toledo Ohio.

TELESCOPES 16 inch 2-section 8 power, precision ground polished lenses. Individually packed \$1.50, 36 inch 3-section 17 power, precision ground polished lenses including carrying case \$2.50. Postpaid. Criterion Co., Dept. PS, 327 Trumbull St., Hartford, Conn.

ASTRONOMICAL telescopes, Microscopes, Cameras, Binoculars, Books: Bought, sold, repaired; Lists 10c; Specify instrument wanted. Rasmussen and Reece, 41 Market, Amsterdam, N. Y.

REFLECTING Telescopes, complete. 3 1/2" diameter, equatorially mounted. View planets, stars. \$19.75. Write Skyscope Co., 475-5th Ave., New York.

POWERFUL, efficient astronomical telescopes easily made. Perfect lenses and instructions. 100X \$2.00, 200X \$3.00, 400X \$4.00. Instructions alone 10c. Carl Jamer, Manorville, N. Y.

TELESCOPE, Powerful Army type, 8-power, 3 section, all aluminum construction, with scientifically ground 40mm. lens. Length closed, 8-in., open 15-in. Only \$1.65 postpaid. Money-back guarantee. Utica Mail Order Co., 923 Eagle St., Utica, N. Y.

56 FRUITS AND FOODS

MAPLE Syrup. Send \$1.00 for sample kit. Pure Maple and food products. Complete line of Pet items. Northwestern Sales Co., Box 3402, Chicago 64, Ill.

57 FOR THE HOME

LUMINOUS Nursery Wall Decorations, fascinating cutouts glow in darkness. Complete set 25c. Two glowing nursery pictures suitable framing 25c. Circulars, Luminolettes, 469 Irving, Brooklyn, N. Y.

ATTENTION Home Owners, level sagging floors with our new all steel pyramid adjustable cellar post with built in jack. Simple to install only \$9.95. Free description leaflet on request. Barbon Specialties, 12 Medford Place, Buffalo, N. Y.

GUARANTEED Wringer Rolls, Grates, Firepots, Linings, Pensax, Magprodax, Royal Oak, Mich.

58 FOR INVENTORS

RANDOLPH & Beavers, Registered Patent Attorneys, 340-E Columbian Building, Washington, D. C. In order to Protect your invention and reap the reward that should be yours, Patent your invention without Delay, and at the same time have Rights to sell as Manufacturers convert to Civilian Production. Write for Information and Record Form To-day.

INVENTORS: Avoid unnecessary expense. Write for free booklet explaining how our Consulting and Advisory Service can assist you in deriving greatest profit from inventing. Institute of American Inventors, Dept. 30-A, 1926 Eye St., N.W., Washington 6, D. C.

INVENTIONS Having profit possibilities in demand by specific manufacturers, cash or royalty. Free descriptive booklet, protective disclosure form, references, and how to safely disclose an invention for sale, upon request. Invention Reporter, 3A-11106 S. Longwood Dr., Chicago 43.

CASH for practical ideas and inventions. Mr. Ball, BB-9441 Pleasant, Chicago.

INVENTORS—Take prompt steps to protect your invention. Delays are dangerous. Get new Free Book, "Protect, Finance and Sell Your Invention," and "Invention Record" form. Preliminary information free. Reasonable fees. Conscientious counsel. Easy payment plan. Learn how to protect and sell your invention. Write us today. McMorrow, Berman & Davidson, Patent Attorneys, 143-D, Atlantic Bldg., Washington 4, D. C.

WANTED: Practical Inventions. Inventors Exchange, Research Division, D6, Hartford 1, Conn.

INVENTORS: Learn now—without obligation—how to protect and sell your invention. Write for free "Record of Invention" form and complete instructions for making disclosure and establishing date of your invention. We also send our new free "Patent Guide for the Inventor", containing complete information about patent procedure and how to sell inventions; giving illustrations of many successful inventions; over 150 basic mechanical movements. We assure you prompt, confidential service. Delays may be dangerous. Write today for your free "Patent Guide", and "Record of Invention" form. Clarence O'Brien & Harvey Jacobson, Registered Patent Attorneys, 62A-E Adams Building, Washington, D. C.

INVENTORS! Have you good patentable ideas? Write Mr. Mettler, 11 West 42nd, New York.

INVENTORS: We design and market your idea or product. Gadget Designer, 728 Walnut St., Room 23, Phila. 6, Pa.

SELL your invention direct to Manufacturers, says successful inventor. Names, addresses, financial ratings of Manufacturers, any type product, average list, \$3.50. Inquiries invited. Inventor's Guide Service, Joseph Woods, Director, 1249 Vicente St., San Francisco 16, California.

"INVENTOR'S Guide" free, containing 100 mechanical movements. Information about patenting, selling inventions. F. B. Ledermann, 154 Nassau St., New York 7.

MODELS of Inventions and Patent Drawings made. All work guaranteed. Free estimates. Information upon request. Model Laboratory, Box 215, E. Akron, Ohio.

100 — NATIONALLY Needed Inventions \$1.00. Fuller, Box 7056, Richmond, Va.

INVENTIONS Sold Developed Models. Zachau Engineering Service, 5312 Grace, Chicago.

WILL pay cash or high royalty for practical inventions of small rubber or metal articles. J. P. Bent Rubber Co., 5926 Regent St., Huntington Park, Calif.

DEPENDABLE Patent searches \$5.00— complete with patent copies. Protection form free. Write Raymond L. Smith, Patent Searcher, 410-S Bond Building, Washington 5, D. C. (Former U. S. Patent Office employee).

59 FORMULAS, PLANS, ETC.

137 MONEY-making plans, also formulas for salable products. Descriptive booklet free. Elite Co., 220-A Grand St., N. Y.

FORMULAS—All kinds. Latest money-makers; literature Free. KemiKal, Park Ridge, Ill.

FIFTY formulas, recipes for one cent. Literature free. Pauline, 924a Southern Blvd., Bronx 59, New York.

10,000 FORMULAS! 924 Pages! Only \$2.25 Postpaid. Monarch, 38 Jefferson, Auburn, New York.

AUTO and Farm Plans, that can be made for \$1.00. List Free. P. Lessard, 716 Tyler St., Oakland, Calif.

POPULAR SCIENCE OPPORTUNITIES

TESTED Formulas make your own products. Johnston, Box 13, Little Rock, Ark.

NEED Chemists? Formulas. Analyses. Ideas. Consulting Scientific Company, Swarthmore, Pa.

FORMULAS—Latest, best Analysis. Literature free. E. Belfort, Engineering Building, Chicago 6.

PERSONAL formulas available. Tried and proven. Not stock items, but our individual development. Currently available: Antiseptic, window cleaner, silk preserver, grass greener, 1.00 each. Allied enterprises, P.O. Box 236, Dowagiac, Mich.

"FORTUNES in Formulas," 10,000 trade secrets, authentic, reliable, practical, moneymaking ideas galore. This 900 page book is a real bargain \$2.98 Postpaid. Stillmans, 555 Kingston Ave., Brooklyn 3, N.Y.

ANY Formula, recipe, \$1.00. Manufacture at home. Suggestions free. Interstate Laboratories, 1515B Oriental Blvd., Brooklyn 29, N.Y.

ICELESS Icel Colder; Cleaner; Cheaper. Instructions, 25c. Duffy, C28, Covington, Ky.

ANY Highgrade formula \$2. Or refund. Continental Industries, 3439 Michigan, Chicago 16.

MODERN Specialties from formulation to packaged products. Gerard, Consultant, Fairmount, W. Va.

60 FROG RAISING

TADPOLES make money Booklet 25c Complete illustrated book \$2.00, Charlton Corp., Century Bldg., Chicago 4.

"FROG Raising!" New book tells how. Marlboro House, 1035 Marlborough, Detroit 15, Michigan.

FISHING Poles: Dealers only. Sample Jointed Cane \$2.50. Bob Pace, Combs, Ark.

62 FUR FARMING

ORIGINAL chin-chin Giant Chinchilla Rabbits, the Big Money-Making Rabbit. Big demand. Small investment. Ideal business for anybody anywhere. Willow Brook Farms, R16, Sellersville, Pa.

63 GAMES, ENTERTAINMENT

SIX Best Card Tricks Includes \$5,000.00 Poker Hand. Send \$1.00 today. Zeis, 728 Lesley, Rockford Ill.

"DICE Games—How One Man Beat Them." 12-page true story 25c. Henson, Apt. 3A, 2942 Wayne Ave., Kansas City 3, Mo.

YOU Bet! A change for Young and Old. Complete rules and instructions. Play "Watch The Blue Room"—\$1.00. Viviani, Marseilles, Illinois.

64-A GENEALOGY

TRACE Your family history with "Guidex"! Literature free. Family Guidex, P.O. Box 829, Annapolis, Md.

68 HELP WANTED

OPPORTUNITY of lifetime supplying DDT and other profitable products to farmers. No experience or capital required. Must have Auto and good references. Permanent. Write or wire McNess Co., Dept. 713, Freeport, Ill.

COLLECTION System Attorney Service over thirty years; paying larger commissions; proposition appeals to experienced men. Write fully 2024C Calvert, Baltimore.

AMBITIOUS man. Capable operating branch factory. \$3000.00 year. Write all qualifications. Shelton Enterprises, 201 Halladay, Jersey City, N.J.

AUTHORS, organizers, agents. Sensational new opportunities. Alliance 21, Portland, Maine.

EXPERIMENTERS: Build model Jet Propulsion engines and Helicopters planes. Shea, Box 33, San Lorenzo 55, Calif.

69 HIGHGRADE SALESMEN

ADVERTISING Book Matches. World's largest Direct Selling Manufacturer of Advertising Book Matches offers opportunity for profitable year 'round selling. Every business a prospect. Cash commissions. No experience needed to start. Full or part time, Factory Service, Repeats. Sales Kits furnished. Match Corp. of America, 3433 W. 48th Place, Dept. N-6, Chicago 32.

LATEX Salesmen: Send \$1.00 for salesman's sample kit. Brings \$6.00. Big savings on latex. Wholesale prices. Send order today. Leo Service, P.O. Box 1267, Roanoke, Va.

70 HOBBIES, COLLECTIONS

JEWELRY stones removed from rings, etc., 100 assorted \$2.40; 50 large ones \$2.40. B. Lowe, Holland Building, St. Louis 1, Mo.

COLLECT colorful Army Patches, Pictures. Prices and sample patch only 10c. insignia Mart, 703 Broadway, N. Y.

INVENTING can be an interesting and profitable hobby. Write for complete particulars. Institute of American Inventors, Dept. 30-E, 1926-Eye St., N. W., Washington 6, D. C.

"GEM Cutting" Profitable, Interesting Hobby. Instructive Illustrated Booklet, One Dollar. Mineral Specimens Co., Box 1191, Santa Monica, Calif.

HOBBYISTS—Join Hobby Clique, only 10c. Free hobby listing. Raymond Dow, 2922 164th St., Flushing 24, N. Y.

DECORATE, Experiment, Large Florida Palm Leaves, Moss, Generous Supply \$1.00 Each. Box 3424, Jacksonville, Fla.

KNIFE Throwing Secrets Exposed! Illustrated book tells all. \$1.00 Postpaid. Universal Enterprises, Box 3009-A, San Francisco, California.

"METAL Work"—book shows how to do spinning, inlaying, cutting, etching, plating, etc., in metal. A great hobby. 193 pages, 450 pictures, \$2.00. Popular Science, Dept. 66-C, 353 4th Avenue, New York 10, N. Y.

UNUSED Match Book Covers. 100 all different \$1.00. 35 Royal Flash Covers \$1.00. Free list. Charles Edelman, 1311 P East 84, Cleveland 3, Ohio.

WANTED Old cigarette cards. Write Charles Bray, East Bangor, Penna.

MATCH Covers, 125 different kinds \$1.00. Ernio, 175 Gramercy, Glen Rock, N. J.

HOBBY Directory. Men and boys only. Get your name and Hobby inserted in mid-year issue (also winter issue) with copies to you. Mail 60 word write-up with \$1.00 now Box 91, So. Orange, N. J.

FOSSIL Shell Novelties from Wyoming. Larrys Novelty Shop, Box 1771, Billings, Mont.

NEW Hobby craft medium dries to touch in two minutes on any surface. Utility kit—eight one oz. bottles, solvent, glaze, stirring rod, camel hair brush, black, white, red, blue, green, yellow, brown silver—\$3.65 plus postage. Flo-Paque Prods., 1248 Post Road, Scarsdale, N. Y.

BUTTERFLY Collectors Attention! Butterflies direct from South American tropics, 10c each \$6.00 per 100 brilliant blue "Morpho" 5 inch wing spread 50c each. Make your own Butterfly traps pictures etc. Write for free booklet, American Butterfly Co., 3457 Park Heights Ave., Baltimore 15, Maryland.

EXCLUSIVE hobby news, copy 10c. Rambler Magazine, Box 174-B Staten Island 1, N. Y.

HOBBYISTS! Learn to make things from magnesium alloys! Perfect for model work. Lightest metal for airplane construction. Instructions included. Deluxe Kit contains six 1/2" rods 1/4 to 1 inch diameter. Price \$2.50 Postpaid. Saginaw Bay Industries, 621 Harrison St., Bay City, Mich.

EXCHANGE duplicates. Swappers everywhere. List 10c particulars free. Box 2166, Denver 1, Colorado.

71 HOME CRAFTSMEN

WHITTLES—20 Patterns, instructions. X-acto knife, wood, \$1.00. "Old Whittler," 1402 Charles, LaCrosse, Wis.

JEWELRY Accessories and Findings. Plastic and metal screw eyes, pinbacks, clasps, chains, rings, etc. Prompt shipping service. Complete lists 10c. Doremby Co., Chisholm, Maine.

TOY patterns. Circus wagons, trucks, carts, pull toys, etc. 35 patterns \$1.00. Continental Homecraft, 907 Birch, Eau Claire, Wis.

LUCITE—Flexiglas Prime quality 12" x 12" masked sheet 1/16"—\$1.50. 1/4"—\$1.75. 1/2"—\$2.50. Add 10% Postage. Rods, Dyes Buffing compounds, Hande tool free listings. Craft Plastics, Box 129, Somerville, N. J.

CARVE Your Own Costume Jewelry. Five Patterns, Wood Blocks, Pinbacks, etc. \$1.00. O. Nerad, 532 Clinton, Oak Park, Ill.

PLEXIGLAS—5x6x3/16, five, \$2.00. Fabricators Supply Catalog, 10c. Technicraft, 1156 Commonwealth, Boston 34.

VENETIAN Blind Supplies, Catalogue 10c. Manufacturing Booklet \$1.25. "Roberta", Gloversville, New York.

KNOCKDOWN Cedar Chest Lumber Veneers Free Price List. Giles-Kendall, Box 435, Huntsville, Alabama.

HOBBYISTS, Homecrafters: Join the "Allcraft Club" Free. No Obligations. Write Now! Allcraft Products Co., 19 W. Columbia St., Hempstead, New York.

REDWOOD turning buris details, Jean McLean, Bryant St., Eureka, Calif.

"ELECTROPLATING"—book on how to set up and operate a complete home electroplating workshop. 260 pages, over 150 diagrams. \$2. Popular Science, Dept. 66-C, 353 4th Avenue, New York 10, N. Y.

ALUMINUM can be soldered with ordinary soft solder and soldering iron. Send \$1.00 for generous supply of our new flux. Warhavan Industries, East Aurora, N. Y.

PAINT Beautiful pictures quickly, easily, inexpensively. Free literature. Art Book Shop, Arnold 3, Mo.

MAKE Shell Butterfly Brooch, Floral Spray, Key Chain all for Dollar, Shell Catalogue Free, Dixie Shell Service, Lake-land, Fla.

LAWN Furniture: single Chair, Settee, Picnic Table with Benches, and Garden Bench. Four Plans \$1.00. Woodcraft Plans, P. O. Box 136, Sedalia, Mo.

CATALOG: Patterns plywood Novelty Furniture - Letters - Numerals - Plaques - Frames - Weathervanes - Silhouettes - Lawn Ornaments, 100 Books & Booklets on Crafts & Hobbies, Picture Frame Mouldings, Tools, Large Line Decal Transfers. Other lines. Hundreds articles finely illustrated. Write Wo-Met Shop, Ashburn, Georgia.

BUILD lawn chairs. Sturdy and easily made. Pattern 20c. Spina, 1034 Emerald Ave., Chicago Heights, Ill.

ENLARGEMENTS, Precision instrument eliminates graphsquares. Illustrated literature dime. Pantographs, Munsing, Mich.

TOOLS, Materials, Metalcraft, Woodworking, Leathercraft, Plastic-craft, Modeling and Pottery-craft. Send 25c for prospectus on one of above mentioned, plus drawings including directions for one or more projects and treatise on hobbies including an interesting proposition; also list of tools kits we can supply; others to your specifications. Don't delay. Send for yours now. Hobbycraft Co., Box 982, Pittsburgh 30, Penna.

BUILD Farm Type Portable sawmill. Blueprints \$3.00 Edger Prints \$1.00 12" Planer Prints \$1.00. Nichols Equipment Co., Furlvis, Miss.

MAKE Dowels Round tenons any size length 50c easily made plans. 220 Lee St., Rock Hill, S. C.

POPULAR SCIENCE OPPORTUNITIES

80 LAWN Ornament, Silhouette and Novelty patterns, \$1.25. 6 New Hanging Shelf patterns, \$1.25. Doll Stroller, Colonial, Cradle, Table, Chairs and Circus Group, \$1.00. All Patterns \$3.00. Modern Woodcraft, Saginaw, Michigan.

LUMINOUS Paint for safety and convenience key holes, light switches, clock dials, shine in the dark. Liberal bottle with instructions 15 cents prepaid. Pioneer Art Products, P.O. Box 374, Englewood, New Jersey.

STAINLESS Steel with undersize hole for making rings. Indicate size. Price \$1.00. Better Rates for Schools, J. Willem, 37 Tamaqua Village, Beaver, Pa.

106 NEW never marketed woodwork patterns \$3.00. 50 new different toy patterns \$1.50, all for \$4.00. Kathryn Schilder, Cresbard, S. Dak.

BUILD and sell Lawn Chairs, Plans \$1.00. We tell you how and where we sell. Woodcraft, Danby, Vermont.

TURNIT A motor shaft (1/2") attachment for fast turning of wheels and discs. Has face plate and arbor for pulley grinder and chuck. Postpaid \$1.50 Send Postal Note. Earthmover Toys, East Lansing, Mich.

TOOLING leathers, Felt Projects. Authentic doll kits. Wool sheep scraps, 3 lbs. \$1.00. Storr-Nelson Co., Rt. 2, Muskegon, Mich.

74 INFORMATION

DRUNKENNESS is a disease which responds to treatment. Medical skill plus human sympathy prove successful with liquor and drug cases. 60 years experience. Write for free booklet, P. S. Nelson, The Keeley Institute, Dwight, Ill.

LOOK, Valuable Information on advertising by Mail. Book \$1.00. V. D'Amrosca, 7 River St., Natick, R.I.

OILFIELDS offer good paying pleasant jobs from Boom Town to city offices. Names, addresses, 100 companies. List of jobs and pay rates. Research, Box 559, Victoria, Texas.

HOW to search for missing heirs, relatives. Rewards! The Research Review \$1.00. Chaffee, 308 Washington, Chicago 6.

LOOSE False Teeth can be made to fit tight, snug, with entirely New Dental Plate Liner—made by a Dentist. Do it yourself. One application lasts. New discovery—not a paste or powder. Guaranteed to make loose dental plates fit perfectly. Write for 15 day trial offer. Send no money. C. N. Reese, D.D.S., Box 268K, Winnetka, Ill.

75 INVENTIONS WANTED

WANTED—Patented, unpatented inventions having profit possibilities, all kinds. If will sell, reply immediately. Descriptive booklet, references, free. Invention Reporter, 3B-11106 S. Longwood Dr., Chicago 43.

INVENTORS: Hundreds of manufacturers have requested our assistance in locating marketable new products. Complete information, free. Institute of American Inventors, Dept. 30-C, Washington 6, D.C.

CASH for Inventions—Patented, unpatented. Mr. Ball, BC-9441 Pleasant, Chicago.

WANTED: Practical inventions for marketing through chain, drug and cigar stores. Particularly desire lighters, smokers' articles, etc., in plastic, wood or metal. Write Matt. 112-GN, Great Northern Bldg., Chicago 4.

INVENTIONS Promoted. Patented or Unpatented. Write Adam-Fisher Co., 183-A Enright, St. Louis, Mo.

INVENTORS Attention! Have you an invention patented or patentable of a novel electrical or mechanical device? Are you the owner of dies you wish to dispose of? If you have either or both give full particulars. We are a highly rated manufacturing concern with a nation-wide distributing organization. Your rights will be scrupulously respected. Lion Manufacturing Corp., Dept. B Y, 2650 Belmont Ave., Chicago 18, Ill.

INVENTIONS and Designs Wanted At Once. Patented or Unpatented. Cash or royalty. John D. & Son, Dept. AA, 140 Spruce St., Bridgeport 5, Conn.

EARN Up to \$2,000 year. Inventing simple items for special cash markets. Ideas only. No patents. Hendrickson, Argyle, 8-A, Wisce.

INVENTIONS wanted for items suitable for manufacture by screw machine plant. Any basis. No novelties. Held, 2112 Westchester, Bronx 61, N.Y.

76 JEWELRY

MANUFACTURE Costume Jewelry At Home For Profit, Hobby, Therapy. Free Wholesale Supply Catalogue, Instructions, Florida Supply House, Bradenton, Fla.

DUPONT'S remarkable plastic watch strap. Outlasts any leather or fabric one! No metal. No stitches. Ideal for summer comfort. Unaffected by perspiration. Will not crack. Will not irritate. Colors—brown, white, black, crystal. Money Back guarantee. Send only \$1.00 to Roger Kent Co., 211 North Seventh, St. Louis, Mo.

CERAMIC Jewelry Supplies. Bar Pins, ear screws, for ceramic and woodworkers, also, glass and sea shell assemblers. Free catalog. Philadelphia Badge Co., 1007 Filbert St., Philadelphia, Pa.

GENUINE diamonds, out-of-pawn low prices, wonderful values. Unredeemed loans and big buying power enable us to offer beautiful gems at prices far less than original cost. Shipped Free for inspection. Appraisal. Send for Big Free list showing fine diamonds at startling low prices. Lloyd J. Butler, President, Prudential Loan Assoc., 133-UF N. Clark St., Chicago, 2.

JEWELRY findings, chain, links, etc. Metal and Plastic. Send dime for catalog. George Sassen, 154 Nassau St., New York City.

"JEWELRY. Gem Cutting, Metalcraft". Fascinating designs for hobbies and moneymaking opportunities. New, complete illustrated book covers cutting, polishing, mounting gems, metal, jewelry work, etc. 287 pages, \$2.95 postpaid. Money back guarantee. We supply tools, materials at lowest cost. Modern Technical Book Co., Dept. MS, 55 W. 42nd St., New York 18.

EXPANSION type watch bands and bracelets repaired. Broken parts replaced like new. Mens. Womens any make, \$1.98 complete job. Sherman Bracelet Shop, 124 W. 6th St., Los Angeles 14, Calif.

77 LANGUAGE OUTFITS

29 LANGUAGES by Linguaphone. Russian, Spanish, Portuguese—Direct conversational method for mastering any language quickly, easily, correctly at home. Send for free book. Linguaphone Institute, 54 RCA Bldg., New York, CI 7-0830.

78 LEGAL DIRECTORY

MEXICAN Law Practice, L. Gonzalez, Box 236, El Paso, Tex.

80 MACHINERY TOOLS, SUPPLIES

EXPERIMENTERS — 400 valuable new springs 75 kinds, numerous sizes, 10,000 uses, \$2.00. Deluxe assortment, \$3.00. Jumbo, \$5.00. Guaranteed. Technico, Box 246, West Hartford, Conn.

MACHINE shop tools released for private industry. Face milling cutters high speed blades 11" 12" diameter, \$5, 16" 20" \$11. Small power press \$80, 2" Acme turret lathe \$340. Two spindle special hand miller \$130. Large slotter \$180. Small Brown & Sharpe universal miller \$180. Large Lincoln type miller \$260. 3 foot radial drill \$20. 36 in. Brown & Sharpe boring mill \$260. American pressure blower \$40. Bearing and oil testing machine \$80. Conversion Parts Co., 277 Adams St., Boston 22, Mass.

YOUR electric drill has 100 other uses when used with K-Jax attachments for sawing—shearing—riveting. Write for circular C. K-Jax, P.O. Box 3044, Dallas, Texas.

GEARS For inventors, experimenters, model makers, schools, work shops, laboratories, etc. Government surplus made of brass, bronze, dural steel and stainless steel. 12 matched pairs; 24 gears, bevel, spur and ratchet. List price \$12.00, our price \$2.50. 25 matched pairs; 50 gears. Includes larger gears, also sets of worm gears. List price \$30.00, our price \$5.00. 50 matched pairs; 100 gears better assortment, including internal set and worm sets. List price \$75.00, our price \$10.00. Limited quantity. Order now. Write for our bulletins on ball bearings, rectifiers, Relays, Selsyns, Horns and government surplus materials. Met Exchange, 323 Canal St., New York.

SAW mandrels bronze bearing 1/2 inch shaft 1/2 inch arbor. List 10c. Wilson Mfg. & Sales, 2233 Summit St., Columbus 1, Ohio.

GEAR Trains. Dual ratio 133:1 and 66.5:1 Brass gears and oilite bearings. James Fred, Russiaville, Indiana.

GRINDER Kit, for all small hand grinders. contains 10 rotary files, five ball and five inverted cone type, 3/32 diameter shaft, 25 abrasive disks and mandrel, 6 chamols buffing heads. All for \$2.00. Radioco, 1110 S. Marshall Bldg., Cleveland, Ohio.

WASHING Machine and Vacuum Cleaner parts. Andy's 4325 N. Ottawa, Chicago.

CENTERLESS and internal grinding closest tolerance, highest finish. Arduin Mechanical Co., 503 W. 56th St., N.Y.

DRILL Grinder for Twist Drills \$2.95, and other Craftsmen's tools. See ad on page 281.

IT'S Easy to build your own metal and woodworking tools from Lewis castings. Materials and blueprints—and at savings up to 80%! Lewis mills, shapers, drill-presses and other shop tools have ample capacity and performance for home workshop jobs. New catalog sent on receipt of 10c to cover mailing—describes 23 Lewis tools. Address Lewis Machine Tool Co., P.O. Box 116, Station A, Dept. S-65, Los Angeles 31, Calif.

81 MAGIC TRICKS, PUZZLES, ETC.

MAGICIANS' Gambler's secrets exposed. Cards, Dice, Punchboards, Slot Machine. Catalog 10c. Book Co., Box 671, St. Louis 1, Mo.

500 TRICKS you can do! Douglas' famous Catalog of 500 Tricks, now only 10 cents. America's fastest service on magic for pocket, parlor, stage, professional, amateur. Douglas' Magicland, Dallas, Texas.

WORLD'S largest professional magic shop keeps you in touch with latest tricks. To receive mailings send 25c for new catalog. Holdens, P-220 W. 42nd St., New-York.

MAGIC vanishing card. Throw it into air, it completely disappears, reproduce it later from spectators pocket. Easy to do. Complete 25c with magic catalog. The Magician, 2463-D Kensington Ave., Philadelphia 25, Pa.

"THE Fakir" Monthly Magazine for Magicians. Copy 25c, Subscription \$2.00. Joseph Rachun, 114 Grand St., Brooklyn 11, N. Y.

BE a Magician. Large professional magic catalog of latest tricks. 25c. Ireland, F-109 North Dearborn, Chicago.

JUST Out! Guaranteed Fly-Killer. Laugh-Provoking Novelty, 25c. Daykin, 240-6th, Elyria, Ohio.

FREE! Twelve catchy tricks; magic catalog. Send stamp for postage. Lee's, 2231-S McKinley, Berkeley 3, Calif.

POPULAR SCIENCE OPPORTUNITIES

MOST amazing offer ever made. Complete Checker, Chess and Domino sets. 25 Mystifying Magic Tricks: how to become a Hypnotist and Ventriloquist explained in big book with 105 Money-making secrets; also given large collection of Jokes, Riddles and Toast; art of Fortune Telling taught with Cards, Numbers, etc., And Forty-two other amazing Games and Novelties. Only 69c. House of Magic, Box 62, Brooklyn 28, N.Y.

THAYERS! Quality Magic since 1907. Send 25c for current Catalog. Free Lists. Secrets Twelve Illusionettes \$1.00. Sample Gem Magic Magazine 30c. Thayer Mfg. Co., 612 S. La Brea Ave., Los Angeles 36, Calif.

MAGNETIC "Tricky Dogs" Sample 30c. Dozen \$2.00. "Hum-A-Zoo" Musical Novelty Sample 15c. Dozen \$1.10. "Spook Kat" Party Game. Sample 25c. "Luminous" Ink. Sample 30c. Kant, 323 Third, Pittsburgh 22, Pa.

MAGIC Novelty. Catalog. Gift. 10c. Wencel, 2615 E. Valine, Hamtramck 13, Mich.

FLOATING Cigarette Trick—Cigarette Floats in Air, with instructions. Dime. J. Eastwood, Box 623 Parkersburg, W. Va.

AMAZE and mystify your friends with highest quality magic. New catalogue 25c coin. Mazda Magic Co., Mt. Sterling, Ky.

VANISHING Quarter and Catalog 25c. Sterling Magic, Box 191, Royal Oak, Mich.

VENTRILQUISM—Handy, 54 page, pocket size volume 25c. Joe Jones, 1028 Broadway, Columbus 1, Ga.

MAGIC catalogue 25c. St. Louis Magic Studio, 406 Market, St. Louis 2, Missouri.

FREE! Large Catalog of magical apparatus if you remit 25c for "Magic is Fun" magazine. Robbins Co., 152-F W. 42nd St., New York.

MAGIC: Big 160 page Illustrated Catalog, latest Magic Goods. 25c. For over 1/2 century we have supplied Professional as well as Beginner. Chicago Magic Co., 2300 N. Mason, Chicago 39.

SELL! Themselves Novelty 101% Different; Repeat-Repeatedly. You and Merchant sitting pretty very shortly—new, unique wholesale catalog and samples prepaid 25c. Specialties, Bristol, Va.

THREE card Monte 25c. Cigarette vanisher 50c. 10 Trick magic kit \$1.00. Kogel's Magic Novelty Co., 6751-B Colbert St., New Orleans 19, La.

WORLD'S Greatest No Skill Card Tricks. One trick and literature 10c. Wonder Magic, 1285 B Broadway, New York 1.

ENTERTAINER Deluxe—Mysterious mind reading, weird magic tricks, ventriloquism. Both courses only 60c. 3512 Binkley, Dallas 5, Texas.

TEACUP Magic: Fortunes appear. Tea Writing; Dime, Chem-Lab, Box 306, Harvey, Ill.

81-A MAGNETS

MAGNET, "Alnico" 4 oz. Horseshoe, powerful (lifts about 5 lbs.), \$1.00 Postpaid. Ross, 66 W. Broadway, New York 7, N. Y.

MAGNETS—Alnico extremely powerful 1" x 1 1/4" x 5/16"—useful for all kinds experimental and educational purposes. Send 30c (no stamps) for matched pair. Special rate for larger quantities. Hall, Box 74, Meriden, Conn.

82 MANUFACTURING

MANUFACTURING, New Inventions models. Dies. Machines. Baum's Metal Specialties, Kansas City, Mo.

MODELS, small lot manufacturing, metals, plastics, etc. Milburn, Burlington, Kentucky.

TOOLS and Dies. Models. Gunsmithing, Plastics, General Machine Work B & H Tool Co., P.O. Box 113, Morrisville, Pa.

INVENTIONS: Market study; Developing; Manufacturing; Models. J-M, Burlington, Ky.

83 MILK GOATS

MONEY from dairy goats! Booklet free. Introductory 5-month subscription to leading magazine 25c. Dairy Goat Journal, Dept. 668, Columbia, Missouri.

84 MILITARY INSIGNIA

FREE: 50 Military emblems, when joining "Insignia Club", Squadron, Foreign and regimental crests available. Price List, insignia guide 10c. Embroidered sample 5c. Hobbyguld, X 35 W. 32nd St., New York.

MILITARY Medals, Decorations, Enameled orders bought—sold. Collections Purchased. Kenneth Lee, 622 Security Bldg., Glendale 3, Calif.

MILITARY Insignia: 22 different, for \$1.00 (Value \$4.00). Introductory offer, never before equalled. Prices and Insignia Guide 10c. Sample 5c. Hobbyguld, X35 W. 32nd St., New York, N. Y.

FOREIGN decoration ribbons, list, sample, 20c. Assorted insignia packet, folder, \$1.00. Insigniacraft, 236-28th Ave., N. W., Calgary, Canada.

85 MINERALS & PRECIOUS STONES

12 ROUGH Red Garnets 36 Gram \$2.40. Cut Australia Green Garnet Brilliant \$3.00. Finest cut optical prism 1 1/2 inch \$3.00. Federal tax included. Ernest Meier, Church St. Annex, P.O. Box 302, New York 8, N. Y.

POOL'S Gold—From Famous Gold Camp 10c per sample. Gold \$1. Martin's, 506 Harrison, Leadville, Colorado.

GEMS, precious and semi-precious, all genuine, from world wide sources. Deal direct, no overhead, save money. Catalog 10c. Hill Co., Route 7-K, Salem, Oregon.

SMALL unpolished-slabs, 1—each—obsidian, Jasper, wood—\$1.00. Smith, Box 422E, Albany, Oregon.

GEM Cutters 1 lb. Gem Agate and Jade \$1.00 Postpaid. Gem House, Box 1003, Casper, Wyoming.

441 ANTIQUE Firearms: 5,000 Bargains; Minerals, Fossils, Rifles, Coins, Indian Relics, Carabines, Cartridges. #10 Catalog with photographs. Watke, Wenona, Ill.

86 MISCELLANEOUS

GOOD "Used" self-instruction educational books on all subjects bought, sold, rented, exchanged. Satisfaction guaranteed. Complete information and 100-page illustrated bargain catalog Free! Write—Nelson Co., Chicago 5.

DRUNKENNESS Is a disease which responds to treatment. Medical skill plus human sympathy prove successful with liquor and drug cases. 60 years experience. Write for free booklet. P. S. Nelson, The Keeley Institute, Dwight, Ill.

HYPNOTIZE Anyone! Get the most perfect, easily learned, modern scientific course of "Genuine Hypnotism" in the world! Fully illustrated. Only \$1.00. Money back guarantee. Fowler, Soldiers Field, Boston 63, Mass.

FIRECRACKERS! Free Catalog. No Utah orders accepted. Vern's Specialties, Box 29-A, Sugarhouse, Utah.

THE Lord's Coming! Get dozens free proofs. Write quickly. International Evangelism, Box 263-F.S., Duluth, Minn.

ARMY goods (used) canteens, mess sets, helmets, life preservers raincoats, knapsacks \$1, cartridge belts, holsters, gas mask bags 50c. Life Rafts \$7.50, Bunks \$5, Rubber suits \$5. N. Y. Salvage, 144 Chambers St. N. Y. C.

FREE Information! Locates thousands scarce bargain merchandise. Druggist, Box 1279-S, Joliet, Ill.

MEXICAN Jumping Beans. Dozen 25c. hundred \$1.00, thousand \$5.00. Mexican Products Co., 126 N. Main, Tulsa 3, Okla.

MECHANICAL Drawing Instruments—Veeco, 4 piece, compact, precision set, brand new in lined case, value \$12.50. Special, \$7.25—Deitzgen 11 piece Set, \$10.00—Charvos 9 piece set, \$8.50. Army Surplus Slide Rules, slightly used, 75c each. Hull Auto Compass, for accurate road direction, brand new, \$2.50. Brand new folding valise knapsacks made of heavy olive green duck, heavily bound and reinforced, repellent to fire or water. Inside 3 large snap fastened pockets, heavy webbed straps, hand and shoulder handles, size opened 22" x 54", closed 22" rolled. Useful to Hunters, Boy Scouts, Hikers and for all traveling use. A \$7.50 value, Special \$2.25 postpaid. Forward money with order. No C.O.D. shipments. Public Sport Shops, 13 S. 16th St., Philadelphia, Pa.

A THOUSAND Laughs—Unique Jackass Cigarette Dispenser. Holds 10 cigarettes. Simply press donkey's head down, tail rises—presto—out slips cigarette. Satisfaction guaranteed. Send postpaid for \$1.00 with order or \$1.10 C.O.D. Sanimo Industries, Dept. PS-10, Spencer, Indiana.

MEDICAL Laboratory Technicians in great demand. We train you in your spare time, in your own home. You can practice while studying. Write for free catalogue. Imperial Technical Institute, Box 973-S, Austin 5, Texas.

2 BUFFALO Robes unused dark winter \$60 & \$75. G. Amundson, Prineville, Oregon.

EXPRESS Wagon Chassis all steel. Disc wheels rubber tires \$5.95 wholesale prices on application. Paradise Craftsmen, Box 98, Bradley Beach, N. J.

MANUFACTURES Childrens marbles toy for sale. New patent. Most interesting toy, when on the counters. Particulars, Box 279, Royersford, Pa.

UNUSUAL Novelties, samples 10c. Modern, Box 2, Station B, New York 2.

NEW Nylon Parachutes, 21x7 feet, cords, case, complete \$5.69 Postpaid. Rainbow Silk Co., Decherd, Tenn.

BIG Mails, Samples, Bargains, Opportunities—10c. Dover Salesmart, 173 Washington Ave., Dover, New Jersey.

GUARANTEED Cockroach Killer: dying like magic, with apparatus complete \$3.00. Colony, Dancetax, Davenport, Iowa.

GIANT Mails, leading Mail Magazines, Ad-sheets, Opportunities 10c. Harvey Teeple, Decatur, Indiana.

FAN Blades, 20" airplane type for ventilating or circulating, disc on any small motor, 1/4 h.p. up, 1 1/2" shaft, \$3.00 postpaid. W & D Mfg. Co., Stuttgart, Ark.

SQUARE Dance instructions, calls, 25 sets, \$1.00. Reburn, Eureka Springs, Ark.

RECEIVE Mails, Samples, Money-making Opportunities, literature. Your name in several Mailing Lists, 10c. Rodgowski, 3415 Broadway, New York 13.

JACKPOT—Coin-Machines for sale. Real money-makers. Write for full details. Sommers Distributing Co., Dept. 5, Box 243, Center, Texas.

MAGIC dice, gamblers secrets exposed. Write Radin, Box 311-W, Benton Harbor, Mich.

ALINCOV "Magic Magnets", most powerful steel, defy gravity, through wood, glass. Useful tool, stunts, gift, 7" long, 2" for \$1.00. Also "Toothpick Magnets", 8 for \$1.00; "Magnetic Wand", 2 for \$1.00. Eljay, Box 891, Newark 1, N. J.

FIREWORKS! Firecrackers! Torpedoes! Free Catalog. Mackay Specialties, Box 441-B, Mackay, Idaho.

AMERICAN G.I.'s, or Civilians who were prisoners of war may file claims for up to \$3,600 a year. Heirs of deceased prisoners of war may file claims for up to \$15,000. Prompt action required. Details, instructions and claim forms \$1. D. O. Coats, Box 4522-PS, Station E, Kansas City, Mo.

Be a good conversationalist! Our practical, inexpensive course teaches you how! Nankers Co., Box 1222, Colorado Springs, Colorado.

POPULAR SCIENCE OPPORTUNITIES

HOUSE construction. New type, 60% savings possible. Send \$1.00 for instructions. P.O. Box 713, Mobile 4, Ala.

HANDCRAFTED leathers billfolds \$5.00 deluxe billfold keycase \$11.00 secretaries \$12.00 ladies beach bags \$7.00 envelope bags \$37.00 shoulder strap bags \$45.00 unexcelled gifts refund Guarantee, Artcraft, Box 1522, Jackson, Miss.

VENETIAN Blind tape 25c yard color Duck Cord 5c yard. Moore, Box 461, Kittanning, Pa.

"FREE Information!" Locates thousands scarce bargain merchandise. Drugist, Box 1279-S, Joliet, Ill.

MAKE Your own Plastoplate printing cuts. Simple, easy process. Plastoplate, Argyle 2, Wis.

KILL All Weeds with 2000 degree flame, famous fire gun sterilizes, thaws, incinerates, disinfects. Works like blow torch, burns kerosene, mostly air. Economical, safe, sure. Free literature tells how. Write Sine Equipment, 5376, Quakertown, Pa.

HOMELESS? Learn about factory-made homes. 10c brings list of firms making these homes. Research, Box 169, Columbus, Indiana.

MAKE Arc Welders, Power Hacksaws, Power Mowers, Supplies, Holger's Service, Canton, Kansas.

INVISIBLE Ink Kit. Professional Type, many uses for Young and Old. \$1.00 Postpaid. Elite Nov., 719 Driggs Ave., Brooklyn, N.Y.

WHO makes it? Who sells it? Name it, send 25c coin for list. Technical, 2180, Amsterdam Ave., N.Y.C.

AUTOMOBILES Versus Helicopters. information 25c. Porters Shop, Box 535, Atascadero, Calif.

ELECTRIC Pencil: Professional size. Writes and Engraves all metals, precision built. \$1.00 Postpaid. Reb Industries, Box 265-Y, Elmhurst, Ill.

FREE! Introductory offer. Collection of business plans, tested moneymakers, formulas. Send 10c cover postage, handling. Larson, Galeton 5, Pa.

HOBBY and Novelty catalog 10c (Stamps), Barrington Smith Company, Halfwaytree, Jamaica, B.W.I. (Postage Jamaica 5c).

NAMEPLATES—glass bead letters on board to match house trim. Reflects lights, weatherproof. 25c letter \$2.00 minimum. Plac-Art Co., Round Lake, Ill.

ALNICO. Four powerful magnets \$1.00 Exceptional value. Lift 30 times their weight! Literature free. Ronald Eyrich, Box 849, Milwaukee, Wis.

PERSONALITY tests, valuable, interesting, scientific, with report \$2.00. Analyst, Box 758, Beverly Hills, Calif.

STAG. Book Matches. 10 for \$1.00. Logan Novelty Co., Bellefontaine, Ohio.

FREE literature how to locate buried treasure and minerals. Fisher Laboratory, Palo Alto, Calif.

"ANT Hara-Kiri!" Amazing Ant Suicide device! War-veteran's story explains fully. Use it Yourself! Folio sent postage-paid. Satisfaction Guaranteed! Send \$1.00 Now! Anthony, Box 57A, Allston 34, Mass.

CUTTERS Dental burrs assorted reclaimed Job-lot, \$1.90 per gross. D Wolf, 1924 E. Hartlane, Philadelphia, Pa.

87 MODELS, MODEL SUPPLIES

MODEL Ship Builders! Are you looking for authentic, precision ship models? Send for richly illustrated fully descriptive catalogue in full color of famous ships of all kinds. Only 10c. Marine Model Co., Inc., Dept. C-18, Halesite, Huntington, N. Y.

SHIP & Yacht Model Fittings and blueprints. Hundreds of items to choose from. Send 25c for new illustrated catalog. A. J. Fisher, 1002 Etowah Ave., Dept. S, Royal Oak, Mich.

MOST complete Illustrated Catalog—"O-HO OO" Model Railroad Parts ever published. Send 5c for mailing. Selly, 1377 Gates Ave., Dept. 829, Brooklyn, N. Y.

SHIP Model and yacht supplies, complete large 84 page catalogue, 25c. Wm. Wild, 510 E. 11th St., New York City.

SHIP model kits and fittings. Complete line Fisher model yacht equipment. All Boucher, Fisher, Marine Model and Ideal Kits, fittings and blueprints at standard prices. Most complete stock in New England. Send 10c for price lists. James Bliss & Co., Inc., 230 State St., Boston, Mass.

BIG illustrated model engine catalog 10c. Active Products & Supply Co., 53 W. Jackson, Chicago 4.

MODEL Engine Catalog, Railroad Supplies, 25c. Refunded. Simonsen, P3054 Greenview, Chicago 13.

"MODEL Railways"—book with simple instructions for building, laying out, operating a complete model railway. 256 pages, 365 diagrams and charts. \$2. Popular Science, Dept. 66-C, 353 4th Ave., New York 10, N. Y.

KITS for constructing Waterline Models of Missouri Class battleship, Essex carrier, Cleveland cruiser, Fletcher destroyer. Kits include plans, instructions, and All Parts Ready for assembling. Free illustrated booklet. Naval Ship Model Co., 58 Winthrop St., Taunton, Mass.

"SHIP Model Making"—book filled with complete plans for making any type galleon, clipper ship, etc. Nautical glossary, 193 pages, 133 pictures, \$1. Popular Science, Dept. 66-C, 353 4th Ave., New York 10, N. Y.

BRASS Gears and Model Supplies, send 10c for catalog. Pierce Model Works, Tinley Park, Ill.

RAILWAY models, complete line, new 128 page catalog, O. Ho, gauge 25c Walthers, 269 Eric, Milwaukee 2, Wisconsin.

FLY-Powered Plane—Real model plane uses housefly for engine. Simple instructions with complete plans \$1. Earl Enterprises, Box 92045, Los Angeles 5, Calif.

CATALOGS (Illustrated) for Modelers! Airplanes 60 page book on Solids, Features construction, data, specifications, camouflage, 15c. Railroads: 128 page "HO" guide. Equipment, accessories, fittings, 25c (included refund coupon). Send coin or stamps for each profusely illustrated catalog desired. Folk's "Nations Leading Hobby House", 314-P Fifth Ave., NYC 1.

MOST complete Illustrated 68 page Master Model Airplane and Gas Model Catalogue ever published. For your copy send 25c (includes refund coupon) to General Modelcraft Co., 91-17 86 173rd St., Jamaica 3, New York.

CARVE it from scrap lumber \$1.00. Blueprints and Description for Model Automobile. Paragon Engineering Corp., 4031 Goodwin Ave., Los Angeles 26, Calif.

MODEL Builders! The Husky "JV" model airplane motor is available again! This powerful little motor turns an 11 inch prop 7,000 RPM Every engine block tested and guaranteed. Price only \$12.50, including coil and condenser. Send only \$1.00 and engine will be immediately shipped O.O.D. Residents of State of Wash. include 3% sales tax. Bainbridge Machine Co., Dept. A-1, Winslow, Wash.

88 MONEY MAKING OPPORTUNITIES

DETECTIVES Earn Big Money. Experience unnecessary. Particulars free. Wagoner, P-125 West 86th. N. Y., N. Y.

LEARN Metascience. Remarkable drugless healing. No manipulation. No apparatus. Unbelievable simplicity and results. Inexpensive correspondence course. Write Metascience, De Land, Florida.

ELITE Collection describes 137 money-making plans; local, mail order. Particulars free. Elite Co., 220-A Grand St., N. Y.

MECHANICALLY Inclined Men—Own and operate general Appliance Repair shop. Complete, illustrated course shows you how. Welding, Refrigeration, Motor repair. How to get business, etc., all phases covered. Free literature. Christy Supply, Dept. 1464, 2835 N. Central Ave., Chicago.

MANUFACTURE Costume Jewelry At Home For Profit. Hobby, Therapy. Free Wholesale Supply Catalogue, Instructions. Florida Supply House, Bradentown, Fla.

PRACTICAL Moneymaking plans. Free literature. Goodrich, 16 Edgewood Ter., Longmeadow, Mass.

EASY money during leisure time. New item everyone wants on sight. Details, sample. International Industries, Culver City, Calif.

EARN Money at Home—Realize Independence. Write Successful Income Builders, 508-B, Hollywood 28, Calif.

BUY Articles wholesale. Make money by mail. Formulas, Trade Secrets, Literature free. Massey, 64 Sterling, Franklin, New Jersey.

"THUNDERBOLT"—Transformer welder, dial-control, 3 heat stages, 60 amps, 110 Volts-AC, takes up to 3/32 Rod, carrying case, all accessories, illustrated instructions. Professional heavy duty welding, brazing outfit, \$39.50. Also "Super-Welder," for light work, 110 Volts, AC-DC \$19.95. Save 2%, send check. Or order C.O.D. West of Mississippi \$5.00 deposit required on Super-Welder, \$10.00 on Thunderbolt. SuperWelder Mfg. Co., Dept. PSC, 23 E. 20th St., New York 3, N. Y.

1001 MONEY Making Ideas for everybody. Write, Newway Institute, Box 5463, Chicago, Ill.

GET The Newest and Best Offers. New Service brings complete, ready-to-start offers at low cost. Saves time, effort. Particulars Free. Kelly, 1080-J Casgrain, Detroit 9, Mich.

WIN Contest Money. General Contest Bulletin shows how, 15 Big pages of help. Many current contests listed. Sample 25c. General Contest Bulletin, 1609-A East 5th, Duluth 5, Minn.

200 MONEY Making Deals, Plans, Rare formulas, Schemes, Folio Free. Formico Crafts, Box 572, Dayton, Ohio.

100 MAIL Order Tips, Opportunities, Formulas, Information 25c. Magazine Free. Wm. Scherrer, Cochocton, Ohio.

RECEIVE Mails, samples, moneymaking opportunities, literature, steadily, one year, 25c. Zbiegniewics, 147 N. 8th St., Brooklyn 11, N. Y.

PROFITABLE Ideas \$1.00. Free literature. Michael's Business Enterprises, 715V Lorimer St., Brooklyn 11, N. Y.

NOVELTY Manufacturing offers splendid opportunity to start highly profitable business. No expensive equipment, orders waiting, large profits, easily learned. Write to-day, Plastex Products, 127 Clement, San Francisco 18, Calif.

ELECTRIC Clocks are everywhere you go, buildings, homes, parking-lots, factories. Repairs increasing. Our easy to learn course with pictures and drawings teach you how to repair these clocks. Electronics Supply Co., Box 2350-B, Houston 1, Texas.

EARN money at home! Thousands do! "Home Worker Magazine" tells how. Sample, 25c. Sisemore, Box 6, 4917 North Kostner, Chicago.

GIGANTIC Mails—Trade Magazines—Name Listed 13c. Jackson, Newfoundland 4, Ky.

PRIZE Contest Hobby pays off with free automobiles and contest gold. Here's how and where to get your share. National Contest Bulletin, Box 634-M, Grand Central Annex, New York City.

WHOLESALE Sources 500,000 articles 25c. J. S. Gisoil, 135-A Chestnut, Scranton 4, Pa.

IDEAS, Opportunities, supplies, tips, mail order information. Sensational new 1946 Directory hot off press. Rush name for free prospectus. Wilkin & Co., 118-C5 E. Main St., Hillsboro, Ohio.

EARN Money evenin'—copying and duplicating comic cartoons for advertisers. Adservice, Argyle 2, Wisc.

POPULAR SCIENCE OPPORTUNITIES

A \$100 a month hobby at home! No soliciting, no mail order, no meeting phone. Easy, enjoyable pastime. Details, 25c (refundable). Laura Dickson, 808-PS Elizabeth St., Anderson, S. C.

EXCLUSIVE Circular Letters guarantee profits for our mailers. See for yourself. Free samples. Argent & Ross, Landover, Md.

START your own business. Send 10c. Reese, 75 Walnut, Ridgewood, N.J.

MONEY-Making Opportunities. Sources of Supplies, Personal Interest Guaranteed For Complete Information. Remit 10c. American Mail Trade Ass'n., 313 East 21st, New York.

HIT The Jack Pot in Radio, Plastics, Electricity, Aviation. Details Free. Technibook, Box 261-A, Mt. Kisco, N.Y.

RECEIVE Mails, samples, moneymaking opportunities, literature, steadily, one year 25c. Zbiegniewicz, 147 N. 8th St., Brooklyn 11, N.Y.

ANY Highgrade formula \$2. Or refund. Continental Industries, 3439 Michigan, Chicago 16.

MAKE more money. We show you how. Free Catalog. Interstate Publishers, 1429 S. 51st Court, Cicero 50, Ill.

GET Dollar Cash Orders by Mail—Keep 90c of each dollar. Easy! Pleasant! Everything furnished. New Four-Way Plan shows How! Literature Free. Genmerco, Box 142-A, Dorchester Center, Mass.

BUSINESS Opportunities. Stamp brings descriptive folder. Box 855-PS, Des Moines 4, Iowa.

WIN fame, success, security writing short stories, newspaper features. New, easy plan shows you how. Write today for exclusive details. Writer's Institute, 4-P So. 15th St., Philadelphia 2, Pa.

NEED Money? Guaranteed Spare-time Mail Plan 25c. Nemco, 1301A Commonwealth Ave., Allston 34, Mass.

DO You Want Results??? Opportunities galore. Earn big money at home. Dime brings details. Billings, 210 Fifth Ave., New York.

"HOW To Make Money with Big Malls" booklet 25c. Frank J. Artz, 10660 Harding Dr., Toledo 9, Ohio.

\$200 MONTHLY with camera! Forty money-makers with camera. Complete guide 50c. Frank Dickson, 808 Elizabeth St., Anderson, South Carolina.

START your own business! Big Money—manufacturing novelties, plaques, statuary. Catalog Free. Write: Bing Products, 88-BO Broad St., Boston 10, Mass.

OPERATE profitable Mail Order Business. 75c profit each dollar. Powell Service, 5713 Euclid, Cleveland 3, Ohio.

89 MONUMENTS

WRITE For Direct Prices \$14.00 Up. Freight Paid. Guaranteed. Free Catalog. Granite-Marble Factory, A49, Oneco, Fla.

90 MOTION PICTURES, SOUND EQUIPMENT

8-16mm **SILENT**-sound films. Complete rental library. All latest subjects. Free catalogue. (sample film 10c). Garden Film, 317 W. 50th, N. Y. 19.

TAKE finer movies. Professional instruction at home. Free Catalog. Motion Picture Institute, Birmingham 5, Mich.

BEAUTIFUL Kodachrome Slide and list. 25c. Art Slide Co., S-1, Canton, Ohio.

MOVIE Camera Films. 100' 16mm \$2.50. 25' Double 8mm \$1.25. Free Developing. Better Films, 742 NewLots, Brooklyn 7, N. Y.

BEAUTIFUL Kodachrome film subjects. 8mm, 16mm. Low prices. Big catalog, 25c. Projection length sample from "Waikiki Hula." \$1.00. World in Color, Box 392, A, Elmira, N.Y.

GUARANTEED Fresh movie film! Three spools double 8mm \$3.45! Six spools single 8mm for Univex cameras \$3.50! Processing free! Postpaid. (\$1.00 deposit C.O.D.'s.) State camera make. Catalog. Eso-S, 4038 Broadway, Kansas City 2, Mo.

FEATURE Sound and Silent programs—shipped anywhere. 16mm Sound \$4.95; 16mm Silent \$4.50; 8mm Silent \$3.50. Free catalog. National Cinema Service, 71 Dey St., New York.

MOVIE Projectors and binoculars bought and sold. List 10c. United, 2309-D Lawrence, Toledo, Ohio.

16mm **MOTOR** Driven projectors \$16.00 postpaid. Sterling's, 679 Northampton, Easton, Pennsylvania.

LOW Price Electric Projector. At last a practical all metal projector. Will project and enlarge photos, drawings, postcards, stamps etc. In full color or black and white. 101 uses for schools, home or club. Send only \$3.98 or sent C.O.D. plus postage fees. Disco Sales, Inc. Dept. ES1, 154 Nassau St., N. Y. 7, N. Y.

BEAUTIFUL Kodachrome subjects. 8mm 16mm. Lists, glamour color sample, dime. Campus Films, Box 668-C, Ithaca, N. Y.

35mm and 16mm **SOUND** Film and Equipment. Will trade for 16mm Film and Equipment. Send stamps, Mertz Films, Springfield, Ill.

LEARN movie projection, management. Free catalog. Theatre School, Elmira, N. Y.

UNUSUAL Movie! "Temptation" Featuring Beautiful Models. 50 ft.—8 mm \$3.00. 100 ft.—16 mm \$5.00. Fine Art Productions, Box 2084, San Antonio 6, Texas.

UNUSUAL 8-16mm. film subjects. Big Catalog with sample film, 10c. National Film Exchange, Sta. E-Broadway, Toledo, Ohio.

8MM, 16mm, 35mm, films. List and samples 10c. Paramount, Monmouth, Ill.

PROJECT-O-COLOR The New Sensational accessory for movie projectors available now! Information Free. Write Project-O-COLOR, Palatine 20, Ill.

1946 **PROJECTORS**, brand new! Victor 40B 16mm sound projectors \$425! Universal PC500 8mm 500 watt projectors \$63.50! Shipped prepaid in U.S.A.! Our reference Dun, Bradstreet! Charlie Poorman, Dept. PS, Schuylkill Haven, Penna.

HOME Movies. Rent-buy-swap 8/16mm silent and sound at money-saving rates. Details for a dime. Midland, Box 429, Oak Park 3, Ill.

FILM. Free Processing 100 Ft. 16mm Weston 6, \$2.50; Weston 24, \$4.90; Weston 64, \$4.95; 25 Ft. Double 8, Weston 6, \$1.35; Weston 24, \$1.39; Weston 64, \$1.99; Write for circulars. Promader Genera, Davenport 5, Iowa.

NEW! DeLuxe Hollywood Sepia 8mm camera film. Your own movies like popular Hollywood golden tone movies! Double 8mm \$2.00 roll! For Univex 8mm cameras \$1.00 roll! Free finishing. C.O.D.'s accepted. Eso-S, 828 W. 39th, Kansas City 2, Mo.

CAMERAS, Projectors, Accessories. All kinds films. Lists, free. Box 337-N, Valley Stream, N.Y.

FRESH Movie Films 100'—16mm \$2.25. Three rolls \$6.00, 25' double 8mm \$1.25 developing included. Ambassador, 479-A Quincey St., Brooklyn, N.Y.

USED 16mm, 35mm projectors, cameras, Avond, 24 W. 46 St., New York 19.

16mm **SOUND** Comedies, Musicals, Shirley Temple, Bob Hope, Bing Crosby, Stoopnagle, others. Comedy House, 130 W. 46, New York 19.

SOUND and Silent Rental Films shipped anywhere. Free Catalogs. National Cinema Service, 71 Dey St., New York.

ART model films. Rentals exclusively. Adults. List, enclose stamp, Larm Company, 3023 Seyburn, Detroit 14, Michigan.

SLIDE Projectors—"Vokar" \$13.95 "Mar-ton" \$27.50. Slide viewers—"Magnascope" \$2.50. "Da-Brute" \$1.95, with leatherette case \$2.95, with case and Six Kodachrome art-model slides \$4.95. Scenic slides 50c. Add 25c postage. Photo-Craft, Box 470-S, Jamaica 1, New York.

UNUSUAL Home Movies: Travel, Adventure, Sports, News, War films. Many film bargains. Big 1946 Catalog and sample. Dime. Audet, Box 6520-AG, Philadelphia 38, Pa.

MAKE \$8.00 to \$10.00 net profit daily with your 8mm or 16mm projector. Write, Metcalf, 10806 So. Glenroy Ave., Chicago, Ill.

91 MOTORCYCLES, BICYCLES, SUPPLIES

LARGE stock Indian parts. Expert motor rebuilding. Indian Motorcycle Sales. Kansas City 1, Mo.

WHEELS, Tires, Tubes for Motor Scooters, Midget Cars, Wheelbarrows, and Industrial equipment. All sizes. Bicycle Parts, accessories. Largest stock in United States. Send dime for list. Cycle Transport Company, 1241 S. Michigan Ave., Dept. C, Chicago 5, Illinois.

CHANGE your Bicycle to Electric or Gas Motorcycle. Write, T. M. McDonald, 837 Magnolia, Beaumont, Calif.

WHEELS! Complete with rubber tires for wagons, scooters, trailers, wheelbarrows, mowers. 6 1/2" to 16". Free List. Trulsen Mfg., Co., 811 E. 31, K.C., Mo.

BOYS Steel Scooter New Low price \$3.95 C.O.D. Dandee Distributing Co., 320 1/2 W. Second St., Los Angeles 12, Calif.

CUSHMAN Motorscooter less motor \$18; Midget racer less motor \$35, motor-scooters \$40 up complete; motorbike \$30; 1 1/2 h.p. Smith motorwheel \$3; New 2 h.p. Lauson motor in factory crate \$22; Briggs-Stratton motors \$6 up. Over 1500 small tires in stock. \$1.50 up. Mailorder only. Send 25c for catalogue Number 13 just out listing these and hundreds of other bargains. (35c by first class mail.) Midget Motors Directory, Athens, Ohio.

MODERN Motorcycle Mechanics manual, 560 pages, 300 illustrations, covers Harley, Indian and English makes. The most complete motorcycle book published, \$3.00 postpaid. Nicholson Brothers, Motorcycle Engineers, Saskatoon, Sask., Canada.

MOTORSCOOTER Plans for boys, Speedy. Simple to build. Uses washing machine gas motor. \$1.00. Strachen Scooter Shop, Howard 3, Kansas.

USE scrap parts and easily build your own two-passenger midget "Jeep" or speedy Scooter-Car (three wheel, two-passenger runabout, powered with small gasoline engine.) Working plans for both vehicles only \$1.00. Universal, 2671 Algonquin, Toledo 6, Ohio.

PROFESSIONAL Midget Racer, Motor-scooter, Midget Roadster, and Midget Motorcycle. Plans, specifications, for all four contained in illustrated handbook, 25c. Big list bargain priced used motors, motor-scooters, Servicycles, etc., included free! Midwest, 3839 Drummond, Toledo, Ohio.

BUILD America's lowest priced motor-scooter speedster! Complete plans, specifications, \$1.00. Big list bargain priced used motors, etc., included free! Motor Supply, Box 1682-CS, Toledo, Ohio.

MOTORSCOOTER \$10, Motor \$3, Tires \$2! Send 25c for big new catalog Number 912. Just printed, listing scores of other sensational bargains in motors, wheels, motorscooters, motorbikes, Servicycles, tires, etc. Associated, Box CS-1764, Toledo, Ohio.

WHEELS! Steel Disc Rubber Tired For Toys, Wagons, Scooters, etc. Sizes 5" 7" 8" Available. United Wheels Mfg. Co., 11727 Lafayette Ave., Chicago 28, Ill.

INDIANAPOLIS "500" Race History Book. 320 large pages, 2000 illustrations. Complete detailed information every event held Indianapolis Speedway since 1909. Year by year detailed results. \$3.50. De Luxe edition red Du Pont Fabrikkid binding \$5.00. Postpaid. See our ad under "Automobiles," Clymer, Dept. B67, 2125 W. Pico, Los Angeles 6, Calif.

POPULAR SCIENCE OPPORTUNITIES

PLANS For attractive Motor Scooter \$2.00
Electric Bicycle Plans \$1.50
Clymer, Dept. B65, 2125 W. Pico, Los Angeles 6, Calif.

ENGLISH Motorcycle Magazine. Photographs, articles, advertisements interesting foreign motorcycles. Sample copy 50c postpaid. Clymer, Dept. B66, 2125 W. Pico, Los Angeles 6, Calif.

NUMBER Three Clymer Motor Scrapbook now ready. Entirely different from Editions One and Two. 250 early automobiles, motorcycles illustrated, described. Pike's Peak Racing History included in Floyd Clymer's story. \$1.50. De Luxe clothbound \$2.50. (Editions One and Two available same price). Clymer's Steam Automobile Scrapbook \$2.00. All Postpaid. Clymer, Dept. B63, 2125 W. Pico, Los Angeles 6, Calif.

FLOYD CLYMER'S Popular Motorcycle Books: Motorcycles, How to Manage Them \$1.50
Motorcycling Manual \$2.00
English Motorcycle Service Manual \$1.50
Speed, How to Obtain It \$1.50
Sample English Motorcycling Magazine 50c
Complete Plans build attractive Motor Scooter \$2.00
Plans Electric Bicycle \$1.50
all books postpaid. See our advertisement under Automobiles for Automobile Books. Clymer, Dept. B60, 2125 W. Pico, Los Angeles 6, Calif.

TIRES, Inner Tubes, Wheels, for small trucks, wheelbarrows, power scooters, carts, farm equipment, etc. Sizes 8" to 18" o.d. in 2, 4, and 6 ply first-line quality tires, with removable inner tubes and heavy duty demountable wheels. Not to be confused with tubeless pneumatic tires. Can also supply Easter Forks, straight or swivel. Free circular and prices. Jahant Co., 628 East Exchange St., Akron 6, Ohio.

GENUINE Moto-Scout Parts. Complete wheels, tires, tubes; 4:00 x 7, 3:50 x 6. AMSCO centrifugal clutch. Windshields, side cars. All other parts and accessories. Write for parts list. Also genuine engine parts for Briggs and Stratton, Lauson, American Moto-Scout Co., 1313-23 Carroll Ave., Chicago 7, Ill.

92 MUSIC, MUSICAL INSTRUMENTS

SONG Poems Wanted, for musical settings. Send poems for Free Examination. Write for Free Instructive Booklet outlining opportunities. United Music, Salem 12, Indiana.

CROSS-Note Puzzles Music-Lover's Delight. Interesting, Instructive, Original. \$1.00. P.F. M.B. Guarantee. D'Alco, 190 Sackman St., Brooklyn 12, N. Y.

PIANISTS - Quickly improve technique, sightreading, accuracy, memorizing, playing through Mental-Muscular Coordination. Free Booklet, Broadwell Studios, Dept. 96-F, Covina, California.

HAWAIIAN Music (diagram) System and fifteen tunes. Loose leaf, \$3.00. Tulsa Institute of Music, 109 1/2 W. Third St., Tulsa, Oklahoma.

HARMONICAS \$1.35 ea. postpaid. Band Instruments, Free Catalogue, Maple Music Shop, 98 Maple Ave., Newark, N.J.

PHONOGRAPH Records. Send \$5.00. Will ship you 30 good used "Juke box records". Satisfaction Guaranteed. John's Novelty Co., 1014 Mass. Lawrence, Kansas.

POPULAR Advanced Piano Course on chords. \$1.50. William Otto, 4215 Park Ave., Union City, N.J.

HARMONICA Magic. Easy new system eliminates notes. Self instruction method includes 75 songs. Send only \$1.00. Money back guarantee. Harmonica Magic, Dept. PS-1, Box 3445, Merchandise Mart, Chicago 64.

"GUITARS"—"Band and Orchestra Instruments."—"Harmonicas" List Free. Rudolph's, Atchison, Kansas.

HAWAIIAN Guitar Chord Chart \$1.00. Over 650 Chords in A-E7th-C. -B-11th-Notes and Diagrams by Sol Hoopii and Dick McIntire. Best for arranging. Fator's, 935 W. Santa Barbara, Los Angeles 37, Calif.

FOR the best in late used jukebox records write, Olin Milner, 335 McDaniel, Atlanta, Georgia.

HARMONICAS \$1.50, \$2.00, \$2.90. Musician's Shop, 2 E. Centre Street, Baltimore 2, Md.

WANTED Coin operated old-style musical instruments cash. Bobs, 112 E. Seventeenth St., Los Angeles 15, Calif.

93 NAME LISTS

MILLIONS of Names. All kinds, State your needs. Q Service, 422 S. Dearborn, Chicago, Ill.

95 OLD GOLD, WATCHES, ETC.

GOLD \$35.00 Ounce—Mail old gold teeth, diamonds, jewelry, watches—receive cash by return mail. Satisfaction guaranteed. Free information, Dr. Welsberg's Gold Refining Co., 1500-B Hennepin, Minneapolis, Minn.

WANTED—Old or broken jewelry. Cash paid immediately. Mail gold teeth, watches, rings, silverware, diamonds, spectacles. Satisfaction guaranteed or merchandise returned. Information free. Rose Smelting Co., 29 E. Madison, Chicago, Dept. Y.

96 OLD STAMPS WANTED

WHAT have you to offer? A collection? A "Shoe Box" accumulation? Anything in stamps. We urgently need them. Spot cash paid. Cosmopolitan Stamp Co., 1487 Broadway (Times Square), New York.

WANT Uncancelled United States Stamps. What Have You? Ben's Stamp Co., 72 W. Washington, Chicago 2, Ill.

98 PATENT ATTORNEYS

C. A. Snow & Co., S-427 Snow Bldg., Washington 1, D. C. Registered Patent Attorneys. Established 1875. Literature mailed on request.

INVENTORS: Before disclosing your invention to anyone send for Form "Evidence of Conception"; "Schedule of Government and Attorney"; "Fees" and Instructions. Sent free. Lancaster, Allwine & Rommel, Registered Patent Attorney, 413 Bowen Building, Washington 5, D. C.

"INVENTOR'S Guide" free, containing 100 mechanical movements. Information about patenting, selling inventions. Frank B. Ledermann, 154 Nassau St., New York 7.

PATENTS Obtained; selling service, information, recording forms free. Labiner, World Building, New York 7.

INVENTORS: Learn now—without obligation—how to protect and sell your invention. Write for free "Record of Invention" form and complete instructions for making disclosure and establishing date of your invention. We also send our new free "Patent Guide for the Inventor," containing complete information about patent procedure and how to sell inventions; giving illustrations of many successful inventions; over 150 basic mechanical movements. We assure you prompt, confidential service. Delays may be dangerous. Write today for your free "Patent Guide" and "Record of Invention" form. Clarence A. O'Brien & Harvey Jacobson, Registered Patent Attorneys, 62B-E Adams Building, Washington, D. C.

INVENTORS—Take prompt steps to protect your invention. Delays are dangerous. Get new Free Books, "Protect, Finance and Sell Your Invention," and "Invention Record" form. Preliminary information free. Reasonable fees. Conscientious counsel. Easy payment plan. Learn how to protect and sell your invention. Write us today. McMorow, Berman & Davidson, Patent Attorneys, 143-E, Atlantic Bldg., Washington 4, D. C.

INVENTORS: Write for information on Patents and "Record of Invention" form, free. Randolph & Beavers, Registered Patent Attorneys, 340-A Columbian Bldg., Washington 1, D. C.

PATENTS Secured. Two valuable booklets. "Patent Protection" and "When and How to Sell an Invention," together with valuable "Evidence of Invention" form sent free. Write immediately to experienced patent counselors, Victor J. Evans & Co., 141-G Merlin Bldg., Washington, D. C.

PATENTS—Trade marks. Irving L. McCathran, 316 McLachlen Bldg., Washington 1, D. C. Registered Patent Attorney.

99 PATENTS

INVENTORS: Test the commercial value of your patented or unpatented inventions, quickly and inexpensively. Write for free information. Institute of American Inventors, Dept. 30-B, 1926 Eye St., N. W., Washington 6, D. C.

PATENTS Designs, Fred C. Geiger, 511-A Bond Bldg., Washington, D. C.

OBTAIN your Own Patents. Free Circular. Aristocrat Co., 545 Fifth Ave., New York.

CAPITALIZE inventions without patent expense. Patents guarantee No Protection. Send \$1.00 for booklet, "The Patent Racket", and profit thereby! Ryan Valve Co., Box 142, Easthampton, Mass.

RELIABLE Patent office searches \$10.00. Prompt service. Free invention protection form. Mail sketch or description to M. F. Bell, 723 - 19th St., N.W., Washington 6, D. C.

100 PATENTS FOR SALE

THREE first class items, outright or royalty basis. Sensational new type tweezers, household nail and screw starter, new non-mechanical pencil, (no sharpening necessary,) nothing like it. Items Patent Applied for, information to Manufacturers only. Ellis B. Law, Box 588, Gulfport, Mississippi.

OUTRIGHT or royalty basis, wardrobe automobile seat for hanging clothes wrinkle-free while traveling. Mrs. A. Z. Looney, 722 Sunset Drive, Lexington 19, Ky.

101 PERSONAL

DRUNKENNESS is a disease which responds to treatment. Medical skill plus human sympathy prove successful with liquor and drug cases. 60 years experience. Write for free booklet. P. S. Nelson, The Keeley Institute, Dwight, Ill.

LEARN Ventriloquism. 3c stamp brings particulars. Smith, Dept. 401, 801 Bigelow, Peoria, Illinois.

POEMS Wanted for Musical Setting. Send poem for immediate consideration. Five Star Music Masters, 646A Beacon Bldg., Boston.

PSORIASIS Sufferers: Has everything failed to bring even temporary relief from scales, lesions and itching? Then write today for Free important information. You needn't invest one cent! Pixacol Co., Dept. S, Box 3583, Cleveland, Ohio.

MAIL Postcards from the Ozarks in your own Handwriting, 25c each or 3 for 50c. A. Kerry, 1292, Noel, Mo.

MAIL forwarded from the Ozarks, 25c each. Confidential. A. Kerry, 1292, Noel, Mo.

PERPLEXED? Depressed? Involved? Ease Yourself. Confidential Advice Send \$1.00. Professor Ethelbert, Box 3424, Jacksonville, Fla.

THINK! Amazing "Key To Power," helps anyone: great leaders discovery—Carnegie! Napoleon! Ancient Healing Psychology that works—Master "Key" to Riches! Health! Success! "Mystery Message" Free—Cosmocracy, Box 7-EE, Long Beach, Calif.

OZARKS Postcards—where the sensational Jessie James film was made. 5 for 25c. A. Kerry, Noel, Mo.

POPULAR SCIENCE OPPORTUNITIES

DOMESTIC Problems, Reliable advice rendered on Domestic Relations. Each letter given personal attention \$3.00. Immediate confidential service. Domestic Relation Bureau, Box 566, Ypsilanti, Mich.

BORROW By Mail Loans \$50.00 to \$1,000.00 to employed men, women. Easy, quick. Completely private, confidential. No endorsers. Up to 18 months to repay. Details Free in plain envelope. Write First Loan Co., World Herald Bldg., Dept. B-15, Omaha, Neb.

HAVE fun visiting Detroit, Mich., or Pittsburgh, Pa., by proxy. We send 3 postcards for 25c. Name city, address and return. Letters 50c each. Francine, 1213 Voskamp St., Pittsburgh 12, Pa.

GENUINE wine made at home in glass jugs, easy. Details \$1.00. Homecraft, 220 S. Fountain, Wichita, Kansas.

HYPNOTISM. Complete 20 Method Course, 25c. Western Institute Hypnotism D-1619, Palatine, Ill.

PILES. Medicless Permanently Cured. Information \$1.00. J. Ragno, Berwick, Pa.

NERVOUS, self-conscious, fears? Be Courageous, Self-Confident, Magnetic. Sensational psychology course. Only \$1.00. Dr. Malcolm Smith, 1104 Union Ave., Montreal 3, Canada.

"**SEAL of God?**" Identified! 5c. Bulletin, Box 87, Station H, New York 25.

LEATHER Jackets Scientifically Cleaned, refinished like new, \$3.50. O.D. Trousers dyed \$2.50. Lawrence Jacobson, 2825 N. Broad, Philadelphia 32, Pa.

MYSTIFY your friends, Mail forwarded from New York, Ask for details, Rochmann, 69 E. 55th St., Brooklyn 3, N. Y.

HAIR Falling? Dandruff? Write Trichologist, 139 Lewis Street, Phillipsburg, N. J.

PICTURE Post Cards produced photographs. For hotels, resorts, advertising purposes. 4154 Fifth St., Philadelphia 40.

PERSONALIZE your clothes with name tapes. 75c per hundred. Arrow Label Co., P.O. Box 31, Brooklyn 12, N. Y.

VISIT Niagara Falls by proxy. We send 5 postcards, \$1.00. You Address, Stamp, return for Mailing, Box 22, LaSalle Station, Niagara Falls, N. Y.

PICTURE yourself as others picture you! Caricature drawn from photograph on 8 1/2 x 11 Bristolboard, by "Jay" outstanding caricaturist. Send photo (returned in good order) and \$1.00 to, Reslyn Publications, 171 Madison Ave., New York 16.

ATLANTIC City By Mail 3 Postcard Views 20c. Address return 1 remail. Letters Mailed 15c. Mailing Address \$2.00 month. Muriel Koler, 1111 Atlantic Ave., Atlantic City, N. J.

NEW discovery has produced perfect formula for Athletes Foot. Make your own supply for only a few dimes. Material readily purchased at drugists without prescription. Send \$1.00 for full details. Brown Lab., Chicago 26, Ill.

SEX life tells what every one should know. Free catalogue, Interstate Publishers, 1429-B So. 51st Ct., Cicero 50, Ill.

READ, "The Atomic Bomb And The End Of The World", 25c postpaid, Write New Age, 1708 So. Humboldt, Minneapolis, Minn.

The Academy of Power. Do you possess a yearning to increase your health, happiness and financial success? Then turn the magnifying glass of You towards the inside of You and reveal what a marvelous You lives within You and the possibilities that await the revelation. How? The Academy of Power comes to your aid by sending you our course of 52 lessons. We have faith in You, therefore will leave you to be judge of their worth. A post card giving your name and address plainly written will bring absolutely free full information. Address: R. E. Orabel, P.O. Box 103, Gatlinburg, Tennessee.

SKIN Itch—Free 10 day trial offer. New discovery stops itch helps heal skin. If satisfied pay \$2. If not return jar. Paul Bros., Pharmacists, 1221 White Plains Road, Dept. P.C. 3, N. Y. 60, N. Y.

SLEEPLESS?—Stop noise with Sleep-Rite Soft Waxen Earplugs. Ask your druggist.

BUY Vitamins direct. Save. Postcard. Matoska Products, White Bear Lake, Minn.

PIMPLES Disappear overnight, I tried everything till I found this formula, \$1.00. Morean, Box 243, Lowell, Mass.

ATHLETE'S foot remedy Guaranteed \$1.00 bottle prepaid. Dr. William Renz, Rm. 3, Chavanne Bldg., Lake Charles, La.

LOVELY?—send for confidential Reading List. Ferrantebooks, 309 Thrd, Pallsades Park, N. Y.

YOUR Handwriting Reveals? Your hidden talents, Valuable Information. Special Analysis, Only \$1.00. B. Bransford, 220 W. 21st St., Indianapolis 2, Indiana.

102 PHOTO FINISHING
MONEY Back Guarantee—All this for 25c; Roll developed, 8 bigger DeLuxe prints, also 8 regular prints, plus two beautiful enlargements and tasteful Leathertone frame. Lifetone Photo Co., Dept. 68, Des Moines, Iowa.

8 EXPOSURE rolls 25c, over 8 exposure 40c, for one Velox print each and Free enlargement coupon, Reprints 3c, minimum 25c. Fred A. Eastman, Bode, Iowa.

SENSATIONAL introductory offer! Send snapshot or negative, this ad, and 3c. We'll send you a beautiful 7" x 5" enlargement! Or, Kodak roll developed with 16 guaranteed deckled-edge velox fadeproof prints or 8 double-size prints, 25c! Special! From your negatives, 16 regular-size or 8 double-size reprints, 25c! Candid Rolls—36 exp. 35mm developed, vapo-rated, enlarged to 3x4, \$1.00! 18 exp. 50c. Reprints, 3x4, 3c each. We have new, perfect 35mm film. Low prices. Free Mailer, details on request. American Studios, Dept. 280, LaCrosse, Wis.

PHOTOGRAPHY for pleasure or profit. Learn at home. Practical basic training. Long established school. Write for booklet. American School of Photography, 1315 Michigan, Dept. 1721, Chicago 5.

CENTURY delivers work and service that can't be beat. 8 exp. roll 25c with two professional enlargements Free. Century Photo Service, LaCrosse, Wis.

BIGGEST \$1.00 value in 35 MM finishing today. 36 exposure fine grain 3 1/4x4 1/2 enlargements; deckled, embossed margin and date. Eighteen exposures 75c; 16 exposure splits 55c; 36 exposure reloads 50c. Special: return this ad with \$2.00 and we will send five 36 exposure reloads. Free mailers. 8 exposure rolls in beautiful, deckled contact finish with embossed wide margin. 25c. Mailbag Film Service, Box 5440A, Chicago 80.

AT Last! We Have Films: 116 & 616—38c ea., 120 & 620—33c ea., 127—27c ea. Roll developed, all your snapshots hand-colored as beautiful as most actual colored photography 35c. Hand colored reprints 4c each, 12 for 45c. Midwest Photo, Janesville 27, Wis.

FAST Delivery. Satisfaction Guaranteed. Eight exposure rolls with two prints of each exposure. 30c; or eight Jumbo size prints, 35c, completely finished. Write for special reprint prices. Pioneer Photo Print Service, Box 123, Wichita, Kansas.

BEAUTIFUL double size Pictures 3 1/2c each, from 116 and 120 negatives, 3 1/4x4 1/2 from all other sizes. All work guaranteed. Overnight service. Roll developed and 8 pictures 30c. Roll 12 pictures 45c. Roll 16 pictures 60c. Enlargements on double weight portrait paper 5x7—30c, 8x10—50c. Copies made from any picture 75c. Pacific Photo Service, Box 666, San Francisco, California.

FREE "Lifetime" enlargements with roll developed plus 8 high-gloss prints—25c. Fast Service, work guaranteed. May Studios, Dept. 061, La Crosse, Wis.

YOUR 6-8 Exposure Roll Developed and Two prints each good negative 30c; Or enlarged to about Post Card size 8 Exposures 25c. 12 Exposures 40c. 16 Exposures 50c. Rapid Foto Service, G.P.O. Box 413, New York 1, N. Y.

EXCLUSIVE Introductory Offer! 4 beautiful enlargements for 10c. Send any 4 negatives of the same size (up to 2 1/2" x 4 1/2") and we will return to you immediately 4 valuable enlargements—deckled and dated on Velox. Negatives returned with order. Send negatives, this ad and 10c coin today. This ad must accompany order. Mail-N-Save, Box 310-9 Quincy, Mass.

FILM 6 or 8 Exposure Roll Developed & Printed Plus 5 x 7 Enlargement Free. Complete 25c. Mail Film to Joy-Photos, G.P.O. Box 606, New York 1, N. Y.

ROLL Developed. Eight, sparkling 4x6 glossy enlargements. 35c. MacDonald's Photos, Box 28-B, Congress Park, Ill.

RENT 8mm—16mm and Sound Films by week. New catalogs. Lowest rates, Dayton Film, 2227 Heppburn, Dayton 8, Ohio.

DON'T Be In Doubt! Try Smith's Fine Quality Service! Any 8 exposure film developed, 8 prints and 2 enlargements, only 25c. 8 Double-Size, 25c. 35MM Fine Grain developed, 36-3x4 enlargements, only 90c; 18-55c. Cartridges refilled, 36 exposures 35c; 18-20c. Enlargements: 4x6—10c; 5x7—20c; 8x10-35c. Write for mailers, sample print and price list. Smith Studios; 8 Saint John St., Plains, Pa.

BEAUTIFUL hand colored 8x10 photo from your negative \$1. from snapshot \$1.50. Commercial Photo Lab., P.O. Box 2412, Philadelphia, Pa.

BEAUTIFUL enlargement from each picture on roll 25c. Cut Rate Photos, Dept. A-6, Janesville, Wis.

11"x14" FROM Negative \$1.00. Barbell Photo, Box 395, Newark, New Jersey.

50 RE-PRINTS \$1. No limit. Studio, 1408-S Bond, Rockford, Illinois.

GENUINE Moen-Tone finishing approved by thousands since 1898. 8 Exposure roll developed with 16 prints or 8 enlargements. 25c. Moen Photo Service, 200 La Crosse, Wis.

8 VELOX enlargements 25c. Send roll or negatives for trial offer. Young Photo Service, 406-E, Albany 2, N. Y.

2 BEAUTIFUL Hi-Gloss prints each good negative and enlargement coupon with each 6 or 8 exposure roll developed 25c. Owl-photo Co., Weatherford, Oklahoma.

INDIVIDUAL Attention Each Negative guarantees outstanding pictures. Roll developed and 8 prints, 25c. 8 beautiful 6 x 4 enlargements. 35c. Fresh Film. Write for free mailers and other offers. 24-hour service. Universal Photo Service, Box 612-N, LaCrosse, Wis.

106 PLASTICS
CELLULOID—Beautiful assortment. Motives, opaques, onyx, pearls. Used by ring makers everywhere. One pound assortment—pieces approximately 30 sq. in. each. Price \$1.00. Please include 10c for postage. Craft Service, 337 University Ave., Rochester 7, N. Y.

PLASTICS—10c brings our Complete Plastics Catalog containing many Profitable, Fascinating Ideas! Special Kits and Bulk Assortments. Pull line of Plastics. Also Details about our Free Offer! Fast, Reliable Service! Write Today to Belco Plastics, Inc., Dept. 82, 147 W. Sydney Ave., Mt. Vernon, New York.

BEGIN your Plastics career. Plastics Home Laboratory—Vacation Set, #1—actually makes 6 useful articles from Lucte, Vinyl, Polystyrene and Acetate. Includes instructions and all necessary materials; no scrap. You do no sawing, sandpapering or polishing. Only \$2.00 complete. Send check or money order to Plastomac Products, P.O. Box 258, Grand Central Station, New York 17, N. Y.

POPULAR SCIENCE OPPORTUNITIES

PLASTICS and Supplies—new Plexiglass, Lucite, and Catalin—Sheets, rods, tubes, Etc. Plexiglass and Lucite sheets per sq. ft. 1/16" \$1.60; 1/8" \$2.00; 3/16" \$2.25; 1/4" \$2.75; 5/16" \$3.75; 1/2" \$4.75; 3/4" \$7.50; etc. 5% discount over 5 sq. ft., 10% over 10 sq. ft. Kits \$2.00; \$5.00; & \$8.00. Postpaid. List free. Send money order. Plas-mat Sales and Engineering, 4648 Shirley Pl., St. Louis 15, Mo.

PLASTIC Plexiglas sheets new; 144 square inches following thicknesses; 1/16" \$1.60; 1/8" \$1.85; 3/16" \$2.00; 1/4" \$2.50; 5/16" \$3.50; 1/2" \$4.50; 3/4" \$7.25; 1" \$9.25. 5% discount over 5 square feet. 10% discount over 10 square feet. Send prepaid. Send money order. Plastic Supply Co., 2618 St. Louis Ave., St. Louis 6, Mo.

10c BRINGS our Booklet with Illustrations. Project Suggestions, Instructions on Lucite, Catalin, Plexiglass and Bakelite. Douglas Home Craftsman, Box 34V, Stamford, Conn.

NEW, easy, make Rubber Molds. Fishures, Novelties. Shuman Tackle. Green Terrace, Kent, Ohio.

LEARN at home "Working with Plastics". Full information on sheets, blocks, rods, tubes. Trade names, sizes, colors for fabrications. Designing, tooling, bending, cementing, polishing. Also for homeworkshop. Only \$1.25 postpaid. Money back guarantee. Modern Technical Book Co., Dept. M45, 55 W. 42nd St., New York 18.

COLORED plastics—mottled colors; sheets and rods. Free price list. Hanson Plastics. Dept. E, 7625 S. Park Ave., Chicago 19.

CATALIN Square & Round Rod Asst. Many colors. Minimum length 6". \$1.50 lb. Polystyrene round rods, crystal clear, 1/8" diam. x 48", 1/4" each; 1/4" x 36", 24c each; 1/4" x 72", 46c each. Vinyl Film 36" wide, suitable for raincoats, gun covers, tents, aprons, etc.—in clear, green, red, blue. 75c yd.—5 yards \$3.50. Please add 10% to cover postage when remitting. Satisfaction guaranteed. Berton Plastics—21 W. 21st St., New York 10, N. Y. Dept. P.S.

PLASTICS Fabrication Manual and Plastic Materials Catalog, both for 10c. Tells you how to saw, drill, rout, machine, form, etc. A money-maker guide. Berton Plastics—21 W. 21st St., New York 10, N. Y. Dept. P. S.

PLEXIGLAS Lucite scrap from our factory, mostly masked. Make small articles, costume jewelry, handbag-ornaments, novelties. Sizes, thicknesses assorted. 6 pounds \$3.00, 12 pounds \$5.00, add 10c postage. Plastic Fabricators, 44 Murray St., New York 7, N. Y.

LUCITE 5 lbs. \$2.50. 10 lbs. \$4.50 plus postage. Chas. Gass, 307 14th. Arnold, Penna.

"LUCITE" Clear transparent sheets, rods, tubes. Color transparent, translucent, opaques, phosphorescent sheets. Any amount. Also kits. Manufacturers craftsmen: send for free price list. Hamilton Plastics Corp., 717 Cedar Lane, Teaneck, New Jersey.

108 POULTRY AND SUPPLIES

RAISE turkeys the new way, write for free information explaining how to make up to \$3000.00 in your own backyard, address National Turkey Institute, Dept. 57, Columbus, Kansas.

109 PRINTING, MULTIGRAPHING, ETC.

GOOD printing! Low prices! Large, small, quantities. 250 Letterheads, 250 Envelopes, \$2.75. Samples free. Joseph Johnson, 1382-B Fifth Avenue, New York City 29.

500 ENVELOPES \$1.75. Samples Free. Mango, 555-B South 20th, Newark 3, N.J.

ADVERTISEMENTS—Hobby Cliche advertisements cast only 1c a word, Raymond Dow, 2922 164th St., Flushing 24, N.Y.

QUALITY, Economy, Satisfaction—Get our Quotations first! Dover Salesmart, 173 Washington Ave., Dover, New Jersey.

FINE Printing—Reasonably Priced. Prompt Service. Samples. Treaster Printing, (SS-46), Milroy, Penna.

QUALITY Printing At Lowest Cost. Free samples, pricelist. Adams-SP, 30 W. Washington, Chicago 2.

QUALITY Printing. Prompt efficient service. Samples. Lakeside Press, Bolton Landing, N.Y.

QUALITY Printing—Moderately Priced. Estimates—Samples Free. Keystone, 292 W. Third, Williamsport 3, Pa.

QUALITY Printing prepaid; Business, personal stationery. Letterheads, envelopes, statements. Prices reasonable. Samples. Mero Products, 99 Morrison Ave., Punxsutawney, Penna.

350 BUSINESS cards \$1.00 postpaid. Artcraft, 40-06 97th, Corona 2, N.Y.

250 8 1/2 x 11 LETTERHEADS, and 6 1/2 envelopes \$2.75 Postpaid. Advance, Strasburg, Ohio.

150 EACH 8 1/2 x 11—20 lb. Hammermill Letterheads, 6 1/2 Envelopes, printed, postpaid, \$2.00. Race Printing, Hudson, New York.

GET Our Printing Prices First. Crane, 3024A White, Kansas City 3, Mo.

AT LAST! Satisfactory Printing—Samples, Mail Printing, P93, Danvers, Mass.

GUMMED Labels and Stationery. List Free. Box PS-135, Spiro, Okla.

SEND 10c Now, for our 36-page 1946 pricelist—refunded first order. McCall Press, 1326 S. 27th, Omaha 5, Nebr.

LETTERHEADS, Envelopes, Circulars, folders, Booklets, Labels, imitation letters. Quality workmanship, low prices. Get our estimate on your needs. Lonelm Printers, Paulding, Ohio.

110 PRINTING OUTFITS, SUPPLIES

PRINT your own Postal Cards, paper, or anything on "Printomatic Self-feeding Rotary Postal Card Stencil Duplicator. Only \$9.50 with \$2.35 worth of supplies. Stencils, Ink, etc. Literature Free. Pittsburgh Typewriter Supply, 336-RE Fourth Ave., Pittsburgh 22, Pa.

PRINTING equipment, type and supplies. Send stamp for details or dime for complete illustrated supply book. Kelsey Inc. X-8, Meriden, Conn.

CUTS—Make real halftones. Inecuts yourself! Samples 25c, Particulars free, Rapid Chemical Service, Edwardsville, Illinois.

INEXPENSIVE home-made printing press. Details free. Novelty Shop, Downsville, Louisiana.

PRINTING Presses, Type, Supplies, Lists 3c. Turnbaugh Service, Louisville, Pa.

PHOTO-Engravings Reasonable, Estimates. Spada Enterprises, 10 Lexington, Wethersfield 9, Conn.

PRINT At Home—Send 10c for Catalogue—Type, Presses, Supplies, Barnhard Co., 6 Columbia St., Newark 5, N. J.

111 PROFITABLE OCCUPATIONS

ANNOUNCING home study course in commercial baking. Practical basic training. Good field for those with aptitude. Nearly depression proof. Send for free booklet, "Opportunities in the Baking Industry." National Baking School, 1315 Michigan Ave., Dept. 1721, Chicago 5, Ill.

\$5000 FROM Half Acre! Growing Ginseng. Seed, contract supplied. Particulars 10c. Associated Growers, Dept. 12, St. Norbert, Manitoba.

\$40.00 WEEKLY. Made growing mushrooms. Fresh, Dried, Dominion Patent 331583, free spawn, North American, 169Y Yonge, Toronto, Canada.

LOCKSMITHING—Profitable Business or Hobby! New course teaches you how to pick locks, fit keys, de-code, masterkey, etc. Easy self-instruction lessons. Bargain price. Fascinating 100-page illustrated catalog. Free! Write Nelson Co., Dept. 2-01, Chicago 5.

MAKE Beautiful Costume Jewelry At Home For Large Profits, Hobby or Therapy. Free Illustrated Wholesale Catalogue of Sea Shell, Metal and Plastic Parts Contains Detailed Instructions. Florida Supply House, Bradenton, Fla.

MUSHROOMS Grown; Boxes, Barrels. Instructions 50c. Spawn \$1.00. Gordon, 551 William, Winnipeg, Manitoba.

LEARN sewing machine repairing. Pays well. Work at home. Simplified Service—manual fixes any make like new. Work City, Town, or country. Start immediately. Copyrighted. Guaranteed, \$1.59. Serviceman, 231 Main, Hamilton 8, Ohio.

EXCELLENT profits raising Mink. Choice breeding stock available. Details furnished. Franklin Young, Riverhead, New York.

GOLD—Stamping is fascinating and profitable. Free booklet. Home City Specialties, Dept. PS 1273, Springfield, Massachusetts.

PAINTING flagspoes often pays \$50.00 daily. Particulars free. The Skyline Co., P.O. Box 1601-A, Uniontown, Pa.

"PRACTICAL Prospecting", illustrated book, tells how find minerals, treasures with electronic locators. Complete methods. \$1.00 postpaid, Southwest Publishers, Tortilla Flat, Arizona.

SHELL—Jewelry—Supplies Wholesale—only, McFarland Plastic Company, Sarasota, Florida.

YOUR own mail order business. Get set for life. Use spare time to grow independent. Write for free particulars. Van Enterprise, 3308 S. Quincey Ave., Milwaukee, Wis.

VETERANS' Earnings unlimited. Operate Own Advertising Agency. Little capital needed. Start at home in spare time. Send stamp for special folder. Jackson Enterprises, Dept. D, Sliom Springs, Arkansas.

START a home business in spare time. Make extra money. Experience not essential. Literature free. Address, J. Bolden, 409 Washington St., Bristol, Pa.

INTERESTED in Latin American and Foreign Employment? \$1. brings 1946 copyrighted booklet explaining How—Where to apply with listing of 300 firms with foreign interests. L. J. Enterprises, Box 2549 PS, Hollywood 28, Calif.

STORY writing simplified! Don't dream—try! Handsome earnings. Fascinating, complete home study. Free circular. Simple Segment System, P.O. Box 834, Spokane, Wash.

PANNING Gold—Free Literature Pictures. Old Prospector, Box 21R36, Dutch Flat, Calif.

"12,000 ALASKAN Job And Business Opportunities" \$1. brings 1946 copyrighted booklet explaining How—Where to apply with tips on Excellent Business Opportunities and Government Homestead Lands at 25c per acre to approved applicants. Transcontinental Research, Box 2147-XP, Hollywood 28, Calif.

112 RADIOS, SUPPLIES & EQUIPMENT

MAKE Simple, Tubeless, Batteriless, Distance-Getting Crystal Radios. Crystal and Illustrated Instructions 25c postpaid. Allen, 427-S, Clinton, Mo.

TEN Simple, easy to build Crystal Radio Diagrams and Crystal 25c Postpaid. Potter, 1314 McGee, Kansas City 6, Mo.

BUILD your own Radio. All kits complete, including speaker. 4 tubes & full instructions, 10.95. Details & latest parts catalog. National Radio Distributors, 1029-P E. 163rd St., N.Y. 59, N.Y.

LOWEST Prices. Radio Tubes, parts, Bargain Lists 3c. Potter, 1314 McGee, Kansas City 6, Mo.

POPULAR SCIENCE OPPORTUNITIES

FAMOUS "Allen" Midget Semi-Fixed Crystal Detector. Set Building Plans and 100 late crystal set Distance Reports all for 50c. Postpaid. Allen, 427-S, Clinton, Mo.

HAVE fun, building super crystal radios. educational, illustrated instructions and crystal 25c postpaid. Boyer, 634 Nebraska, Kansas City 2, Kansas.

CRYSTAL Radio experimenters. Illustrated catalog, crystal-radio supplies. Write immediately for free catalog. Hulet, 334 E. 39th, New York.

AMPLIFIER, brand new, with tubes, input to 7F7, output 2-7C5's, full wave rectifier 7Y4, with transformer, original carton, prepaid \$4.95. Lyell Hardware and Lumber Co., 1451 Lyell Ave., Rochester, N. Y.

REVISED Plans 18 Crystal Sets (SW record 5300 miles), including "Radiobuilder"—25c. Laboratories, Box I-t, San Carlos, California.

BUILD Newest, Extra-Loud Crystal Set. Instructions, 20c. "All About Crystal Sets", Booklet 45c. Amorse, Rt. 4, Hungary Road, Richmond, Va.

LOUD Speaking Crystal Radio, improved design. Illustrated plans, 30c. Radio Clinic, 10631 A Euclid, Cleveland 6, Ohio.

"**SUPERHET Manual**", \$2.50. Free electronics book! Stone, Lunenburg 22, Mass.

RADIO Catalog Free! Send name for new Concord Radio 112-Page Catalog, offering latest postwar radio sets, phono-radios, radio parts, amateur kits and supplies, electronic equipment, technical books. Thousands and thousands of items, available now at low prices. This great Catalog is Free. Write for it now. Concord Radio Corp., 901 W. Jackson, Dept. 11, Chicago 7, Ill.

FAMOUS Razor Blade Radio! Illustrated Plans 35c. New Radio. Lohrville, Iowa.

RADIO book:—"Everybody's Radio Manual". Tells how to service all radios at home. 256 pages, 216 pictures. Deluxe edition, \$1.49. Popular Science, Dept. 66-C, 353 4th Avenue, New York 10, N. Y.

TUBES, Parts, Test Equipment for service men and radio hams. Wholesale prices immediate delivery. Variety, 601 Broad, Newark 2, N. J.

RADIO service flat rate schedules solve pricing problems. Compiled from 20 years experience. Write for information. Radio Equipment Co., 1415 W. Franklin Ave., Minneapolis 5, Minn.

VEST Pocket Radio! What fun! Listen while strolling or cycling. Local or distant reception. Plans sold all over U.S., Canada, Hawaii, West Indies. Standard parts. Cheap. Easy. Free photograph with Plans. Rush \$1.00. United Manufacturing Associates, 3316-3 Ave. G, Fort Worth 5, Texas.

WESTERN Electric fixed crystal detector, no adjusting, gives loud steady signal nothing like it, a war development. Excellent for crystal sets, meters, other uses, cost Government \$6.00 prepaid 99c. Free list S. Radio City Labs., 30 Church St., New York 7, N. Y.

1 TUBE Radio Kit, including tube, phone two batteries—nothing else to buy. Easy to build, place parts on picture diagram and connect. Anybody can do it. Gets local, distant stations \$10.95 prepaid, plus Federal Excise tax, postage 85c. Crystal Kit all parts including headphone, very efficient. \$2.95, plus Federal Excise tax, postage 50c. Free parts list Z. John Barron, 662 85th St., Brooklyn 9, N. Y.

WALKY-Talky one tube transceiver. Complete schematics, layouts, instructions, one dollar. G. M. Amdahl, 1620 E. Beach, Gulfport, Miss.

BUILD "Proximity Alarm." Free details. Write Robert, Box 2044, Columbus 16, Ohio.

5 TUBE Superheterodyne Radio Kit including Cabinet and Tubes \$17.50 plus postage. Radionic Associates, 95 Nassau St., N. Y. C.

TINY-Talky, one-tube transceiver: Paired-transceivers, new unit for communications; three-tube superheterodyne receiver, equivalent to five-tube receiver; Two-tube super-regenerative receiver, equivalent to four-tube receiver. One tube regenerative received includes power supply in listing of items. Complete schematics, layouts, instructions for any one of the above, one dollar. Richard J. Preston, Brentwood, Excelsior, Minnesota.

RADIO servicemen, Amateurs, experimenters—thousands surplus meters, condensers, resistors, speakers, radio earphones microphones, etc. List five cents. Campbell, 3800 Kinzie, Racine, Wis.

115 REPAIR WORK

SEWING Machine Servicemen needed, fix any make up to 60 years old. Hang out a Shingle with our Manual and you are set for life \$1.98. Money back guarantee. Serviceman, 231 Main, Hamilton 10, Ohio.

118 RUBBER STAMPS

RUBBER Stamps, 3 lines 35c; Signatures \$1.75; Pad 25c. Printridge, Wauwatosa, Wis.

THREE Lines, Cushioned, Indexed, Knob Handle \$1.00. Additional lines 25c each. Ideal Rubber Stamp Co., Detroit 8, Mich.

PICTORIAL rubber stamps for Schoolroom use, 10c each, Catalog free, Stamporium, 2680m Rochester, Detroit 6, Michigan.

BETTER Rubber Stamps, Ezy-Order Literature Free. Lee-Vall Press, Box 1242, Indianapolis 6, Indiana.

119 SCIENTIFIC EQUIPMENT

METAPHYSICIAN treatments. Simple scientific apparatus book \$3.55. New Artisan Psychiatrist, Lytles, 281 Main, Watertown, N. Y.

122 SONG WRITERS

POEMS Wanted to be set to music. Free examination. Send poems. McNeil, Master of Music, 510-PS S. Alexandria, Los Angeles, California.

SONGWRITERS, Songs Published Monthly. Advance Royalty. Send your songs or poems today to our exciting offer. Hollywood Tunemasters, Dept. 10F-C, 1537 N. Vine, Hollywood 28, Calif.

WANTED! Lyrics, melodies for songs. We arrange, publish, sell. Superior Song Studios, Passaic, N. J.

SONGWRITERS! A limited amount of songs wanted for radio distribution. Tin Pan Alley, Inc., 1650 Broadway, New York 19, N. Y.

POEMS Wanted for musical setting. Composers' Guild of America, 545 Fifth Ave., New York 17, N. Y.

POEMS Wanted for musical setting. Send poem for immediate consideration and Free Rhyming Dictionary. Richard Bros., 46 Woods Bldg, Chicago.

SONGWRITERS—Send Poems for immediate examination and Free Book, "Your Future in Songwriting". Radio City Music Academy, 1674 Broadway, New York 19.

SONGWRITERS: \$100 Cash Awarded Each Month For Best Song or Song Poem. Melodies supplied Without Charge By Hollywood composers. Lead sheets and records furnished. Cinema Song Co., Dept. B-35, Beverly Hills, Calif.

POEMS Wanted for Musical Setting. Send poem for immediate consideration. Five Star Music Masters, 646 Beacon Building, Boston.

SONG Writers Attention! The amazing demand for phonograph records, accelerated by more than 300,000 Juke Boxes and the Hits accredited them warrants your immediate consideration. We are offering song-poem writers the rare opportunity of having established composers collaborate on appealing material received this month. Recola Records, Box 987S, Hollywood 28, Calif.

SONGWRITERS! Amazing. Outstanding offer. Hibbler, C15, 2157 N. Avers, Chicago.

EXTRA Copies of your music. Inexpensive. Musicopy Service, Box 181, Cincinnati 1, Ohio.

SONGWRITERS: Collaborate with famous Hollywood composer. Send poems for Free examination. Valuable Monthly Awards For Best Songs. Recording and Manuscript Service. Hollywood Harmony House, 126 S. LaBrea, (L-16), Los Angeles 36, Calif.

SONGWRITERS! for best proposition. write Art Music, 1658 Broadway, New York 19, N. Y.

SONGWRITERS, Have your songs completed by an honest, experienced arranger. Submit songs for free analysis. Tommy Kilbourne, Box 1253, Bakersfield, Cal.

NEW songs and lyrics wanted for Popular Radio Program and professional promotion. Free examination. Transradio Music Inc., Dept. P.S., 1650 Broadway, N. Y.

SONGWRITERS—Send best poems today for our offer, or request free booklet "Getting Ahead in Songwriting". Song Service, 331-J West 46th, New York.

\$100 CASH award for best song poem placed with us every month. Hit parade composer and staff will set it to music. Finished song will be recorded and lead sheets or manuscripts furnished for professional presentation to song publishers. Send your song poems today for free examination and full details how you may win \$100. Screenland Recorders, Dept. P.S., Hollywood 28, Calif.

SONGWRITERS We publish good songs without payment. Write for details. McCinty Music, 34 West Flagler, Miami, Fla.

MUSIC composed—music printed—since 1910. Reginald Belcher, Florham Park, New Jersey.

"**LEARN** to write music, words, arrangements and publishing. The Complete Songwriter tells How. Send \$2.00 M.O. postpaid to Furitan Publishing Co., Inc., 334 S. Dearborn St., Chicago 4, Ill.

REAL Composer of Music will co-operate with lyric writers in song production. Fine publication proposition. Nation wide distribution of publications by Authentic Distributors. C. Isabel Mayer, Box 3896, Portland, Oregon.

123 SOUVENIRS

GENUINE German Medals, secured from homecoming G. I.'s. Limited number available. Other Foreign Souvenirs. Price list 10c. Hobbyguild, S 35 W. 32nd, New York.

WARPLANE souvenir, amazingly useful clamp 25c each. Burgo, 1008 Grandview, Dallas, Texas.

124 SPORTING GOODS,

GUNS, FISHING TACKLE, ARCHERY

BOWS-Arrows for Recreation-Hunting-Fishing. Beautiful Archery instruction book, 70 pages, 50 illustrations, only 50c. Illustrated catalogue Free. Archery Sales-Service, 617 South State, Chicago.

"**AMMUNITION**"—New and Used "Shot-guns"—"Rifles"—"Handarms". List 10c. Rudolph's, Atchison, Kansas.

SEND 10c for list 100 used guns. Frayseth's. Wilmar, Minnesota.

2000 BARGAINS, firearms, binoculars, war relics, catalog 30c. Smith Museum, Runnemead, N. J.

NEW Thumb Safety, Shotgun type, for Springfield, Mausers 54's. Locks Bolt and seat. Fast. No fumbling. Clears lowest scopes Parts \$8.50. Installing \$3. extra. Bolt handles altered \$7.50. Scopes mounted. Scopes and mounts in stock. H. B. Anderson, 1203 Broadway, Yakima, Wn.

POPULAR SCIENCE OPPORTUNITIES

\$3.95 TOMMY Gun or Cal. 30 Carbine
\$3.50. Actual size, authentic models by the makers of the real guns. Kits complete with regulation web sling. Add 30c to each for postage. International Models, Inc., Dept. PS-J, 879 8th Ave. New York 19, N.Y. Send 15c for complete catalogue 1001 Items of Models—Tools.

CARRY extra plugs, lures, hooks in your pocket, protected with KorKer. KorKer kits \$1.00 postpaid. KorKer, Brookfield, Conn.

USED Guns, bought, sold, exchanged. List stamp. Howe, Coopers Mills, Maine.

SILENCER for 22 Rifle or Pistol. Sounds like Air-Rifle. Quickly Assembled! Simple plans \$1.00. Singer, 1014 Colledge Ave., Bronx 56, N.Y.

CORK Grip, replacement. Fits any casting rod handle. .40c, 3 for \$1.00 postpaid. Lane Cork, 18655 Washburn, Detroit 21, Mich.

441 ANTIQUE Firearms—5,000 Bargains: Rifles, Coins, Fossils, Indian Relics, Carabines, Cartridges, Minerals, Antiques, Catalog #10 with Photographs, 25c. Heike, Wenona, Ill.

BLACK powder, percussion caps, ramrods, nipples and Kentucky rifles. Farris, Muzzle Guns, Portsmouth, Ohio.

127 STAMP COLLECTING

ZOWIE-E-EI A Barrel of Fun for only a Dime! 500 United States Stamps—Absolutely unopened and unsorted, just as received from church missions. Many varieties, including large commemoratives, airmails, high denominations up to \$5.00! Stampdom's biggest package of fun, and you might find something really valuable! Price only 10c to serious approval service applicants. Money back if not delighted. Illustrated bargain lists with each order. Mystic Stamp Co., Dept. 55, Camden, New York.

WORLD'S Largest Diamond And Triangle Stamps. Free Stamp Magazine, Stamps from Fighting Free French 20 stamps from 20 different Countries, Pictorials, Airmails, Big Bargain 5c with approvals. Capital Stamps, Dept. 10, Little Rock, Ark.

BRITISH Empire! 55 Different including Batum, Burma, Cyprus, Gwalior, Tasmania, 5c to Approval Buyers. Lyman, 97 Nassau St., New York 7.

FREE—Canadian Sets, Royal Visit, George VI, George V, Coronation, Jubilee, others, to approval applicants. Ensign, Box 118-P, So. Orange, N. J.

118 DIFFERENT stamps including commemoratives, charities, airmail, sets, etc. Only 3c to approval buyers. We buy collections. Badger Stamp Co., Milwaukee 3, Wisconsin.

SCARCE 1880 U. S.—Hussey Local Carrier Stamp listed at 15c. Also Costarica No. 65 listed at 40c. Both sent free to approval buyers sending 3c postage. Pladon Stamps, 1717-S Idaho, Toledo 5, Ohio.

COMPLETE "United States" catalog with 1000 illustrations! Send 10c for mailing. Harris & Co., 99 Transit Bldg., Boston, Mass.

DEALER'S Wholesale Catalog, Postage 3c. Frankso, 5031 Queensberry, Baltimore, Maryland.

SCARCE "Pole To Pole" Packet! Stamps from strange, mysterious countries only—Greenland (North Pole) Solomons, Spanish Morocco, Bhopal, Patiala, Siberia, Grahmland (South Pole), Djibouti, Zanzibar, etc., and including stamps cataloging up to 25c each! Our Price only 5c to approval applicants. Big Dime Packet List free! Methuen Stamp Service, Inc., Dept. 146, Lawrence, Mass.

BOX Stamps containing hundreds all different cataloging up to 25c each. Everything \$1.00. Longacre Shop, 100-C West 42nd, N.Y.C. 18.

WOW! \$10.00 Worth Of Fun Only 10c.

What a treasure hunt! Big package 500 Foreign Stamps—Just as received from foreign missions other sources. Includes stamps from Africa, South America, Philippines, Free French, Cape Juby, Palestine, etc. including airmails, commemoratives, and stamps worth up to 50c and 75c. This amazing offer is given for 10c to serious approval applicants only. One to a customer, money back if not more than delighted. Jamestown Stamp Co., Dept. 5, Jamestown, New York. Stamps—Valued Up to 50c And 75c Each.

FREE! Leeward Is., Cayman Is., Turks and Caicos plus 54 different mint World's Fair poster stamps, to approval service applicants sending 3c postage. Tatham Stamp Co., Springfield 50, Mass.

FREE—Pick 25c worth of stamps from our first U.S. Approval Selection. Approximately 100 stamps to choose from. Excellent value. No obligation to buy. Lists illustrating the most popular U.S. stamps—at prices you can afford—will be included. Don't miss this opportunity! Write today. S. D. Engel Co., 38 Park Row, New York City.

19th CENTURY U. S. Commem. Civil War—Battleship revenues, 5c and 41c. Stamps free to U.S. approval applicants. Metropolitan Stamps, 198 G. Broadway, New York.

25 DIFFERENT India—3c with approvals. Premiums with purchases. Brandwein Stamp Co., Box 92P, Bayonne, N. J.

UNITED STATES approvals complete coverage fine quality, attractive prices. Seminole Stamps, Box 378, Coconut Grove, Florida.

AIRMAILS of World—19 different including Bolivia Triangle, World's Fair, Commemoratives, new issues 5c with approvals. Continental Co., Dept. c, Box 639, New Rochelle, New York.

55 DIFFERENT United States—5c Approvals. Utechts, 1143D, No. Keeler, Chicago 51.

GORGEOUS Colors, scarce Airmail, Surcharges, Charities, Sets, etc. All in our Big Premium packet only 3c to approval Buyers. Dixie Stamp Co., Dept. PS, Milwaukee 3, Wis.

114 DIFFERENT stamps from far away countries including Airmail and Free Fighting French to approval applicants for 10c. Reich Stamp Co., 4847 Kenmore, Chicago 40, Dept. S9.

1000 MIXED U. S. Old And New 25c. Weatherby, Medina, Ohio.

FINE Approvals, freshly mounted, Fast, personal service. Tell me what countries you prefer and I'll send their stamps. Milton Skinner, 438 Locust, Long Beach 2, Calif.

FREE! Negro Triangle: Turks Islands "Cactus"; Dakar; Guinea; Palestine; "Fairy Tale"; Pirate Chart, Map, Ship, Sea Lion and Snake stamps; French, British, Portuguese Colonies, etc. Free for 3c postage. Approvals, Potomac Stampco, Washington 10, D. C.

1,000 GRABBAGS, 15c each. Special Bags 25c. Sandy, 630 Bingaman, Reading, Pennsylvania.

THIRD Philatelic Exhibition Sheet 25 cents To Approval Applicants. Louis Merrill, 1623 5th, Portsmouth, Ohio.

EXCELLENT Pictorial approvals, Reasonably priced. Crown Stamp Co., Box 331, Toronto, Canada.

FREE—Complete Unused 50 year old Guatemala set, Approvals, Dobres, 4108 Garrison, Baltimore 15, Md.

31 DIFFERENT with George Washington Stamps from Brazil and Ecuador; Pirate Island; Victory Issue; Medical set; others—all 4c with approvals. Grayson Stamps, Sherman, Texas.

POSITIVELY Greatest free offer—Latest Scott's International \$5.00 stamp album—covering entire world, contains 36,000 illustrated descriptive spaces; Scott's 1946 Standard \$5.00 catalogues "Philately's Encyclopedia"—absolutely free to applicants for foreign approval becoming customers. Bargain Stamp Service, Palm Springs, Calif.

TURKS, Caicos, Grenada, Solomon Islands, Dominica, Caymans—everything 3c with approvals. Viking, 130-P, Clinton St., Brooklyn, N.Y.

FREE—Liberia Triangle, set Hitler Stamps, Half-Stamp Triangle, Devils Island, others, Approvals, Postage 3c. Pilgrim, 6404 Old Harford, Baltimore 14, Md.

ROCK of Gibraltar Packet Free. A nice collection of stamps from Gibraltar, the mightiest fortress in the world—also New Zealand Centennial—British Uganda—French Colonials—Early British Colonial—West Indies—South American and War stamps plus sample copy Philatopic Monthly Magazine. Send only 5c for postage. Empire Stamp Company, Dept. PR, Toronto 5, Canada.

"LOTUS News," Six months 25c, Approvals and 500 assorted Latin America, Lotus Concern, Kalamazoo 87, Mich.

125 DIFFERENT U. S. Stamps 30c. Frank Strosky, Box 55, Perth Amboy, N.J.

50 FREE, pictorial, etc., stamp dictionary, list. Bullard, Newcastle, Me.

50 DIFFERENT Denmark, 5c to New Approval Applicants, Gross Stamp Co., 1330 E. 28th St., Brooklyn, N.Y.

RARE Canada 16c Special Delivery Airmail 10c, reference, with approvals. Newberry's, 837 Fort, Victoria, Canada.

PACKET: Borneo, Saudi Arabia, Galapagos Islands, Polynesia, etc. 5c Approvals. Mayrer, 58 Van Winkle, Jersey City 6, New Jersey.

FIVE Vatican City Stamps Free to approval applicants. Florida Stamp Co., Box 807, Miami 5, Fla.

NICARAGUA—Will Roger set 10c, P. Gustafson, Box 1206, New Britain, Conn.

UNITED States and Foreign stamps sent on approval outstanding quality, low prices. Fred Herzberg, PS 168 Oak St., Elmhurst, Ill.

FREE 15 Stamps with Approvals, Pearl, 1220 55 St., Bklyn, N.Y.

DEPENDABLE approvals special premium 10c. Standard, 3817 Sackett, Cleveland 9, Ohio.

NEW Zealand B24-25 10c approvals. Box 148, Batavia, N.Y.

OLD scarce U.S. Seconds on approval. Slightly defective, nice appearance, bargain prices. Hearnfeld, 551 Clinton, Newark 8, N.J.

UNITED STATES Approvals, Fine quality, wide variety. Klein, Box 22, Robinson, Ill.

SPAIN'S Nude Goya set complete 30c. Approvals, Royal Stamp Co., Tamaqua, Penna.

25c WORTH of U.S. Stamps Free! No obligation to buy. Complete selections for approval. Write: M & N Co., (Veteran), 742 Sheffield Ave., Brooklyn 7, N.Y.

130 FINE Quality U.S. for \$1.00, R. Simons, 2408 N. 35 St., Milwaukee 10, Wis.

25 DIFFERENT Switzerland 10c with 1/2-1c Approvals. Carroll's, 4357-C S. Hoover, Los Angeles 37, Calif.

PHILIPPINE Occupation Issue Free To approval applicants. Blatt, 1015 Pine, Philadelphia 7, Pa.

CHINA Every stamp with a historical meaning. Twenty of these colorful stamps offered approval applicants for 10c. Collins', 71 Coleridge, San Francisco 10, Calif.

APPROVAL'S U. S. Foreign, Low prices. Free premiums. Fall's Stamp Co., Box 12, La Salle, Niagara Falls, N. Y.

25 DIFFERENT Persia for 6c to approval applicants. Lorraine Brown, Marion, Mich.

POPULAR SCIENCE OPPORTUNITIES

ILLUSTRATED album, Watermark Detector, perforation gauge, all 15c approval applicants! Ajax, Box 6009 Kansas City 4, Missouri.

PERISA 15 different 5c with approvals Libby Stamp Co., Station P, Box 43-s, Brooklyn, N. Y.

"25 DIFFERENT U. S. Commemoratives 25c with approvals, Deane Stamp Co., Box 1002, Miami Beach 39, Florida.

U. S. Mint: singles, blocks, Plate # Blocks, Complete sheets, Finest Quality, Reasonable prices. Send for price lists, Mission Stamp Mart, Washington 17, D. C.

50 DIFFERENT United States, 10c. Price list free. No approvals, Seidenberg, Cassopolis, Mich.

25 ASSORTED German Hitlers and swastikas, Catalogs \$2.75, only 50c. Buckley, PS-208, Ludlow Bldg., Dayton 2, Ohio.

ATTRACTIVE Approvals for Beginners, advanced collectors, Jacobsen, 59 Nagle Ave., New York 34, N. Y.

FREE St. Helena pictorial and big surprise packet to approval applicants, Pioneer, Box 414B, Pasadena 18, Calif.

SENSATIONAL! 5 sets 10c. Approvals, Star, 2110 Westbury, Brooklyn 28, N. Y.

TWO Mint Costa Rica sets 10c. with approvals, Vargo Stamps, 6044 S. Fairfield, Chicago 28, Ill.

FIFTY Canadian Newfoundland, including earlies, commemoratives 10c approvals, Reade, 696 Gerrard, Toronto.

HITLER Heads! 6 Different Mint, 5c To Approval Applicants, Riverside Stampco, Box 1565, Miami 35, Fla.

50 DIFFERENT, free. With approvals, any country, Purchase's, 231-E East 86th Street, Los Angeles 3.

40 DIFFERENT Argentine for 10c to approval applicants, M. W. Payne, West Cheshire, Conn.

FREE! Three new Greece, 1/2c up approvals, Marjay, Box 14, Station B, Brooklyn 10, N. Y.

SENSATIONAL "Queer Country" Packet—3c with approvals! Saxon, Walden, New York.

FREE Packet Aeros, Comms., Pictorials, Approvals, Valentini, Box 1060, St. Petersburg, Fla.

BETTER grade and medium approvals, Mostly foreign, Attractive prices, A. M. Shill, 502 Park Ave., N. Y. 22, N. Y.

125 DIFFERENT, Czechoslovakia set, Perfectiongauge, Hitler head, Japanese occupation, Everything 10c. Requesting approvals, Ferguson, 1619B W. 50th St., Los Angeles 37, Calif.

SELECTED Penny Approvals, Henry Jay Service, 15 Park Row, New York City.

SENSATIONAL Canadian Commemorative Collection! First to latest issues, 1897 Jubilee, 1908 Tercentenary, Confederations, Ottawa Conference, Cartier, all the recent issues, truly representative showing of these fine stamps, only 10c! Approvals included, Thole, Box 868, Elmont, N. Y.

FREE Mint Set and Bargain List, No approvals unless requested, Robert DeVerre, Box 927, Santa Monica, Calif.

UNITED STATES Collection—Thirty Different fine unused, commemoratives before 1939 including Columbians Bicentennials Parks, Price \$1.00 Approval Applicants only, Orange Stamp Co., Albany 7, N. Y.

FREE!! Big Stamp Outfit, Tonga, Perforation Gauge, Hinges, Packet Airmail, Commemorative, Triangular stamps, 3c postage. Approvals, Auburn Stamps, Auburn, Mass.

SCARCE 50 yr. old Commem. \$1-Stamp, regular issues, coils etc., included in packet 33 Different U. S., All free to approval applicants only, Mendelson, 5410-S Beverly Blvd, Brooklyn 3, N. Y.

FREE Bargain lists and profitsharing coupons with extraordinary pictorial collection including Tahiti Spearfishing, Melanesian Idol, Carib archer, Bolivia (Ingavi), Wurlenburg, Reunion, and many other strange stamps from unusual countries. Everything only 5c. Imperial Stamp Co., Yorkers, N. Y.

US commemorative packet only 10c. Imperforate, Nineteenth Century and other obsolete, 75 different US including Civil and Spanish War Revenues, commemoratives, Airmails 25c, 200 Different \$1.00. To approval applicants, AAA Stamp Company, Arcade Bldg., St. Louis, Mo.

UNITED Nations, scarce 5c U. S. Commemorative and packet 30 different U. S., including Airmail, Commemoratives, Revenues, etc. Catalogs 65c—to approval applicants for 5c. Curhan Stamp Company, Dept. G., Gloucester, Mass.

FINLAND—20 Different 3c with approvals, Rosenberg, Box 1303, Chicago.

BRITISH Colony 25 different 10c with approvals, Pelican Stamp Co., 1609 S. W. 8th St., Miami 35, Fla.

500 WORLD Different \$2.00, 100 V.S. all face different \$1.00. Want Lists filled, Hollywood and Graves, Outpost Bldg., Hollywood, Calif.

SAVE! Rearranging dealer's stock, \$5 assortments, Mint sets mostly, Philately Exchange, 523 1/2 Maple, Santa Monica, Calif.

FREE—25 different Japanese pictorials and commemoratives to approval applicants, Charles Cleveland, 806 N. Humphrey, Oak Park, Illinois.

50 DIFFERENT United States, many Commemoratives, approvals, 5c. Gerhart, 2604 Rio-grande, Austin, Texas.

120 DIFFERENT Precancel 25c, Approvals, beginners, advanced exchanges, Dollar Wholesale lots, Harry Mason, Lansdale, Pa.

10 DIFFERENT U. S. Over 40 Years Old, 5c. Foreign, U. S. approvals, Scott, 30 Baker Ave., Lexington 7, Mass.

FREE—18 Different Switzerland with approvals, Excel Stamp Service, Box 1315, Chicago 90.

NEW Issue Commemoratives—10c—to United States approval applicants, Jarr, Box 217a, Madison Square Station, New York 10.

PENNY Approvals, Thousands different, Pictorials, commemoratives, Airmails, Raymax, 123-X William St., N.Y.C. 7.

RICH Man's approvals, poor man's prices. Grand value packet containing five Foreign sets. Free with approvals, Stoll Stamp Service, 2632 W. Burnett, Louisville 10, Ky.

LATIN-AMERICA 65 Diff—Pictorials, Airs, etc., 10 countries 10c with approvals, Crescent Stamps, London, Canada.

129 TATTOOING SUPPLIES

TATTOO Outfits, inks, designs, Write today, Zeis Studio, 728 Leslie, Rockford, Illinois.

TATTOOING—Fun, Profit, Literature Free! Steele, 1138-M Market, San Francisco.

DIAMOND Point Electrograver for all types Freehand Engraving, Also tattoo equipment, supplies. Send for free literature, Moore, 651 S. State, Chicago.

132 TOBACCO & PIPES

CIGARETTES—popular brands; minimum 3 cartons. Price \$1.35 per carton, postpaid. Send check or money order, Ace Mail Order Co., East Orange 82, N. J.

CIGARS, Swell Havans Blend, Fifty \$3.85—Postpaid, Check or Money Order, S. & E. Co., Dept. PS, Red Lion, Pennsylvania.

HONEYCAKE breaks in new pipes. Saves cracked bowls and burnouts. Pipe makers use it. Big Jar 50 cents, 6100 Prescott, St. Louis, Mo.

134 TREASURE FINDERS

MT-SCOPE Metal Locator fully guaranteed and unsurpassed in efficiency. Time payment plan, trade-in and accessories. Free literature, Fisher Research Laboratory, Palo Alto, Calif.

NEW powerful Goldak locators for metals and minerals again available. We are the world's largest manufacturer of fine locators. Goldaks have always been the world's champion locators and always will be. Every Goldak, even our lowest priced model, is moneyback guaranteed to detect buried Gold, Silver, metal or minerals at greater depth than any other locator regardless of vague claims, price or design. When you get a Goldak you are certain of the finest. Write The Goldak Co., 1544 W. Glenoaks, Glendale 1, Calif.

136 TYPEWRITERS

USED Typewriters, Mimeograph machines, Printing Devices, Supplies, Appliances, DixieGraph, King, N.C.

137 VOCATIONAL GUIDANCE

DISCOVER your best abilities through scientific aptitude tests, Information 10c. Testing Service, 420-A3 Gas-Electric Bldg., Rockford, Illinois.

138 WANTED MISCELLANEOUS

TRADE buy or sell Guns, Watches, Cameras, Movie Projectors, Binoculars, Musical Instruments, Books, Jewelry, Antiques, Printing Equipment and thousands of other items with a low cost ad in The National Swappers Guide, Published monthly; contains hundreds of individual traders, buyers and sellers who list thousands of items they want. Send 25c for your copy today. See it or yourself, National Swappers Guide, P.O. Box 418, Evansville, Ind.

LET'S Swap! What's Got? What'd'ye Want? Dime Trial, Swap Bulletin, Royal Oak, Mich.

MERCURY—Highest prices, Free Containers, Write Mercury Terminal, Norwood, Mass.

139 WATCHES

WATCH and clock repairing — complete practical course in modern horology, 66 illustrated self-instruction lessons. Just out! Low price. Fascinating 100-page illustrated catalog Free! Write—Nelson Co., Dept. 8-01, Chicago 5.

WHY not employ the convenient, easy mail method of having your watch repaired. Work guaranteed for one year. Write to Geo. Banks, 55 years at 3 Maiden Lane, New York 7, N. Y.

WATCH and clock repairing increasing, complete home study course with drawings and pictures. Information free. Houston Chromatic and Watch Co., P.O. Box 11408 Houston 12, Texas.

BIG Money in Watchmaking, repairs, adjustment. Learn this profitable trade at home. New, complete "Practical Course" for beginners and professionals, fully illustrated, only \$2.95 postpaid. Money back guarantee. We supply tools, materials at lowest cost. Modern Technical Book Co., Dept. M35, 55 W. 42nd St., New York 18.

140 WELDING, SOLDERING

NEW Model electric welder 110 volt AC-DC; will weld all metals; easy to use, full directions. Complete with power unit, flame and metallic arc attachments, carbons, fluxes, rods, mask; all for \$19.95—Used by the Navy, Magic Welder Mfg. Co., 239-PS-6, Canal St., New York City.

BUILD D.C. Arcwelder without rewinding armature. Plans \$1.00 each. 25 to 600 amperes from Automotive d.c. motors, Light plant generators, Automobile starter-generators, Welders Club, WB-3432, Chicago 54.

WELDERS, Farmers, Shopmen, don't buy welder until you investigate new invention, 20-250 amps. using storage batteries welds anything perfectly. Free information, Battweldo, Santa Barbara, Calif.

HOBBYISTS, Jewelers, Experimenters, Amazing Midget Arc Welder Brazes, Welds, Silver Solders delicate work, Copyrighted plans \$1.00, Marwood Co., 3033 E. 92nd, Seattle 5, Washington.

"BUILD Your Own Arcwelder" Inquiries Welcome, Welders Club, WB-3432, Chicago 54.



BREATHEASY
IS GIVING RELIEF
TO
THOUSANDS OF SUFFERERS
FROM THE SYMPTOMS OF
ASTHMA
OF NON-CARDIAC NATURE
AND HAY FEVER
THE MODERN INHALANT METHOD
SOLD ON MONEY-BACK GUARANTEE

*CAUTION Read literature thoroughly and use only as directed

Write for information Today

BREATHEASY

Write to Dept. P5
BREATHEASY DISTRIBUTORS, INC.
65 Cedar Street, Seattle 1, Wash.

Fix Your Own



ALARM CLOCKS

New, practical home course. Just out. Makes interesting hobby—profitable too. Save money by doing your own repairing at home. Easy if you know how. Price now only \$1.00. Details FREE. Send postcard.

THIES JEWELRY STORE, Genoa 5, Illinois

START HOME MAIL ORDER BUSINESS

Start small—grow big. Amazing new course shows you the way. Write today for full particulars. No obligation.

BELFORT (Dept. O) Engineering Bldg., Chicago 6, Ill.

STOP WORKING for the OTHER FELLOW

BE YOUR OWN BOSS — OPERATE YOUR OWN PROFITABLE BUSINESS IN . . .

HOME AND INDUSTRIAL APPLIANCES



MODERN SERVICE-REPAIR AND INSTALLATION WORK

NEW! DIFFERENT! Gives you practical shop training on real appliances including washing machines, mangles, heat control systems, vacuum sweepers, electric motors, circuits and controls, plating processes, welding, etc. Start work immediately on actual machines under trained instructors.

ACTUAL SHOP TRAINING ON APPLIANCES

Thousands of appliances need expert repairs now. New ones coming off the assembly lines must be installed and serviced. It's fascinating, profitable work. Jobs are everywhere! Investigate this opportunity now. Let us show you the money-making possibilities—the need for trained men—how easy it is to open your own shop and be your own boss. Veterans, ask for Special G.I. plan. Act now!

OLD EST. SCHOOL MOST COMPLETE TRAINING COURSE OF ITS KIND

RUSH COUPON FOR FULL DETAILS

APPLIANCE TRAINING SCHOOL, Dept. P22, Div. of Commercial Trades Institute 6312 N. Broadway, Chicago 40, Ill.

Gentlemen: Please send Free Details.

Name.....
Address.....
City..... State.....

Check here for G.I. plan.

A "HOW-TO-DO-IT" Book Plus a Kit of Supplies to Start You on PLASTIC-CRAFT NOW



Here's a honey of a hobby for both pleasure and profit. **EVERYTHING** you need in this special combination to start right in creating your own jewelry, vases, bowls, decorative articles, etc.

"GENERAL PLASTICS" BY RAYMOND CHERRY

Completely self-instructive with over 40 easy plastic projects fully described and illustrated with start-to-finish diagrams, drawings and photos. Shows how to design, lay out material, cut, bend, shape and finish attractive and useful items like Vases, Lamps, Handbags, Rings, etc. Also explains industrial plastics. 128 pages, 7 1/4 x 10 1/4 inches. Only \$1.50.

COMBINATION PLASTIC KIT

Contains: 1 Coping Saw • 3 Saw Blades • 1 File • 1 Block Buffing Compound • 1 Bottle Cement • 2 pr. Earring Backs • 3 Pin Backs • 2 Bracelet Forms • 3 Ring Forms • 1 pc. 1 x 6 Plastic (colored) • 3 pcs. 1 x 1 Plastic (colored) • (Rings, Bracelets, Earrings, Lapel Ornaments). **Complete Kit \$3.00.**

This hobby can easily be mastered—and this combination is especially suitable for the beginner. Mail your order now!

HOBBY BOOK MART, Dept. PK, 150 Nassau St., New York 7, N.Y.

Please send me the book and/or kit I have checked below. If not completely satisfied, I can return either or both for full refund.

{ } "General Plastics" by Raymond Cherry. . . \$1.50
{ } Combination Plastic Kit. . . \$3.00
() Payment enclosed. () Send C.O.D. plus postage.

Name.....
Address.....
City..... Zone..... State.....

BE A LANDSCAPE ARCHITECT WORK OUTDOORS



The field of Landscape Gardening offers unusual opportunities for trained men . . . greatly augmented by the huge home-building and modernizing program ahead. We provide thorough, interesting home-training during your spare time . . . adapted to your regional conditions.

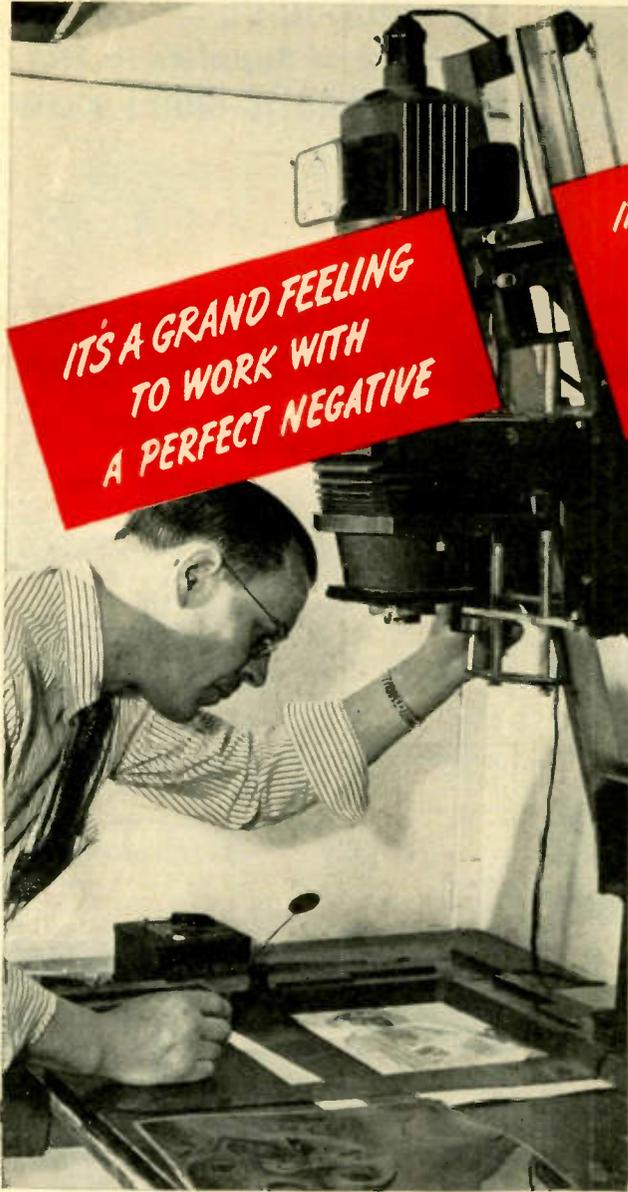
Healthful, pleasant outdoor work in an uncrowded field. **APPROVED for VETERANS**

BE YOUR OWN BOSS

A graduate says, "I finished the course about two months ago and now I average about \$2.00 per hour net for my time." There are many employment opportunities in this profitable, uncrowded field or you can easily start your own business. Write today.

Service from Coast to Coast

NATIONAL LANDSCAPE INSTITUTE DEPARTMENT E 736 SOUTH BROADWAY — LOS ANGELES 14



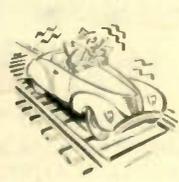
**IT'S A GRAND FEELING
TO WORK WITH
A PERFECT NEGATIVE**

**IT'S A GRAND FEELING, TOO,
WHEN YOUR CAR IS
CUSHIONED WITH MARFAK
CHASSIS LUBRICATION**

MARFAK makes smooth riding last longer . . . a thousand miles and more . . . tangible evidence that your car bearings are lubricated against wear.

You see, *Marfak* is scientifically designed to do the job . . . its special adhesive and cohesive qualities resist wash-out, jar-out and squeeze-out. *Marfak* clings to bearing surfaces . . . sealing out dirt and grime.

Yes, it's a grand feeling when your car is "cushioned" with *Marfak* chassis lubricant. See your Texaco Man today, and say: "*Marfak*, please."



With ordinary grease . . . you're taking the road shocks again after a few hundred miles.

Marfak stays on the job hundreds of miles longer—means more velvet smooth riding.

You're welcome at

TEXACO DEALERS



FIRE-CHIEF GASOLINE



SKY CHIEF GASOLINE



HAVOLINE AND TEXACO MOTOR OILS

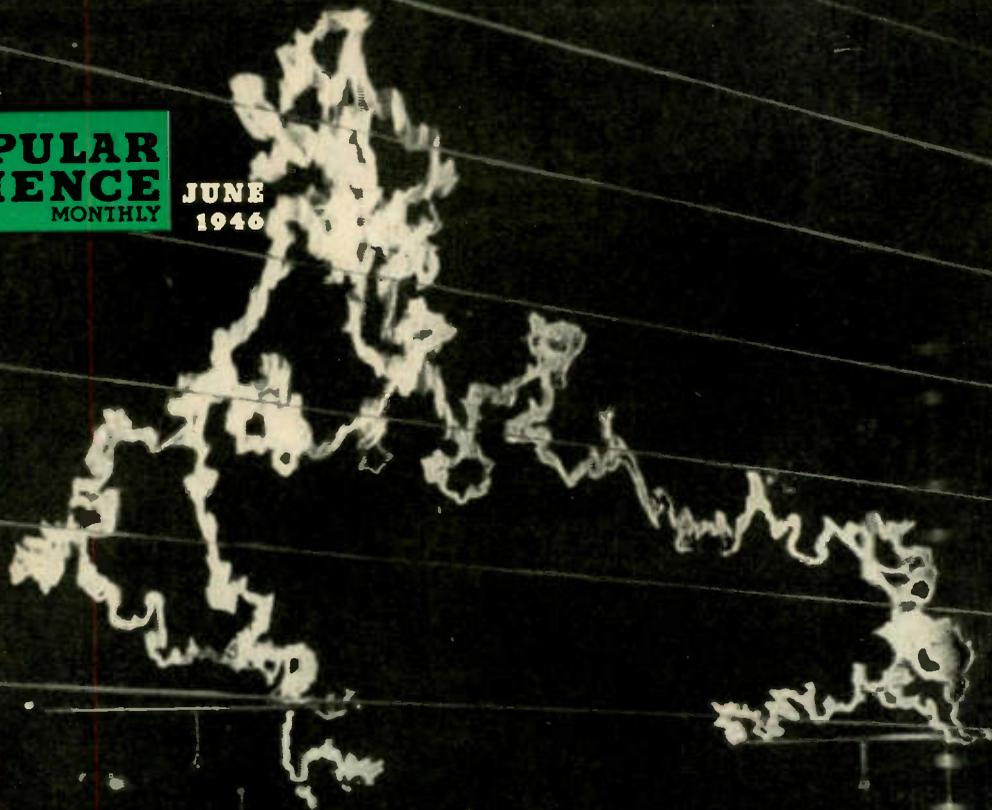


MARFAK LUBRICATION



THE TEXAS COMPANY

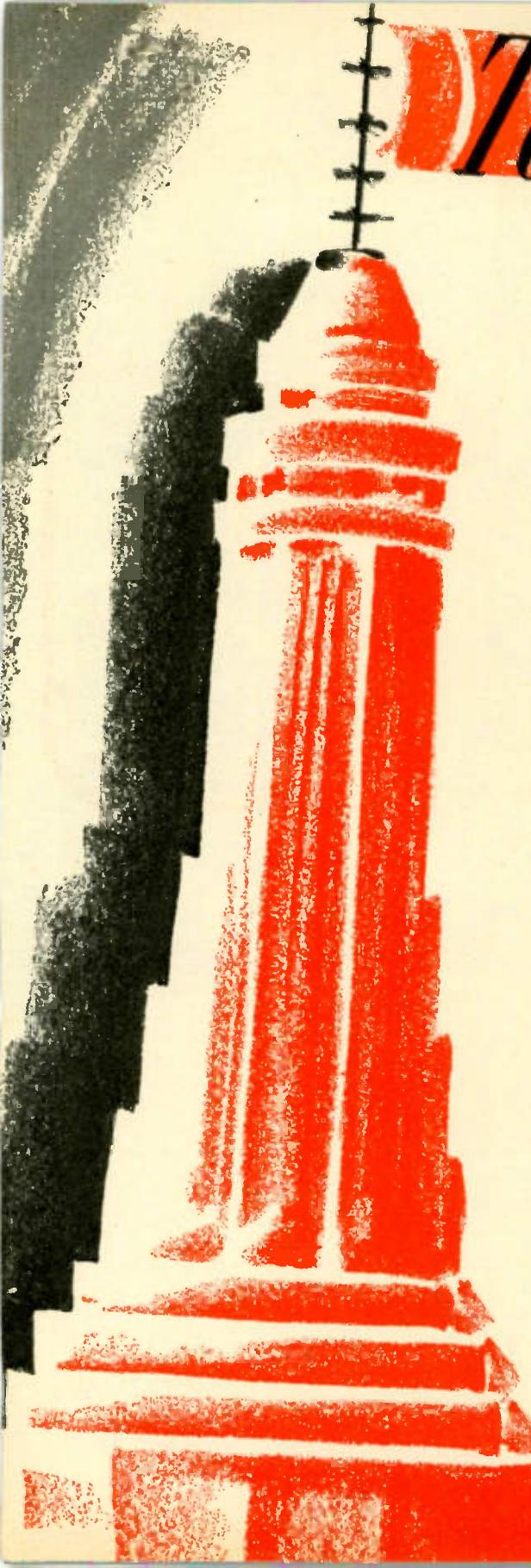
Tune in the TEXACO STAR THEATRE every Sunday night starring JAMES MELTON with his guest, ED WYNN. See newspapers for time and station.



Thunderbolt at Work

IN GENERAL ELECTRIC'S High Voltage Laboratories, at Pittsfield, Mass., lightning crashes across 30-foot gaps to test FM radio sets under thunder-shower reception.

Man-made lightning—up to 10,000,000 volts—is created when capacitors, each storing 100,000 volts, are stacked in two groups several feet apart, fully charged, and then short-circuited.



Television

Sight-and-sound broadcasters
to send more and brighter

By WILLIAM P. VOGEL, JR.

THIS month television starts its postwar campaign for public acclaim. After years in the laboratory and months of limited commercial operation, it is now out to conquer an audience.

Those who already own television sets (at a guess, about 10,000 families) will get at least four hours of sight-and-sound each week this month. The televising of the Louis-Conn fight at Yankee Stadium on June 19 will be the stellar event; boxing will provide some of television's most compact, action-filled, suspense-crammed programs. Next month, unless FCC grants a further postponement, every commercial station will have to put at least 28 hours a week of sports, news, special events and live or screened shows on the air to hold its license.

Television holds such promise today that 30 feet has been added to the Empire State Building. The National Broadcasting Company has doubled the power of Station WNBT by perching a new and taller antenna on top of the world's tallest building. This antenna is so designed that it flattens the signals in the direction of the horizon instead of letting them squirt upward as well as outward, and thereby increases the reception radius from 60 to 70 miles.

Since its fumbling start during the New York World's Fair, television has fallen heir to a fortune in radar research. When frozen for the duration, it was standardized on pictures moving 30 frames per second with a definition of 525 lines. (This means that the electron beam in a television pick-up tube—the "eye" that sees the image—cuts up each picture into 525 horizontal lines and scans those lines, moving from left to right and from top to bottom, in one-thirtieth of a second.) This is still the standard, but the quality of television has become much better.

Out of the war came huge improvements in the cathode-ray tube, which produces the

reaches out

pictures to bigger audience.

received image. The glass was made with better optical qualities; its curvature was lessened, so that when viewed sideways the image would not be distorted like a reflection in a Coney Island mirror. The phosphors—chemicals that blaze into light when bombarded by electrons—were changed to double and triple the brightness of the picture.

In a new RCA cathode-ray tube, soon to be mass-produced, a microscopic film of aluminum, about four-millionths of an inch thick, is ingeniously deposited on the inside of the phosphor coating. The electrons pass through it, striking the phosphors and converting the television image into light. But the light, mirrored by the aluminum film, cannot go back into the tube. In uncoated tubes, the light loss inside runs as high as 50 to 60 percent; in the new tube the light is all projected outward. Increased voltages, 12,000 to 15,000 instead of 7,500, also produce brighter pictures. Even at these voltages, however, there is no danger from shock, because the current is measured in microamperes—just about what you generate when you scuff your foot on a thick rug in a cold room.

In a television picture with more light, more tones of gray can be crowded in. Prewar television had a contrast ratio of about 15 to 1, but soon contrast will be as good as in the average movie screen (40 to 1)—possibly even better.

You will be able to see television pictures in roughly three different grades, depending upon the cost of the set. Probably the most popular grade will be the cheapest (estimate: \$150 to \$250), which will feature small cathode-ray tubes, say five or seven inches in diameter, and produce pictures 3 by 4 or 4½ by 6. Sets in the next price bracket will have cathode-ray tubes up to 12 or 15 inches across. In the highest price range you will see pictures on 20-inch tubes, and projected television in which an intensely bright high-voltage tube sends its

Sports events, long popular with television audiences, will have large share of coming 28-hour-a-week programs.

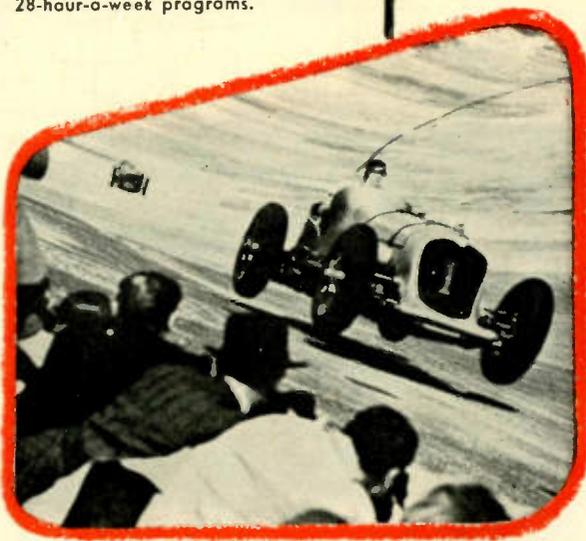
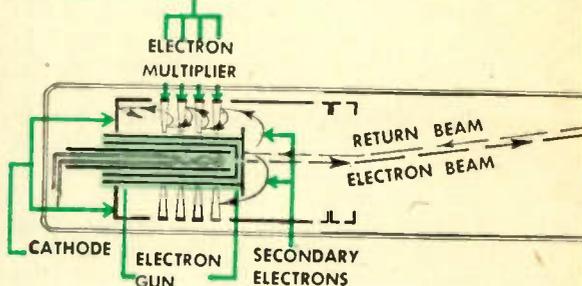
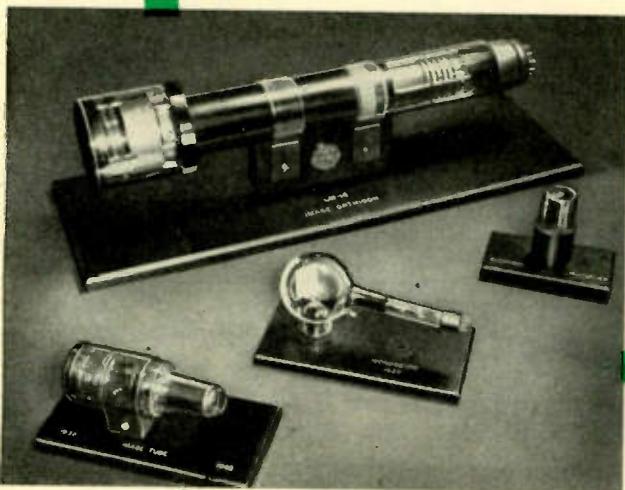
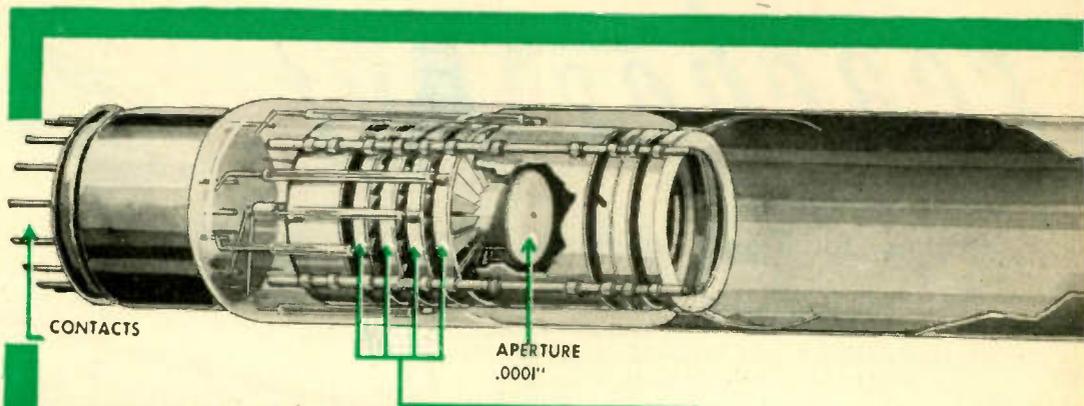


image through lenses onto a ground glass the size of a home movie screen.

Persons accustomed to good radio reception with skimpy antennas will have to be re-educated for television; good antennas will be needed regardless of the quality of sets. The weakness of signals 40 to 60 miles from the stations will necessitate good antennas in suburban areas; and in cities, where signals are stronger, good antennas will be needed to get clear pictures free from ghosts—those troublesome multipath images that make a television screen look like a double exposure. Ghosts, created by reflected signals, are annoying—especially when they make an otherwise nice-looking actress appear to have four arms, two mouths, and several extra eyes and ears—but we must be grateful to them, even so, for they are the basis of radar.

Sight-and-sound has been assigned channels in the short-wave band from 44 to 216 megacycles. The shorter the radio wave, the more like light it behaves. Television waves can be aimed by transmitting an-



The Image Orthicon (rear) is really three historic tubes in one: iconoscope (center), perfected in 1930; image tube (left), 1935; and electron multiplier (right), 1938.

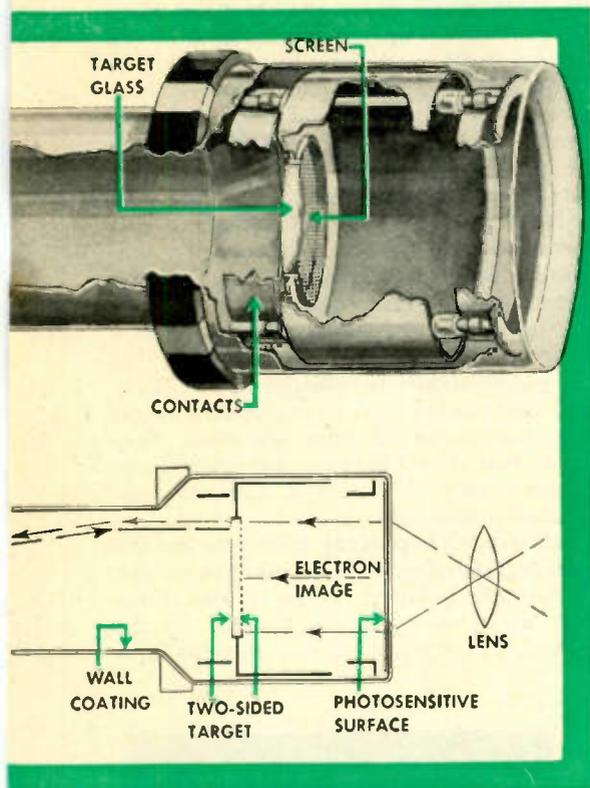
tennas very much as light waves are aimed by searchlights. And they can be reflected by buildings, trees and even airplanes. In general, radio waves begin to be capable of reflection when they are smaller than objects in their path. That is why the waves used in sound broadcasting do not bounce and ricochet—for they are far larger than almost anything they encounter.

Antennas for the public will most likely be dipoles—tall vertical standards with two horizontal pick-up rods measuring about nine feet across. The dipole should be installed at right angles to the line of transmission, so that the spread of the antenna is broadside to the television station. It should be carefully rotated to find the exact azimuthal setting that produces ghost-free reception. There may be several such settings—and there may be none. In the latter case, the set owner is out of luck, for at

the present state of television development a rotating antenna is the only means of eliminating ghosts. The lead-in from the aerial to the set is also important. It will probably be a matched or twisted pair of wires specially designed to keep down loss of the signal. The trick in television lead-ins is to have the two wires a certain distance apart and to keep them always at that distance lest the signal vanish.

The broadcasters are also having their troubles. Most cameras and transmitter rigs now in use need rebuilding or total replacement. New equipment has been held up by the slow pace of reconversion. Studios need enlargement, but building materials are scarce. Broadcasters may not get them at all, because of a recent government order curtailing commercial construction in favor of the veterans' housing program.

Since television can be received only in



The new Image Orthicon tube registers the television image on a photosensitive surface. The image then is carried electronically to a target and scanned. No matter how faint the light (and consequently the electronic image), the electron beam scanning the target can pick up the image. Below: The electron beam returning from the target is made to toss out secondary electrons from a small metal disk at the back of the tube. These electrons pass through multipliers, like tiny steam-turbine wheels, and are stepped up in each stage from three to five times. Thus the signal is amplified as it leaves tube and enters transmitter.

old stuff unless the big movie companies, forever fearful of the effects of television on their big-money industry, bury the hatchet with television and furnish new films.

By fall, broadcasters will be able to use one of the most important inventions in electronic science: the new Image Orthicon camera tube (see accompanying drawings) developed by Drs. Albert Rose, Paul K. Weimer, and Harold B. Law, of RCA. It is 100 times more sensitive to light than prewar pick-up tubes.

Three of the five cameras that will cover the Louis-Conn fight this month will use the Image Orthicon. Two cameras will be mounted on a special platform, two in the NBC television box on the stadium's mezzanine, between first base and home plate, and the fifth beside the ring. Signals will be carried by wire to an ultra-high-frequency radio relay link, beamed from there to a receiving antenna on the RCA Building, fed through NBC's master control board for television, and finally carried by coaxial cable to the Empire State Building for transmission.

Bright lights produce intense heat, and it is no joke to be working near them on a cramped television stage. Such lights will not be needed when the Image Orthicon is in mass production, but until then studios will have to rely on several wrinkles to keep their actors cool. Sheets of special glass will absorb 87 percent of the heat and pass 93 percent of the light. A mercury vapor lamp rated at three kilowatts is said to be as cool at four feet as an ordinary desk lamp. Studio brightness eventually will decrease from several hundred foot-lamberts to around 50. For mobile broadcast, the Image Orthicon does away with bulky equipment and vastly broadens television's scope. It will be able to take almost any kind of spot-news event, regardless of the kind of

line-of-sight transmission, approximately as far as the horizon, rural dwellers will not be able to gather around a 'scope for an evening's entertainment until networks are established. Because television wave-lengths are too short to be carried on the usual telephone circuits that handle sound broadcasting, television will have to be carried from station to station either by coaxial cable or radio relay links. A national network is planned, to be built within the next five years, using a combination of both methods. Economic and technical details of proposals to use airplanes flying at high altitudes as television sources, covering wide segments of the country, must yet be tested. For the time being, television will be confined to the big cities, chiefly those on the east coast.

A typical station operating 28 hours a week will probably offer 12 hours of "mobile" shows (news, special events, sports, etc.), 10 hours of "live" entertainment (plays, short spots, skits, song-and-dance acts, news comment with maps, and similar stunts) and six hours of movies. Unfortunately, the movies, which offer the best possibilities for elegance, are likely to be

light in which it occurs. When turret lenses are also available for television cameras, quick switching from long shot to close-up will be possible; and breaks in the show, such as occurred at the U.N. broadcasts, will no longer be necessary.

No one knows how many sets will be in use by the end of the year, and no one can tell how many television stations will be operating. One big manufacturer who hoped to build 4,000,000 radios and 60,000 television sets has been forced to cut his estimates in half. It's anybody's guess if 50,000 or 200,000 television sets will be made this year, although everyone seems certain that in 1947 around a quarter of a million sight-and-sound receivers will be on the market.

The black-and-white versus color controversy has clouded the broadcasting picture. NBC, backed by RCA, has locked horns with CBS over this issue. CBS, intensely proud of the accomplishments of its research engineer, Dr. Peter C. Goldmark, takes the position that all television should be standardized on the basis of its system. This

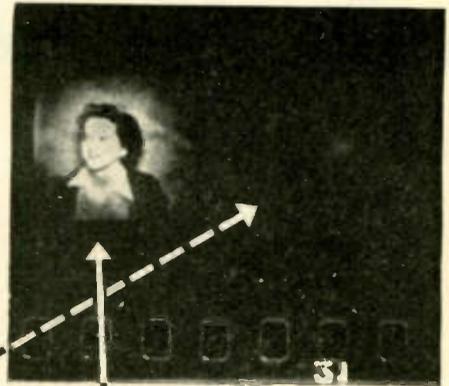
would mean scrapping the black-and-white developments, moving television from its present band in the spectrum to a higher frequency, and re-engineering everything now ready for commercial use. If the industry would cooperate, says CBS, there is no reason why commercial color should not be a reality by next year.

NBC and RCA, as well as others who have lavished both time and money on television since it was merely a dream of the laboratory men, resent Columbia's insistence on the virtues of its system. They want a return on their investment and believe that the public should be allowed to see black-and-white shows *now*, no matter how bright the promises are for color next year. They argue that color television still needs years of basic research before it becomes commercially practical.

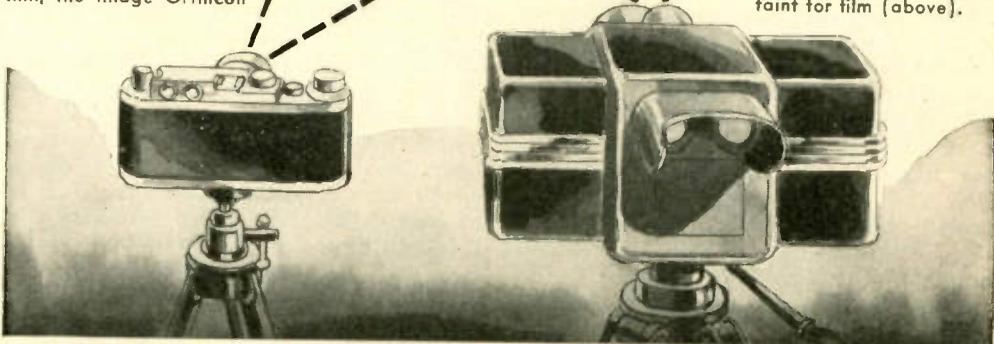
All wrapped up in the color fight are the intense personalities and the misty economics of the radio industry. In the opinion of the best minds in radio, the injection of the color issue at this time is certain to have



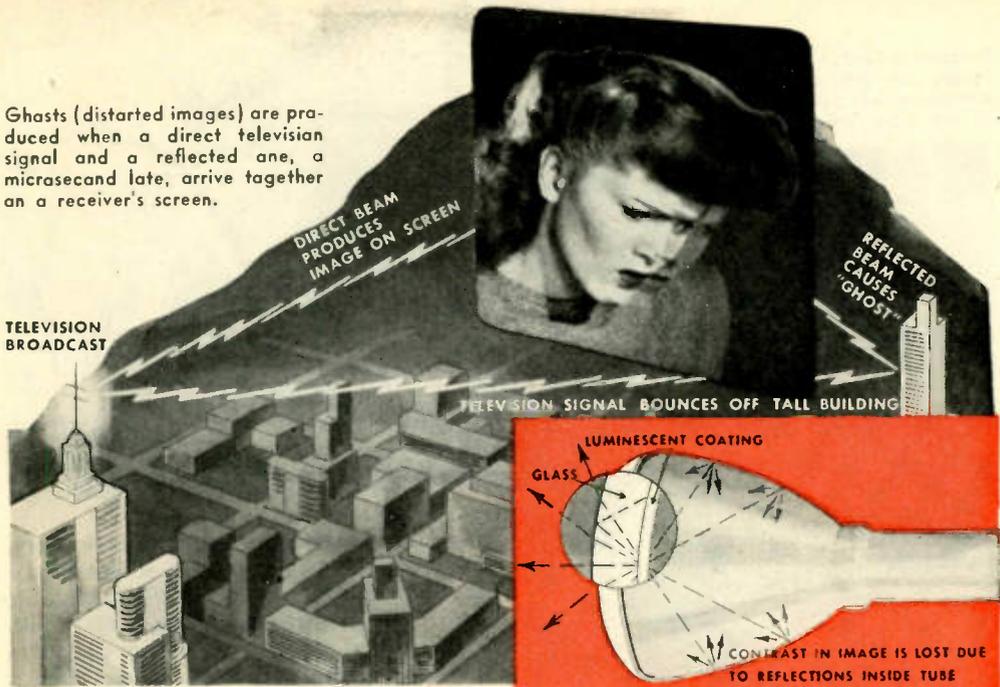
Tested under identical conditions with a camera containing 35-mm., Super-XX film, the Image Orthicon



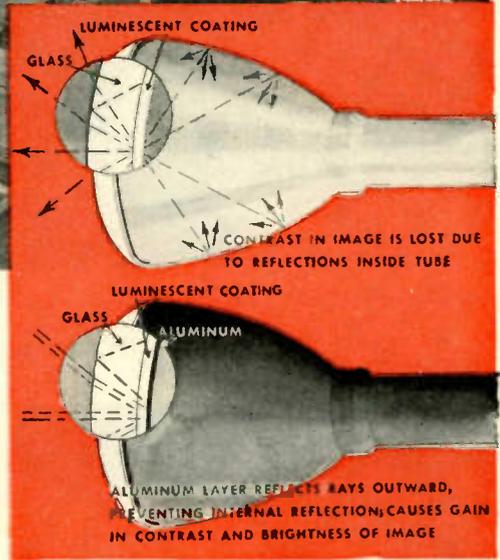
camera proved that it can produce a good image when light has grown too faint for film (above).



Ghosts (distorted images) are produced when a direct television signal and a reflected one, a microsecond late, arrive together on a receiver's screen.



The aluminum-backed cathode-ray tube (right), three times as bright as prewar tubes, evolved from wartime experiments to preserve snow crystals.

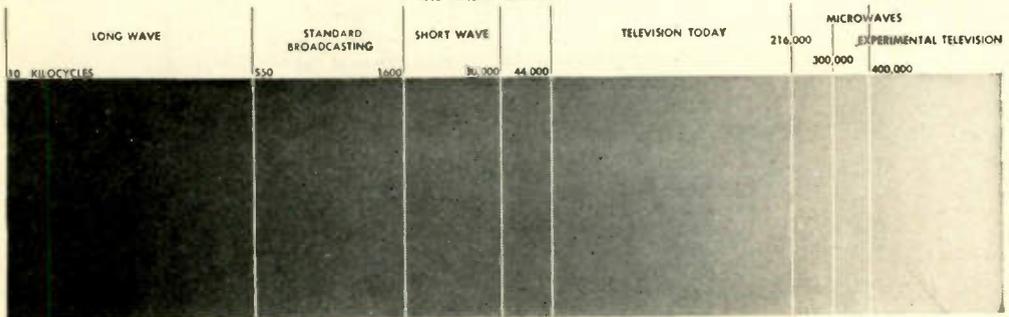


a deterrent effect on the development of black-and-white. Already some 30 applicants for licenses to operate television stations have withdrawn their petitions from FCC. This would indicate that some of the men who want to invest from \$400,000 to \$1,000,000 in television would rather wait and see what happens.

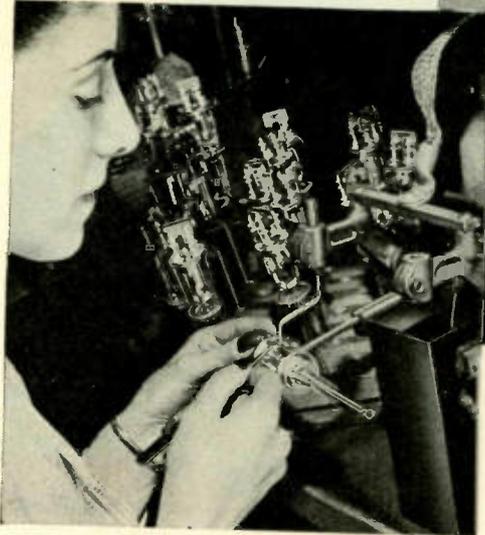
But more important than the immediate controversy is the ultimate decision on where television should be placed in the radio spectrum. CBS, working on its color experiments in the region of 480 megacycles, believes that all television should be in that band. Others believe that an eventual move into that region or higher is inevitable—because there is more room there for individual broadcasters. The higher the fre-

quency, the broader the transmission band can be; in the present television band from 44 to 216 megacycles the air is already so crowded that only six-megacycle channels are available. In the higher reaches, a 16-megacycle channel can be used. The width of the channel is extremely important; if standards are ever to be raised, in the direction of more picture frames per second and more lines of scansion, the channels will

THE RADIO SPECTRUM



Rotating a 10-inch cathode-ray tube in her hands, the girl at right is distributing phosphorescent powder over the inner face of the tube, lined with liquid adhesive.



Spot welding the "gun" parts of a cathode-ray tube at a Dobbs Ferry, N. Y., plant. In the completed tube this assembly shoots electrons at the phosphorescent screen, causing it to fluoresce.

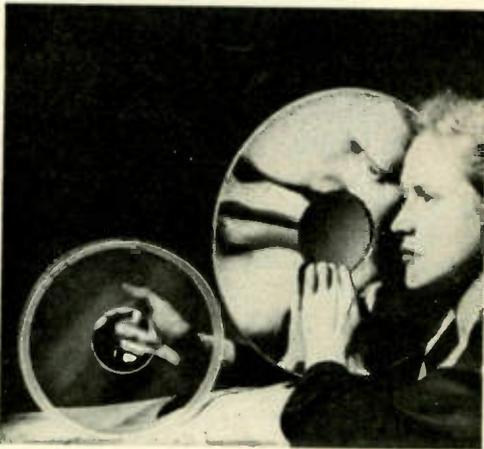
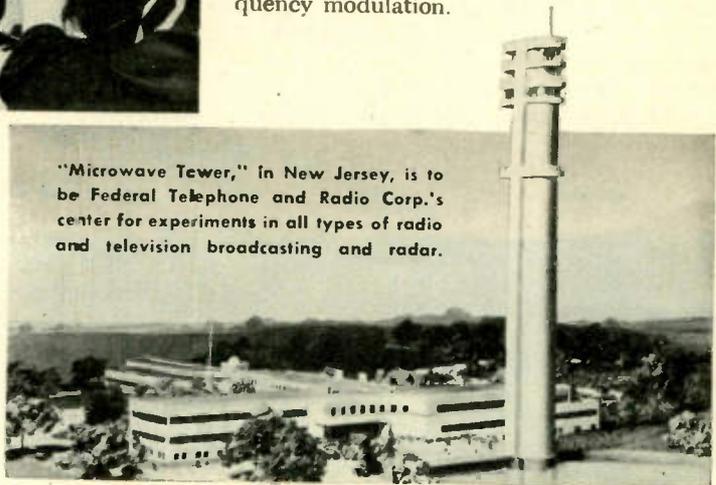


Image-correcting lens (left) and reflecting glass mirror provide larger, clearer television images.

have to be wider. Obviously a faster transmission rate and a picture scanned with more lines produce more "information" in the television image, and bring to the viewer a picture of greater detail and exactness. It is quite likely that even before color is officially sanctioned for commercial operation, television will move up into the UHF (ultra-high-frequency) region or higher.

This summer FCC will hold hearings on a CBS petition to license color television commercially. Television is bound to move up some day. Today's band, where you can see National's WNBT at 66-72 on your dial; Columbia's WCBW (for black-and-white) at 54 to 60, and DuMont's WABD at 76 to 82, is simply a halfway house for the art. But it is a halfway house that promises a good period of occupancy. Regardless of the speeches and the fighting, commercial operation *has* begun. It will not be obsoleted any more than standard-band broadcasting was obsoleted by frequency modulation.

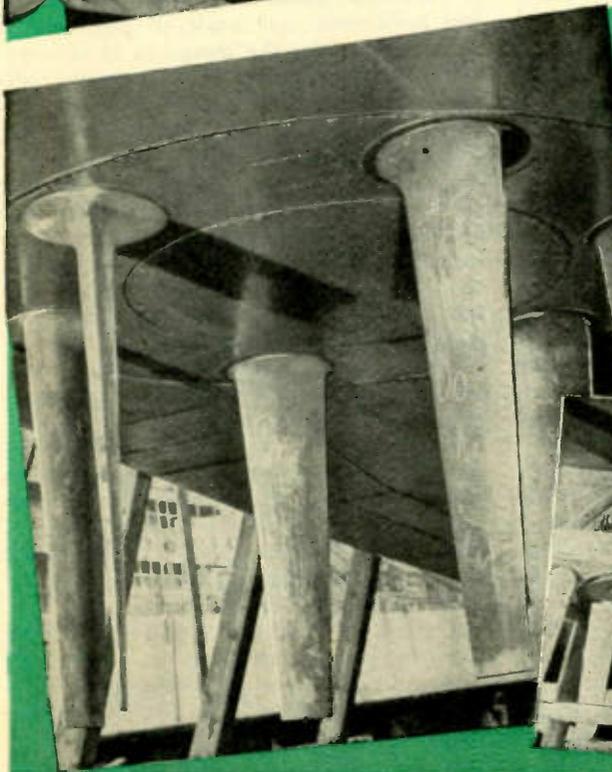
"Microwave Tower," in New Jersey, is to be Federal Telephone and Radio Corp.'s center for experiments in all types of radio and television broadcasting and radar.





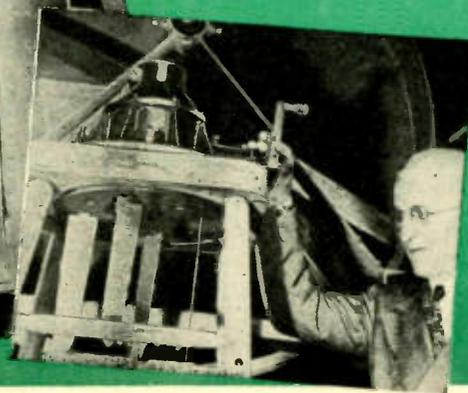
Bull's-eyes in the Night.

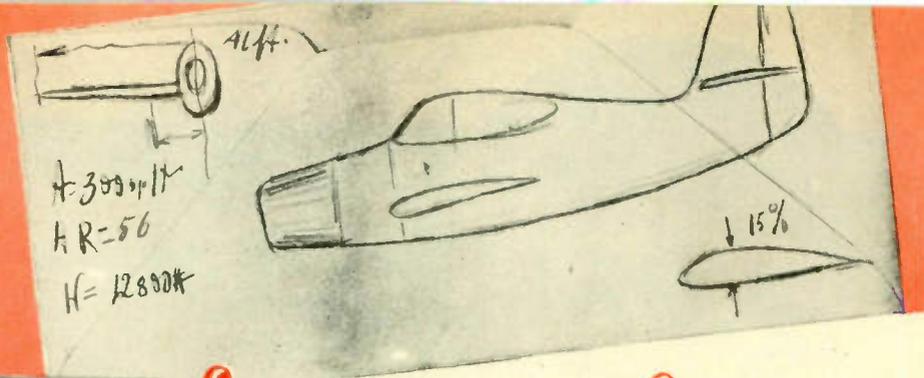
Despite darkness (left), Yanks on Okinawa could see (below) and cut down unsuspecting Japs with the aid of the sniperscope. Attached to a carbine (left, below), the sniperscope emits infra-red light that shines on the target, is reflected, then picked up by the telescope mounted on the gun. The naked eye can't see the rays.



New Ship "Props."

The six-bladed cycloidal propeller (left), now undergoing tests, may boost the speed of U. S. Navy ships three times as well as enable them to move sideways. A manganese-bronze rotor, powered by a spiral bevel-gear drive, spins the blades in a seven-foot orbit. Steering is done from the bridge by regulating the thrust of the blades, and the rudder is eliminated altogether. Prof. F. K. Kirsten, of the University of Washington, is the inventor.





first *with the* fastest

Obsessed with speed, Designer Kartveli builds tail winds into planes to assault sonic barrier.

By LEON SHLOSS

IN THE movies the football coach figures out the play that wins the big game, the girl and the job, with a stubby black pencil on a restaurant tablecloth. In real life, Alexander Kartveli figured out an airplane design on the back of an envelope. That plane helped mightily to win World War II. And now Kartveli is designing another plane. This one may fly man past the sonic barrier.

Kartveli has been vice-president and engineering chief of Republic Aviation since its formation in 1939. He is a quiet, tanned genius who still speaks with a Russian accent after 20 years in the U. S. If he is the first to turn out a plane with speed surpassing the velocity of sound, the attainment will fit properly into his long record of designing very fast aircraft. The envelope doodling took place in August 1940. Nine months later the hieroglyphics flew as the now famous P-47 Thunderbolt.

The strafing, bombing T-Bolt was the first 400-mile-an-hour American fighter. Before it, Kartveli had designed the P-43 Lancer, first 300-mile-an-hour fighter. After P-47 he built more speed into the Thunderbolt until, as P-47J, it became the first 500-mile-an-hour fighter. Recently he turned out the first 600-mile-an-hour fighter, the P-84 Thunderjet. Just before that, his Republic Rainbow, first 400-mile-an-hour commercial transport, made its successful bow. Kartveli is now working on a new transport, which Republic thinks will be the first in the 500-mile-an-hour class.

"Give Kartveli and another designer the same power to work with," say many men in the aviation industry, "and Kartveli will build a plane 50 miles an hour faster than the other fellow." He is the first, however, to state that there is no magic involved. Just hard work and assiduous employment of available data, the mountain of information that has accrued from minute and tedious laboratory studies and tests—plus, according to his votaries, "Kartveli's ability to make the equations fly."

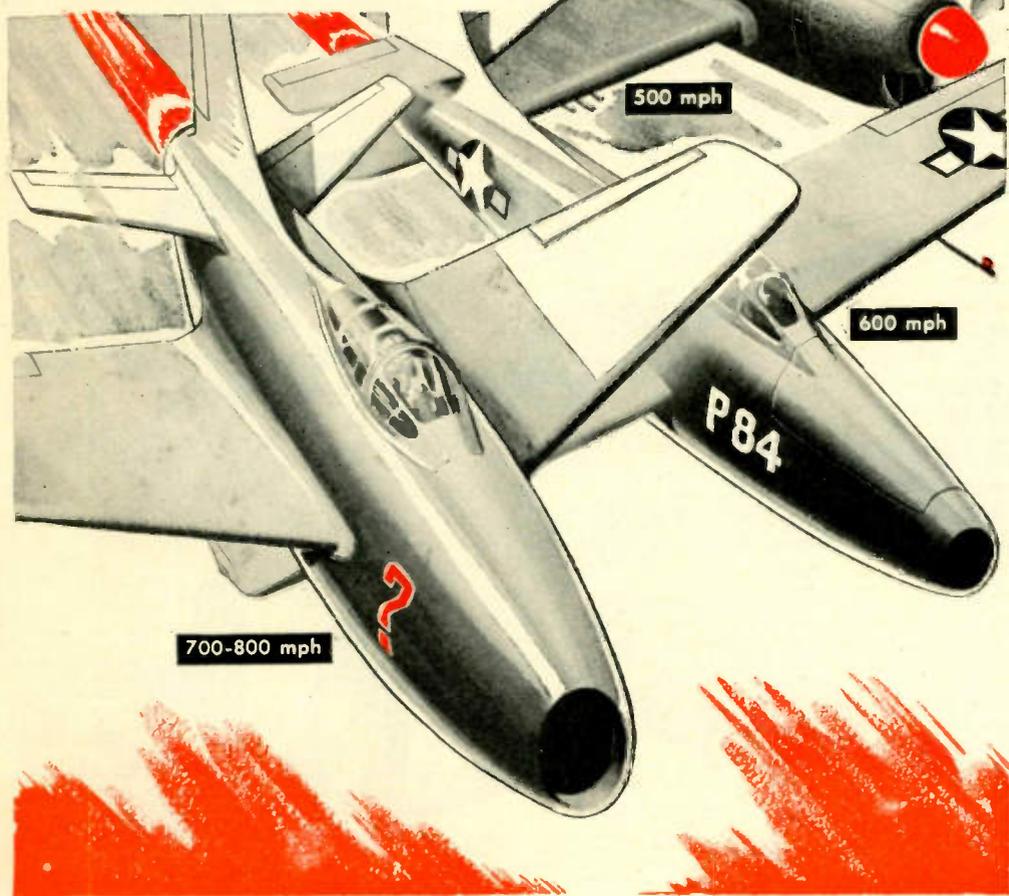
"Commercial flying," says the designer who hasn't piloted a plane in 20 years, "will cease to be thrilling in a few years. Passengers on a long flight will be as bored as though they were on railroad trains. There will be only one justification for flying . . . speed. So, let us fly fast, or walk."

That conviction governs Kartveli's work. In the Rainbow he wanted a long-range, high-speed passenger transport. Many of the steps he took to wheedle his beloved speed caused staggering engineering problems, which had to be solved before production methods could be evolved. He and his engineers solved them. The end product is a 46-passenger air liner that will fly from coast to coast in six hours.

Kartveli achieved this engineering masterpiece by picking up a few miles an hour here and there, some by designing a revolutionary engine nacelle, a few by adding tail-plane dihedral, a little bit with unique cowl flaps, quite a few more miles by using

the exhaust stream to provide jet thrust-assist, and so on. He has always combined two main principles—cleaner design and more power. There's nothing new about that, of course, but he made a religion of them. Advent of jet and gas turbine propulsion was a windfall to him, as it was to all plane designers. It not only provided the power he had dreamed of, but brought closer his goal of an airplane with no external protuberances—the more nearly perfect streamlined shape with most possible lift and least possible drag. When the first flight pictures of the XF-12 (military forerunner of the Rainbow) were shown him, he made the remark his colleagues confidently expected: "Ugh. Those propellers, we must get them off."

In this plane, he got virtually everything *but* the propellers off. On the following pages is the story of how he did it—how he designed the world's first 400-mile-an-hour transport.



POWER: The Pratt & Whitney Wasp Major engine, which develops well over 3,000 horsepower, was available. Four of these massive motive plants were used. In addition, the exhaust gases, which normally increase drag as they escape uncontrolled from the engine to create turbulence, were diverted through nozzles placed at the after end of the nacelles, to provide extra thrust. Further, the air that cools the engine is discharged outside at high velocity around the forward section of the nacelle and adds still more thrust.

WING: Mid-wing was desired to preserve uninterrupted, smooth flow of air over the wing. On the conventional low-wing transport, speed-killing turbulence occurs as the air flows off the trailing wing edge at the fuselage. Placing fillets there to lead the air off smoothly only partially reduces the turbulence. On a mid-wing plane the side of the fuselage itself leads the air smoothly back and off the structure. High- or low-wing airplanes are attractive, production-wise, because wing stressing can be built straight through, from wing tip to wing tip.

To get his mid-wing, Kartveli had to design a doughnut-shaped wing spar to go around the passenger cabin and strong enough to keep the wings on the airplane.

FUSELAGE: Here has been the parasite of the airplane. It contributes no lift but adds great drag. At high speeds this drag is chiefly skin friction—air sticking to the metal skin. Kartveli's objective was to streamline the fuselage as perfectly as possible. He was successful to the extent that the fuselage drag of the Rainbow is only half that of a conventional four-engine airplane with the same wing (lifting) area.

Outstanding was the trick he played on the: **NOSE:** Transport airplanes traditionally have had the pilots' cabin set back on top of the nose for visibility. The turbulence created as the onrushing air starts over the nose and suddenly is bumped upward by the set-back windshield is a speed-robber. So the Rainbow's nose was entirely streamlined by Kartveli—and a set-back windshield of inch-thick glass placed inside. For take-offs, landings and other situations where high visibility factor is essential and



speed is not, the top half of the streamlined nose splits and retracts, leaving the conventional set-back windshield.

COWL FLAPS: Conventional cowl flaps open outward and upward and help ruin streamlining. Rainbow cowl flaps slide forward and backward on a perfect line with the engine nacelle's outer surface. In the forward position a recessed opening is uncovered. Air is taken in through fans in the nose of the engine installation, cools the engine, and is released through this opening.

TAIL: Sharp dihedral was given the planes of the tail assembly. By thus slanting these "wings" of the empennage upward from root to tip, the air rushing over the real wings of the plane sweeps smoothly below the tail. Thus additional turbulence, often created in other planes as air sweeping off the wings bumps into the tail assembly, was precluded.

ENGINE NACELLES: Here, possibly, Kartveli performed his greatest sleight of hand. A slim, streamlined nacelle was desired because nacelle drag in a four-engine plane runs to 20 percent of total drag of the

plane. First, a long slender nacelle, running from well forward of the leading edge of the wing to well behind the trailing edge, was designed. This disposed of another speed-stealer, the turbulence that occurs in the conventional engine installation, which is set in the leading edge and breaks off sharply into the wing surface a short distance back along the wing. In the Rainbow, air flows smoothly all the way back along the nacelle, thus contributing to the lift of the wing.

But—and there were two big buts. To preserve slimness, the landing gear, which normally folds up into the nacelle, had to be put somewhere else. The only other place available was the wing, and to put a fat, double-wheel landing gear into the thin-for-speed wing was impossible. So Kartveli and his engineers designed a single-wheel gear which would stand up under the same impacts—and more—as the double-wheel gear. There were engineering difficulties aplenty. But the hurdles were successfully topped.

Next was the job of getting rid of the various air intakes, which perch astride con-

FUSELAGE

NOSE

NACELLE

ventional nacelles. Air had to be had to cool the huge, radial engines and to provide the hot gases for jet thrust-assist. Kartveli thought it might be inducted through slots in the leading wing edge. So he had several small-scale wing sections built, with leading-edge open lips of varying degrees of sharpness. The very sharp lip was good for speed but bad for lift. The very blunt lip was good for lift but bad for speed. A satisfactory compromise was found. The air comes in through the leading edge of the wing. The air scoops are gone. Speed has been added.

The streamlined nacelle was attained. With it came a speed bonus. Its cigar shape led the air flow over the outer surface clear back to the nozzle, through which the hot exhaust gases were expelled to add propulsive thrust. And these gases sucked more air, faster, off the nacelle skin, thus reducing the thickness of the boundary layer of air that clings to an airform and reduces speed.

The Rainbow will cruise at 400 miles an hour, with a top speed of 450 m.p.h. Kartveli's next new transport will cruise at 500, with a top speed of 550. He is sure of two things he is going to do to add this 100 miles an hour: first, the plane will be powered entirely by jet or gas-turbine propulsion; second, the wing will be thinner. All data leads to the conclusion that the thinner the wing can be made, and remain structurally safe, the faster an airplane will be. The engineer's "bible"—available data—tells Kartveli also that a swept-back, or boom-erang-shaped wing, may lend itself to additional speed.

Out of these three facts emerges the general outline of the 700 m.p.h.-plus fighter that may be the first to transport man faster than his voice travels. It probably will be a jet-propelled machine with thin, swept-back wing. The Thunderjet fighter, flying at better than 600 miles an hour, has a so-called 12-percent wing. That means that the depth of the leading edge of the wing is 12 percent of the distance from leading edge to trailing edge. Kartveli believes this rela-

tionship can be brought down to 10, even 8 percent. However, as aircraft speeds grow greater, vibration threatens to tear a plane apart. Kartveli thinks the first step toward solution is to reduce the size of the aircraft. So the sonic plane probably will have stubby as well as thin wings and a short fuselage.

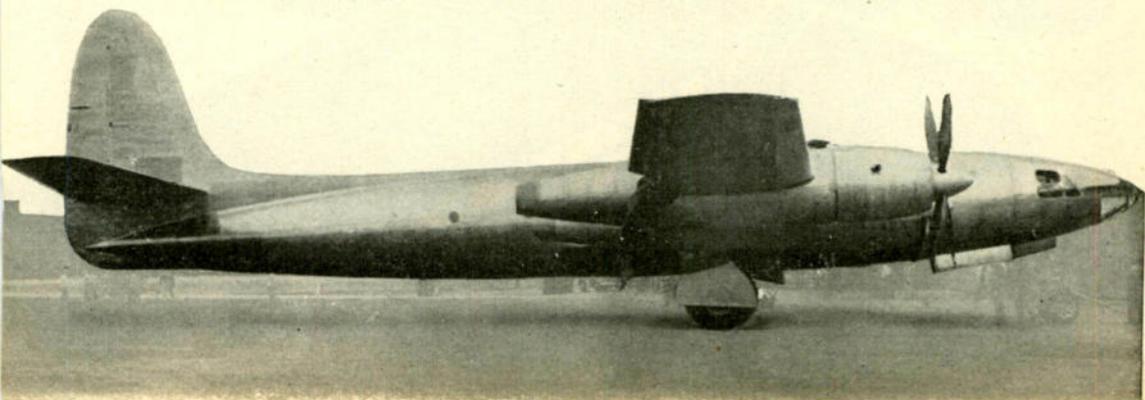
Kartveli points out that aircraft engineers were reaching their limits when the new jet-power vista opened. Efficacy of thin, swept-back wings and stubby shapes was known, but all of these, driven by maximum power output of conventional engines, could not knife through the almost tangible wall of air that builds up at velocity of sound. Now, he believes, piloted flight at sonic speeds is not distant. He says the present is the critical design period because of the compressibility problems presenting themselves as speed of sound is approached. He believes that once speed of sound is passed, design problems will ease because supersonic air flow probably is steadier. An interesting facet of Kartveli's current activity is his use of ballistics as well as aerodynamics data in seeking the perfect streamlined shape.

The Army Air Forces gave Kartveli a million dollars to work with on the strength of the envelope design, and ten million more to work on the XF-12. They have ordered 100 Thunderjets and are talking about more XF-12s. Pan-American World Airways has bought 18 Rainbows; American Airlines, 20.

Kartveli got into aviation in 1919 in Paris, where he had gone to continue his military studies. An artillery officer in the Russian army in World War I, he felt he should know about any machine that gave promise as a weapon. He espoused the all-metal plane, at the time scoffed at by fabric-plane builders. Too costly, too heavy, too much vibration, they said.

Since then, Kartveli has done quite a job of confounding his critics—and his planes are flying VERY fast.

On his office wall hangs a drawing of a turtle. Beneath it: "Witness the turtle. He maketh no progress unless his neck is out."

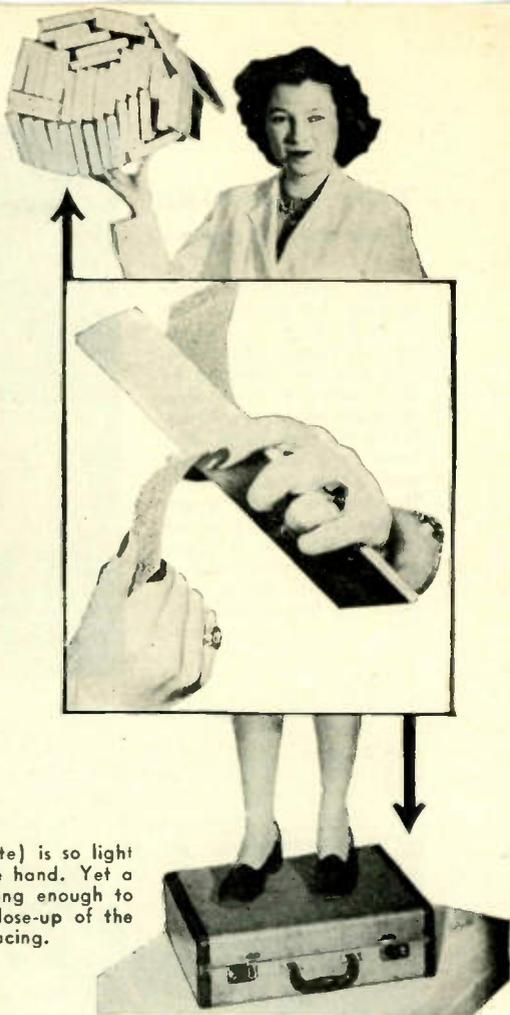


Papers in Lucite, a light, shatter-resistant resin soon to be turned out in sheets for use in street lamps, ticket windows, and various partitions.

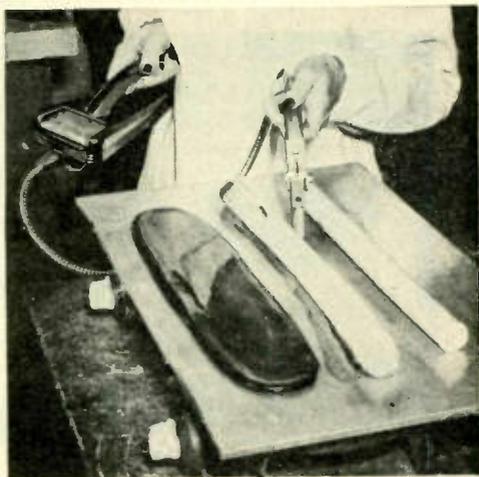
Plastic Products Coming Your Way

DuPont's CCA (cellular cellulose acetate) is so light a girl can hold a bundle of it with one hand. Yet a coating of CCA makes a suitcase strong enough to bear her full weight. Insert shows a close-up of the same core material with an aluminum facing.

A brief case of nylon sheeting, not yet in commercial production, has been embossed to look like leather. It is exceptionally tough though flexible, and is hard to scratch.

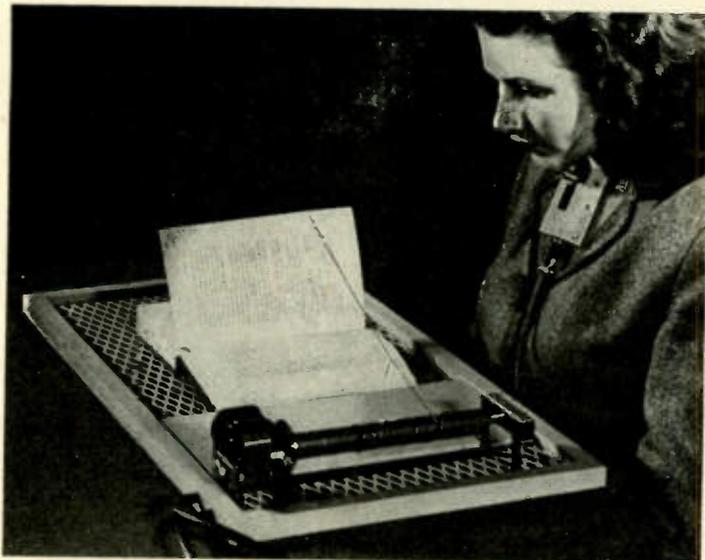


On a hot plate at 390 degrees F., Teflon (below, at right), a new resin used in gaskets and wire insulation, retains form and strength while rods of two other plastics have melted or swelled out of shape.



Tiny Machine Turns Pages

A mechanical page turner devised for crippled veterans by R. F. Mallina, of Bell Telephone Laboratories, can be controlled by foot, knees, or even chin. A round paper clip is fastened to each page of a book on a reading board, and cotton thread, strung through the clips, is attached to a motor-driven roller at the side. A micro-switch, operating like a push button, starts and stops the tiny motor.



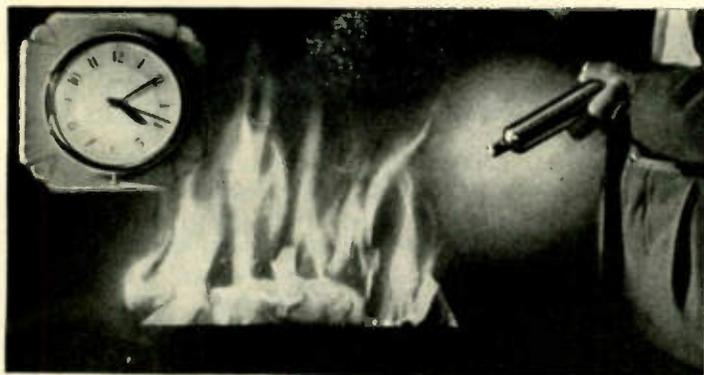
Firemen of London Learn Nazi Stunts

Ways and means the Germans used to fight fires and clear away debris during their blitz are being studied from appropriated equipment by London's firemen. At left is an emergency tender, manufactured by Metz, on a Mercedes Benz chassis. Its novel feature is a crane with a lifting capacity of 4½ tons and a jib that folds onto the roof. The tender has an electric generator, for operating saws. Photo shows the crane lifting a damaged automobile after a street crash.

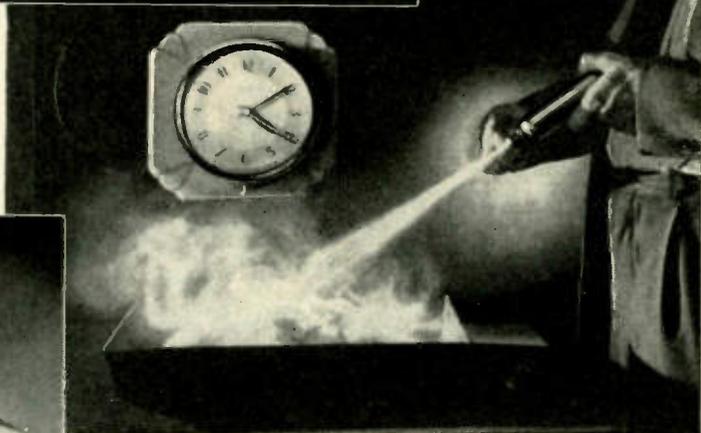


Quick Aid to Injured Miners. Mounted on rails and electrically heated, the ambulance below, in use at Piney Fork Mine, Ohio, can quickly move underground in case of an accident. It carries first-aid supplies and a cot that can be rolled into a regular ambulance at the mine mouth.





Fire of gasoline-soaked rags is put out (right) in less than three seconds as vaporized methyl bromide from the tiny extinguisher smothers the flames with a blanket of heavy, noncombustible gas.



Extinguisher, shown with its bracket, is small and light because it takes only 40 lbs. pressure per square inch to keep methyl bromide liquid at normal temperature; it may take 1,000 for carbon dioxide.

HARDLY a handful, a new fire extinguisher quenches blazes as quickly and thoroughly as extinguishers much larger and heavier. It contains liquid methyl bromide, a solvent that replaced carbon dioxide in the automatic fire-fighting systems of RAF fighters and bombers.

One turn of a simple valve releases a six-foot stream of methyl bromide, forced out by its own pressure, which vaporizes in-

stantly and chokes the flame with a gas heavier than carbon dioxide or carbon tetrachloride vapor. The gas is equally effective in putting out rubbish, oil, gasoline, and electrical fires, and does not wet things, stain textiles, or ruin paint. The cylinder is refillable.

The midget extinguisher can also be used to help start cars or boats stalled by dampness. When sprayed on ignition wires, plugs, coil and distributor, it removes conducting dirt and impregnates the insulation with noninflammable, nonconducting methyl bromide—replacing the water.

Though methyl bromide is toxic, it is no more so than carbon tetrachloride vapor, used for the same purpose, and therefore requires the same precautions.

HANDY Fire Department

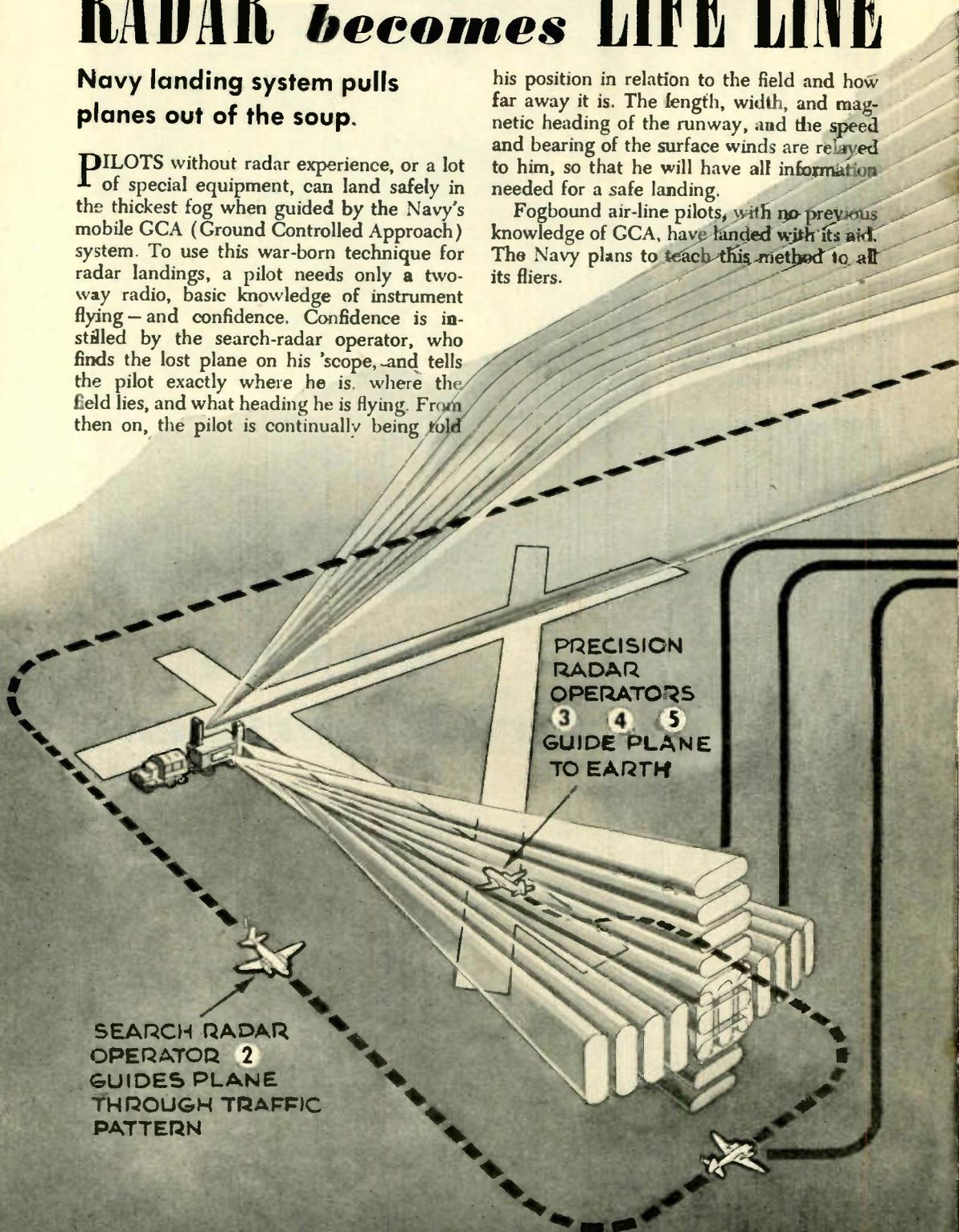
RADAR *becomes* LIFE LINE

Navy landing system pulls planes out of the soup.

PILOTS without radar experience, or a lot of special equipment, can land safely in the thickest fog when guided by the Navy's mobile GCA (Ground Controlled Approach) system. To use this war-born technique for radar landings, a pilot needs only a two-way radio, basic knowledge of instrument flying—and confidence. Confidence is instilled by the search-radar operator, who finds the lost plane on his 'scope, and tells the pilot exactly where he is, where the field lies, and what heading he is flying. From then on, the pilot is continually being told

his position in relation to the field and how far away it is. The length, width, and magnetic heading of the runway, and the speed and bearing of the surface winds are relayed to him, so that he will have all information needed for a safe landing.

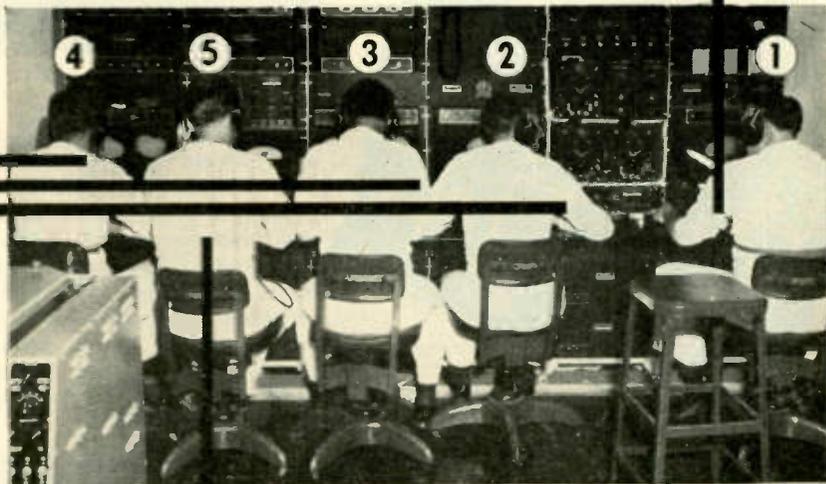
Fogbound air-line pilots, with no previous knowledge of GCA, have landed with its aid. The Navy plans to teach this method to all its fliers.



360° SWEEP

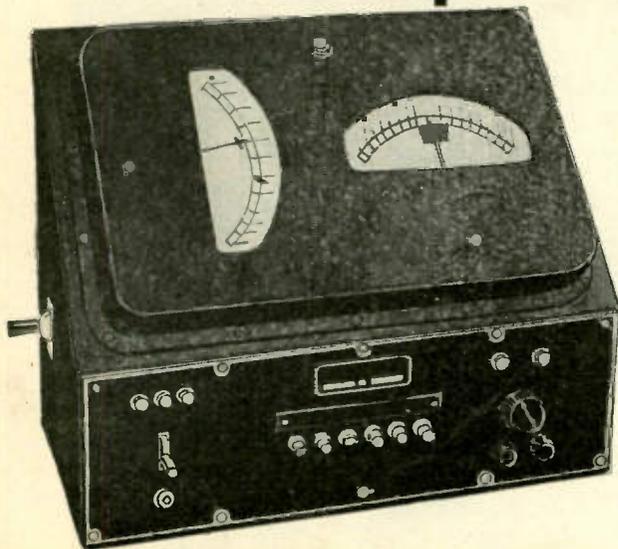
30-MILE RADIUS

SEARCH RADAR
OPERATOR ①
LOCATES PLANE
IN SOUP, DIRECTS
IT TO AIRPORT

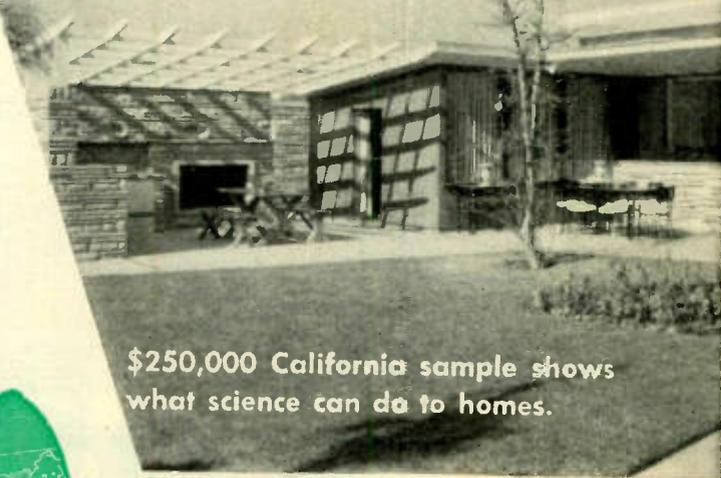


Operator 1 spots plane on a 'scope and radios the altitude and bearing that the pilot must fly to enter the field's traffic pattern. No. 2 guides the incoming plane through the traffic pattern. No. 3 notes its position relative to the runway; No. 4 watches its descent. Operator 5, guided by the findings of Nos. 3 and 4, tells the pilot how to land safely.

Operators 3 and 4 track the incoming plane with a "cursor," which overlays the face of the 'scope. This information is transmitted to the instrument at left, where it is indicated in feet on the dials. Operator 5 reads these dials and tells the pilot how many feet left or right of the runway he is, how far above or below the glide path, and his distance in miles from the end of the runway. Guided to the end of the strip a few feet above the ground, the pilot then lands visually.



The **HOUSE** that has **EVERYTHING**



\$250,000 California sample shows what science can do to homes.

A \$250,000 HOUSE with every available postwar convenience, and some not yet for sale, has been built by a Los Angeles contractor to show how much scientific luxury a home can offer. Fritz B. Burns, who with Henry J. Kaiser plans to produce 10,000 moderately priced prefabricated houses for crowded Californians by next June, knows that his palace of improvements is way out of the average house hunter's reach. But purchasers will demand some of these con-



The house that Burns built has this outdoor barbecue corner, equipped with an electrically operated charcoal broiler, spit, grill, and oven, a gas refrigerator, and other conveniences.



The comfortable wide-roofed porches are illuminated at night by 150-watt incandescent lamps flush-mounted in the ceilings.

veniences in low-cost homes, he believes, and Burns and Kaiser intend to provide them.

Under its aluminum-shingled roof, Burns's house has only two bedrooms, two baths, living and dining rooms, garage, and extra space for hobbies or old trunks. But its sewing machine disappears, there are electric toothbrushes in the bathrooms, and ultraviolet rays keep the medicine chests sterile.

Picture windows and decorated walls beautify the living room. In the kitchen, where circular shelves rotate to save steps, there is a "nerve center"—a control board from which the housewife can manipulate the lawn and garden sprinklers, raise the garage door, and turn on her radio. From here, she can talk to every room in the house. In a cabinet in the master bedroom, infrared lamps dry her stockings in a jiffy.

The kitchen's hydraulic dish washer lifts a basket to receive dirty plates and lowers them into churning soapy water. The filtering unit in the sink traps grease, while the garbage-disposal unit even chews up bones. The clothesline raises and lowers itself at the touch of a button.

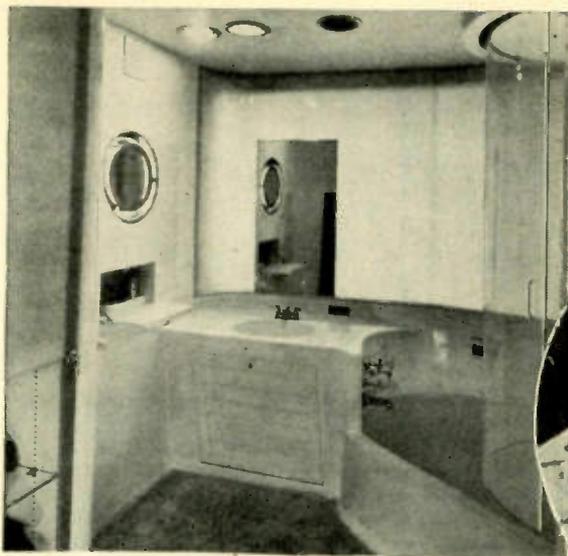
Radio entertainment is available in every room. There are two high-fidelity receivers behind sliding panels at the left of the fireplace. And the house contains recording equipment, an automatic record player, and a built-in television receiver.



Oversize bed in the master bedroom has fold-down arms to make night reading easy. The wall coverings are of stain-proof material.



The kitchen has the new Western re-burner gas range, the Kaiser hydraulic dish washer, a refrigerator, and garbage-disposal unit.



Revolving Plexiglas door (at right, above) converts bathtub into a shower. Mirror magnifies for shaving, makeup.

An electric sewing machine pops out of a kitchen cabinet when needed. The seamstress controls the rate of stitching by operating a lever with one knee.



Mother sits down to iron in on all-electric laundry. Equipment includes a washer, rinsing, and drier. The ironer disappears under a counter when not in use.



House front, with its informal planting, is brilliantly lighted. Arizona flagstone, wallstone and plywood form the walls.

Tiny bulbs glowing under plastic push-button plates show guests where to turn off lights. Because this system carries low-voltage electricity it uses open bell wire from switches to fixtures instead of conduit or heavy wire. And there is never a burned-out fuse to change; a main circuit breaker in the garage takes care of that. It feeds current to a pair of circuit-breaker panels elsewhere in the house, and if a short circuit causes a momentary overload, these circuit breakers automatically close a small switch. To restore the current, someone merely flicks the switch open.

There are no drafts or cold floors in the Burns house; "Moduflow," an automatic temperature-control system, balances heat input and loss. And dust is unknown. An electronic system called the Precipitron clears the air of all dirt and foreign particles. Air passing through the Precipitron flows over many strands of fine tungsten wire, thinner than human hair. These wires, carrying electricity, charge dust negatively. Positively charged plates then pull dust out of the air.



Our World Ages Violently

And when its face slips, as in April, there is a rumpus.

By DONALD H. MENZEL

Professor of Astrophysics, Harvard University

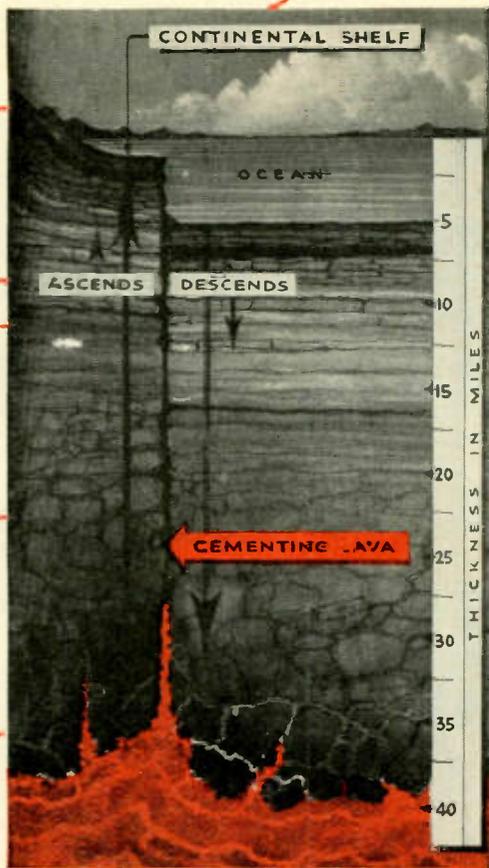
FROM a center not far from Dutch Harbor in the Aleutian Islands, a circular wall of water sped over the surface of the ocean on April 1 at an estimated speed of 400 miles an hour. Near the point of its origin, the wave may have been well over 100 feet high. The waves that hammered the west coast of America from Alaska to Chile were 10 feet high in certain regions. Those that devastated Hilo and other Hawaiian beaches, causing millions of dollars in property damage, ranged from four to six feet in height. The effects were noticeable even at Midway and Wake Islands.

What forces of nature caused this great disturbance? The term "tidal wave," commonly applied to any tide of unusual height, does not accurately describe it. Gravitational pull of the moon upon the oceans causes the ordinary tides (two high and two low tides per day). The sun also exerts a tidal pull; and the ebb and flow of these tides caused by the sun and moon can be predicted many years in advance. Variations in the predicted sea level, however, are due to other outside forces, none of which is truly "tidal."

The most destructive and far-reaching pseudo tidal waves are those produced by submarine earthquakes, the result of a shifting of the earth's ages-old surface.

The rocky crust of the earth extends to a depth of about 40 miles, where the temperature reaches 1,300 degrees Centigrade (2,400° F.). Here the rocks melt, and the entire exterior would float except for the heavy pressure exerted by the overlying rock masses. This 40-mile-thick crust is broken

The earth's crust resembles a jigsaw puzzle of interlocking pieces, as pictured below, glued together by molten rock of the interior. The deepest cracks lie around the borders of the Pacific (above) where sharp drops in the ocean floor indicate that vast blocks have slipped, creating great depths. When red-hot lava does reach the surface, volcanic action results.



and cracked. There are millions of crevices and fissures, some only a few miles deep and others that extend all the way to the semi-liquid interior. The molten rock tries to force its way up between the fissures, but ordinarily it solidifies along the cracks, forming a fairly effective glue.

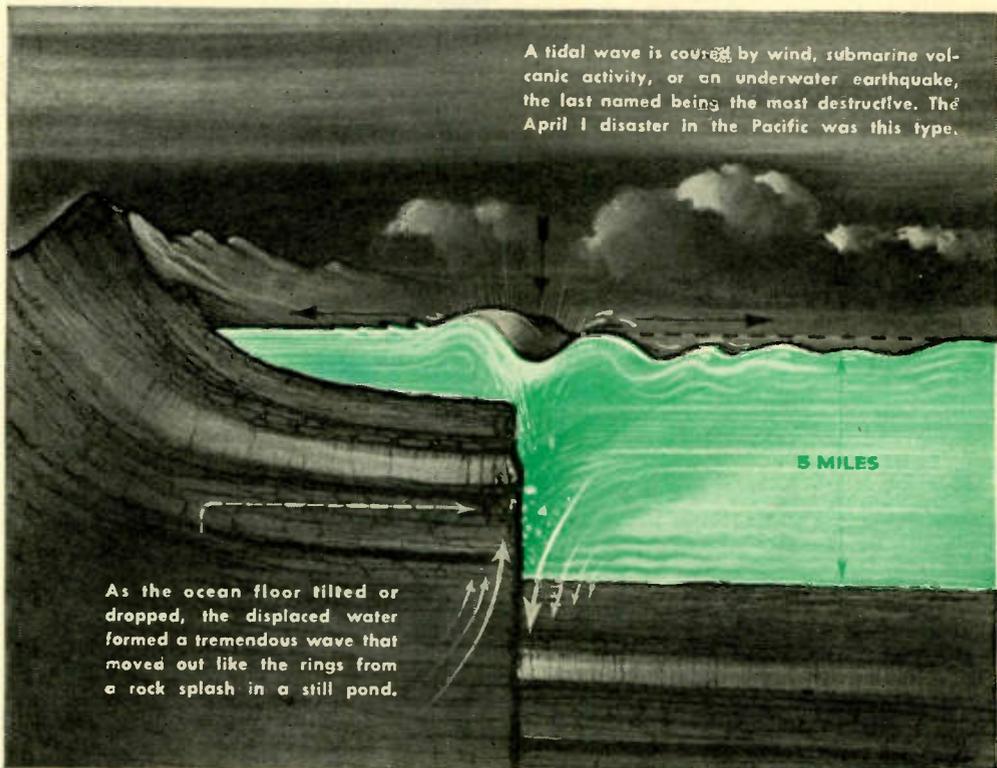
Not all the pieces, however, are in their most stable position. Erosion of land from one mass and accumulation of silt on an adjacent piece will make the former lighter and the latter heavier. The changing weight of ice and snow exerts additional forces. Thus, there is a tendency for the eroded continents to rise and for the heavier submarine areas to sink.

Geologists refer to movement of one section against its neighbor as "faulting." If one end of a block has slipped and jammed, the next movement is most likely to appear—possibly years later—at the opposite end. Sometimes the faulting occurs at deep levels. At other times the slippage may be quite apparent at the surface. Earthquakes accompany each movement, registering themselves on distant shock-recording machines known as seismographs. Hundreds of minor

quakes occur every day, and analyses of the recordings enable seismologists to study the structure of the earth's interior.

It is difficult to find any consoling thought in the recent Pacific Ocean disaster, but if the catastrophe were unavoidable, we may be grateful that it occurred now and not immediately subsequent to the atomic-bomb tests in Bikini Atoll. Had these oceanic disturbances followed hard on the heels of the dropping of the atomic bomb, scientists would have faced a problem in combatting the widespread notion that the Bikini explosion had upset the equilibrium of mother earth.

Great as the energy of a bomb may be, it cannot carry enough force to displace appreciably a solid crustal block weighing many quadrillion tons. It is altogether likely that the tidal strains and stresses within the earth eventually trigger the earthquakes that accompany the settling of some blocks and the rising of others. From a purely scientific standpoint, quakes and tidal waves are mere incidents in the gradual aging and evolution of an insignificant planet—our earth.

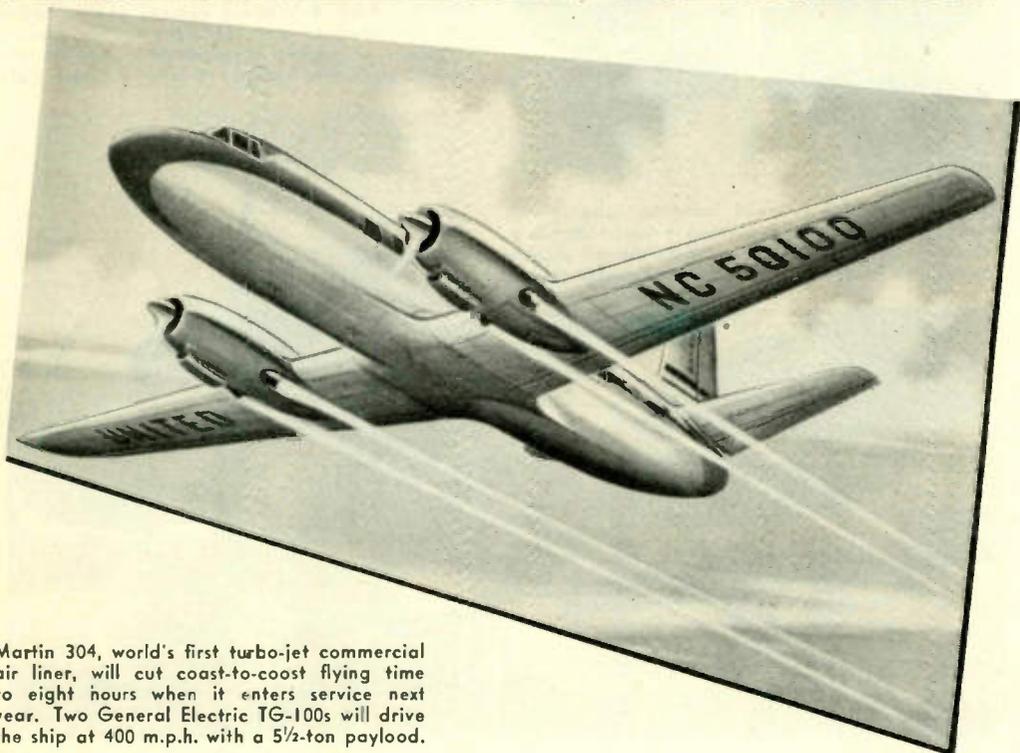
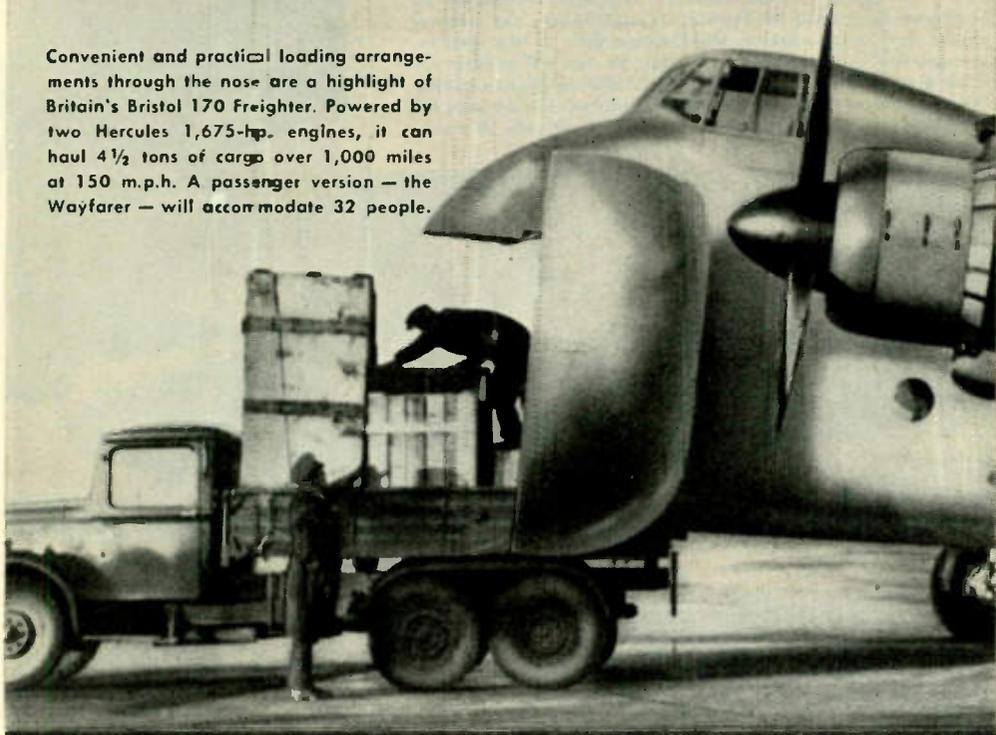


A tidal wave is caused by wind, submarine volcanic activity, or an underwater earthquake, the last named being the most destructive. The April 1 disaster in the Pacific was this type.

As the ocean floor tilted or dropped, the displaced water formed a tremendous wave that moved out like the rings from a rock splash in a still pond.

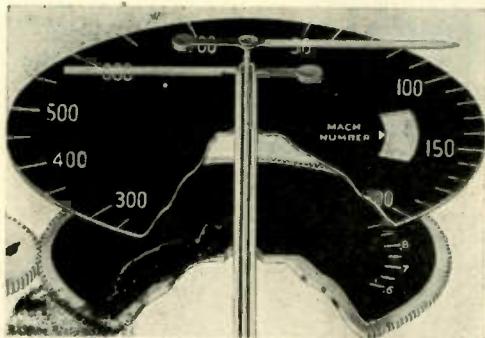
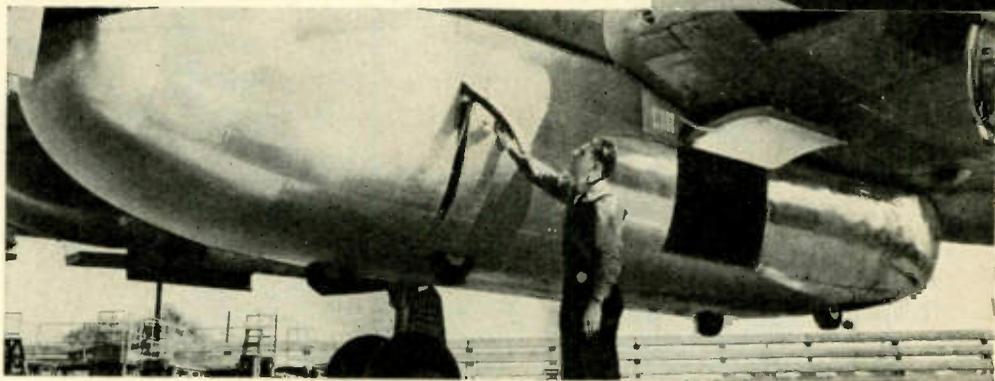
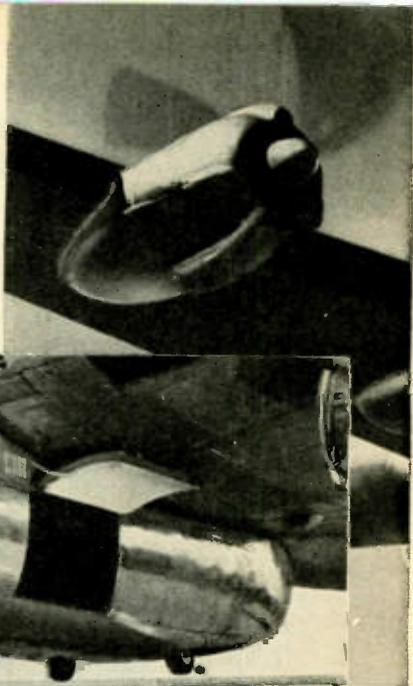
WHAT'S NEW in AVIATION

Convenient and practical loading arrangements through the nose are a highlight of Britain's Bristol 170 Freighter. Powered by two Hercules 1,675-hp. engines, it can haul 4½ tons of cargo over 1,000 miles at 150 m.p.h. A passenger version — the Wayfarer — will accommodate 32 people.



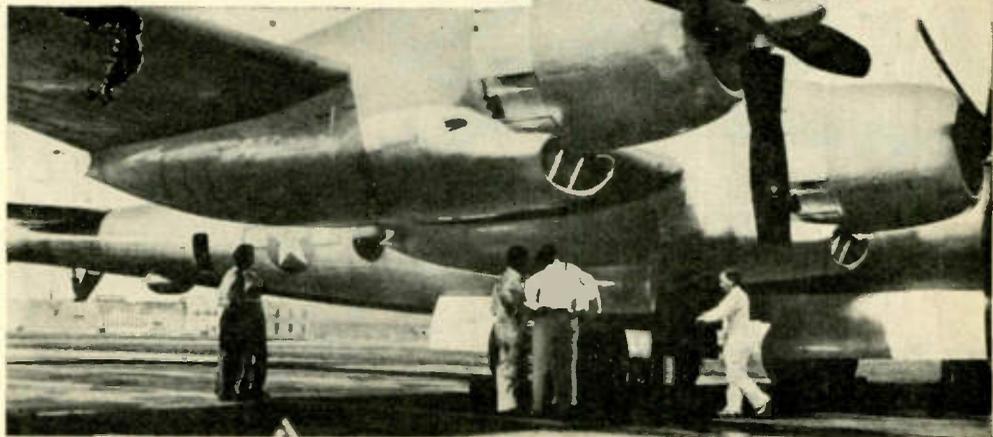
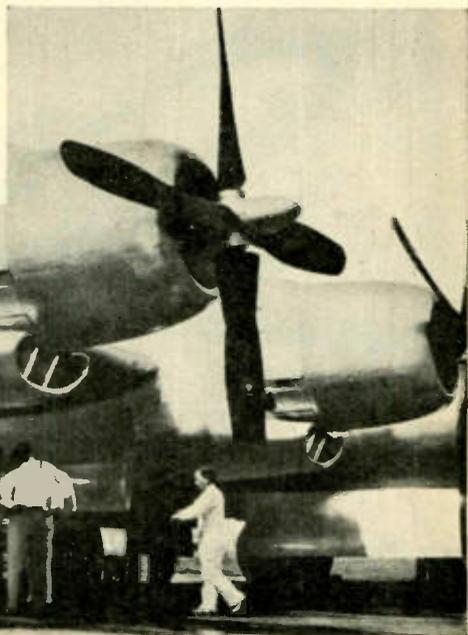
Martin 304, world's first turbo-jet commercial air liner, will cut coast-to-coast flying time to eight hours when it enters service next year. Two General Electric TG-100s will drive the ship at 400 m.p.h. with a 5½-ton payload.

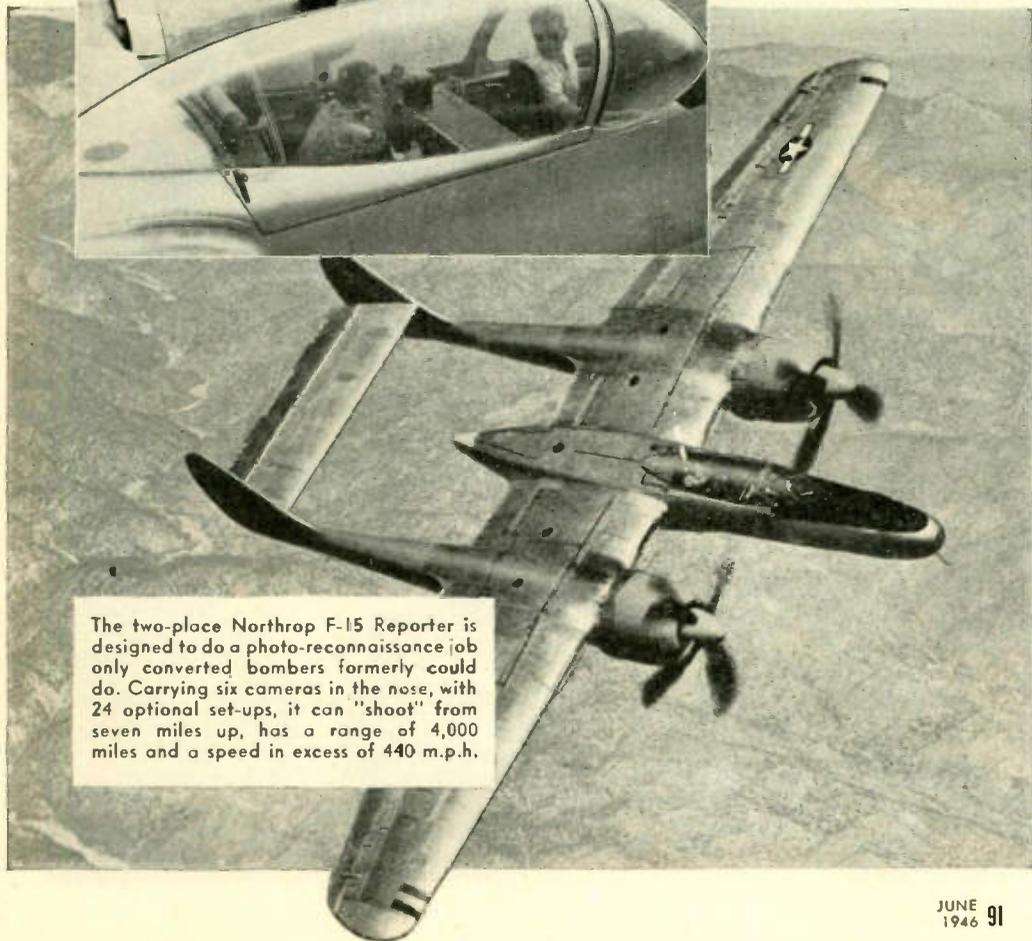
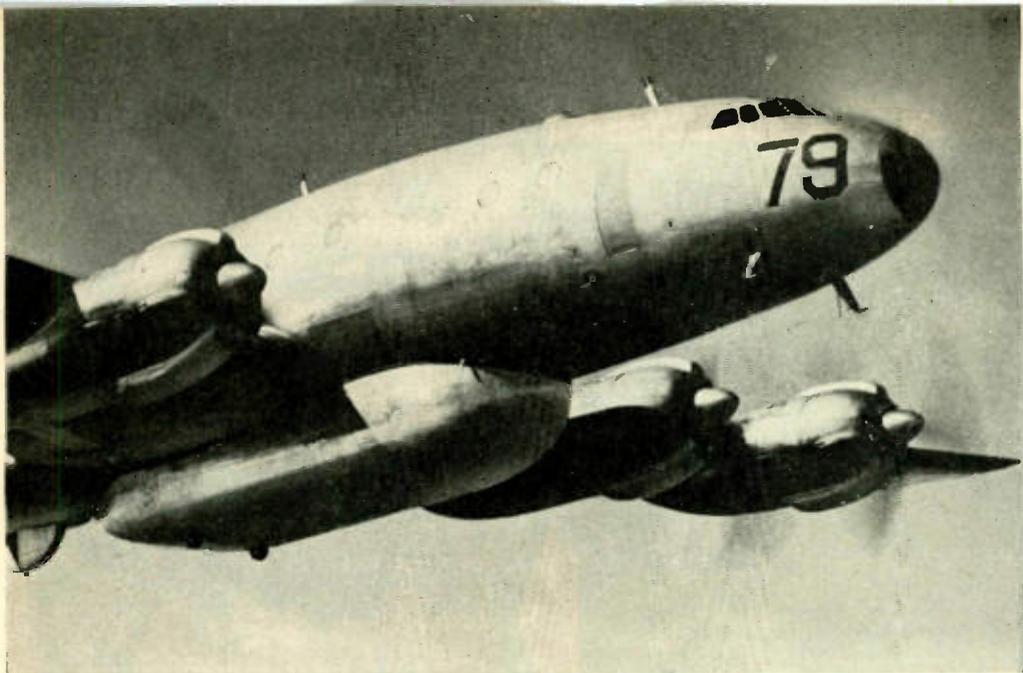
Nestling snugly against the sleek underside of the Constellation (right) is the new streamlined, all-metal container that holds four tons of express, mail and baggage. Developed by Lockheed and named the Speedpak (inset, below), the external carrier can be attached to the fuselage belly in two minutes, or removed in the same brief time. Its use will greatly reduce ground-waiting time along Constellation air-line routes. The sky giant, with loaded Speedpak attached, can be used for flights up to 1,500 miles, its cruising speed cut only 10 m.p.h.



The Kollsman F-4 airspeed indicator (above) will warn a pilot when he is nearing a speed that is a threat to his craft. The upper needle shows a plane's speed, the lower one its maximum allowable speed.

Increased power and improved flight performance are gained with the new-type nacelle (close-up below) designed for the XB-44, a forerunner of the new Boeing B-50 Superfortress. In addition, a crew of six men can change the engine units in a half hour. It takes six men eight hours to do the same job on the wartime B-29. The B-50 will be powered by four 3,500-hp. Pratt & Whitney engines and equipped with four-bladed, reversible-pitch Curtiss Electric propellers. A marked improvement in take-off, rate of climb, and speed has been revealed in current tests.





The two-place Northrop F-15 Reporter is designed to do a photo-reconnaissance job only converted bombers formerly could do. Carrying six cameras in the nose, with 24 optional set-ups, it can "shoot" from seven miles up, has a range of 4,000 miles and a speed in excess of 440 m.p.h.

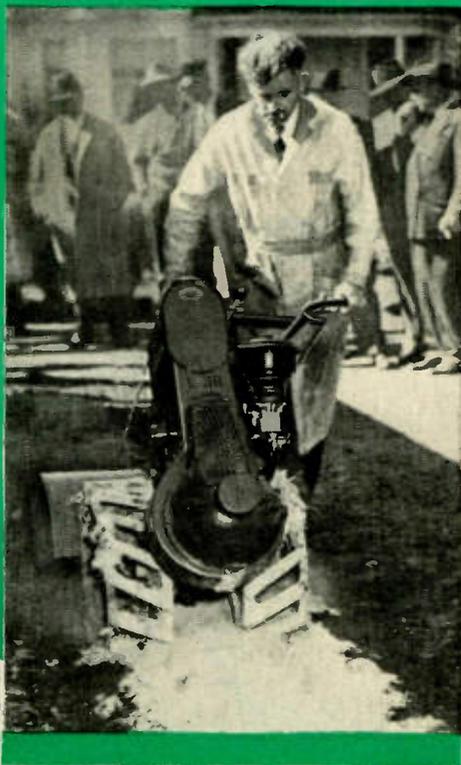
Diminutive Dynamo.

Only one-fourth the size of a match's head and set in half of a small pearl, this dynamo speeds at 6,000 rotations a minute and generates electricity that can actually be measured by an electrometer. Made by M. Fernand Huguenin, Swiss watchmaker, the machine has 46 stainless steel parts, some of which can only be seen with a microscope, and weighs .06 gram.



Farm Tool Lays Sidewalk.

No sand or gravel is needed for laying sidewalks, roads or airfield runways when the versatile Rototiller, primarily a cultivator, is used for making soil cement by mixing dry cement and dirt. Revolving steel tines under the machine mix earth and cement uniformly to a depth of from one to 12 inches, as desired. The mixture then needs only to be sprinkled and rolled.



Flame Thrower Works in Woods.

Its war work done, the flame thrower has been converted into a device for setting fire to piles of brush and debris, called slash, during the rainy season in the Northwest. The kerosene-filled tank will fire hundreds of slash piles a day, thus eliminating a serious potential fire hazard.





100,000,000

harvest . . . from ideas

Research founded Monsanto Chemical Co.,
keeps products pouring from its labs.

By J. D. RATCLIFF

THE new products promised for the post-war world are beginning to pour from laboratories—homely little things that will touch our everyday lives. Things like:

An invisible coating for fabrics, which will prevent ladies' slips from slipping; and make stockings virtually runproof.

Insulating material so efficient that your new refrigerator, though no bigger than your old one, will hold 40 percent more food.

A baking powder that doesn't produce bubbles until the dough is in the oven—thereby making lighter biscuits than Grandma ever dreamed of.

A chemical treatment for overalls, sportswear or children's clothing that triples the

life of the garments without altering their appearance.

A soap that makes no suds at all, yet is much more efficient than any soap you've ever used.

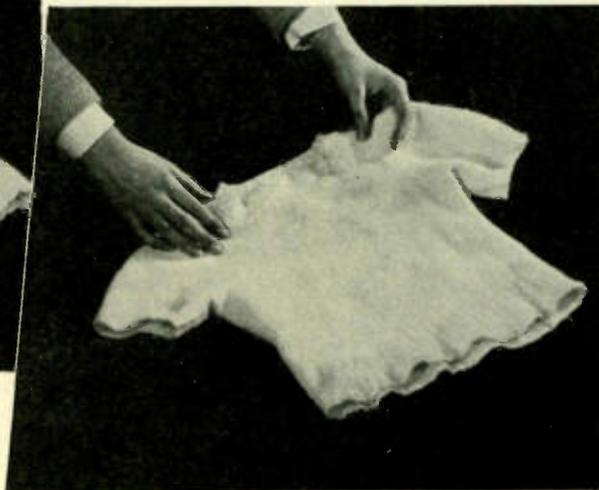
All these things are here now, and they all come from the laboratories of the Monsanto Chemical Company. No organization better exemplifies the value of research. It is the lifeblood of Monsanto, its only life insurance in a changing world. As a matter of fact, the company was born in a laboratory—of a research accident.

A chemist at Johns Hopkins complained to his wife that the ham sandwiches she made for his lunch had a sweetish flavor. Had she added sugar? She said she hadn't. Next day's sandwiches were just as sweet, so the chemist started investigating. He had

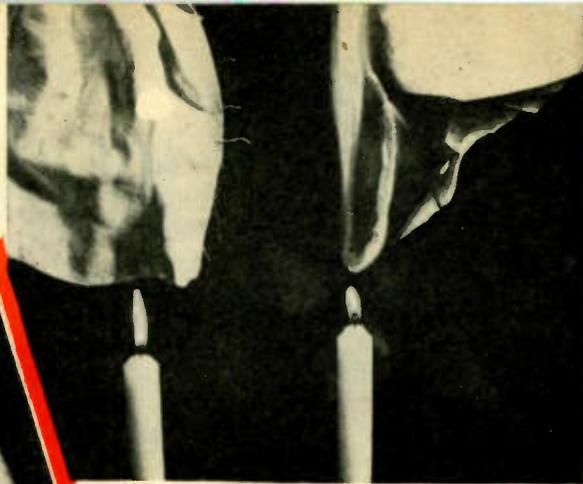
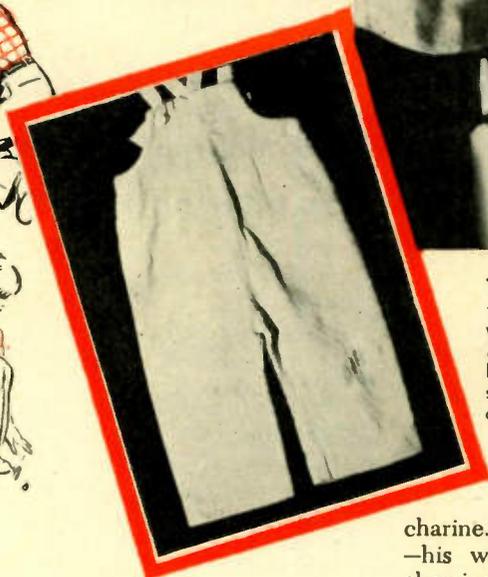


A wool sweater treated with Monsanto's plastic Resloom shrinks only a very slight amount in washing and is exceptionally hard to wrinkle.

The same-sized sweater, untreated, shrinks a third after having been washed in hot water (below). Resloom's protection can be extended to cotton, rayon, and other fabrics.



The untorn leg of Junior's overalls (below) was coated with Monsanto's hard plastic Merlon, a styrene-based compound that doubles or triples the wearing life of fabrics.



The cloth at left above blackens but refuses to burn because it has been saturated with a new chemical, being developed at Monsanto's Central Research Laboratories, Dayton, Ohio. The chemical may make possible the fireproofing of cottons, rayans, and other fabrics at the mill.

been studying coal-tar derivatives, and tiny amounts of his experimental material had clung to his fingers and given his food a sugary taste. Thus he discovered saccharine.

In 1902 the late John F. Queeny, St. Louis drug salesman, took \$1,500 of his savings, borrowed \$3,500, and started making sac-

charine. He named his company Monsanto—his wife's maiden name. The German chemical trust tried to drive him out of business by cutting the price of saccharine from \$6 a pound to 60 cents. Queeny hung on by his teeth, all the time conducting research for new products that would strengthen his position.

Monsanto's \$3,000,000-a-year research program is spread through six laboratories. The most interesting of these is at Dayton, Ohio. Now known as Central Research, this laboratory was founded in 1926 by Drs. Charles A. Thomas and Carroll A. Hochwalt, members of the General Motors research team that earlier had discovered ethyl gasoline. In their mid-20s these men left General Motors laboratories to set up shop for themselves.

Monsanto bought out the two scientists in 1936, and retained them to work on products that might not hit the market for half a dozen or more years. When war came, Central Research worked on atom bombs, rocket propellants, and other secret projects.

Britain expected invasion, and feared Germany might capture the vast stores of gasoline in the coastal areas. To fire the gasoline, to keep it out of the hands of the Germans, would endanger the lives of thousands of people. Monsanto chemists devised a resin that could be added to gasoline without altering its smell or color. The British planned to add this resin when the Nazis



Eight-ounce raincoats can be made of Monsanto's Vinyl Butyral, which also produces lacy shower curtains, jam-proof tablecloths, and washable seat covers. Syton, another product, helps prevent stocking runs.



Wool socks and blankets that have been Resloomed (at left in both photos above) can safely be put in the family wash while untreated ones of the same size shrink drastically.

arrived. The Nazis would use the captured gasoline in their tanks and planes—as they had in France. Within minutes their engines would be hopelessly gummed up. Thus one of history's biggest booby traps was set—but never sprung.

Body armor—first since the Middle Ages—was another product that Monsanto cooperated in developing. Fifteen plies of glass cloth, glued together with plastic, made a light armor stronger than steel. Vests of this stuff weighed 30 pounds, would stop a tommy-gun slug. These vests were used on a small scale in the Okinawa landings and would have been general issue had the assault on Japan ever developed.

Throughout the war the company's 325 scientists concentrated on research directly related to military applications, including operation of the atomic-power research laboratory at Oak Ridge, Tenn. But scores of new ideas were dammed up.

Resloom is one of the most fascinating of the lot. Wool fiber contains microscopic caverns. Resloom is a clear plastic stuff used to fill these cavities. Once filled, the wool loses most of its ability to shrink. Wool flannel normally shrinks 30 percent, but when Resloomed it shrinks only four percent. Worsted suitings shrink three percent, not 11. In one series of tests, wool shirts were washed in the hot water ordinarily used for cottons. After five washings they had shrunk a scant 1½ percent. From now

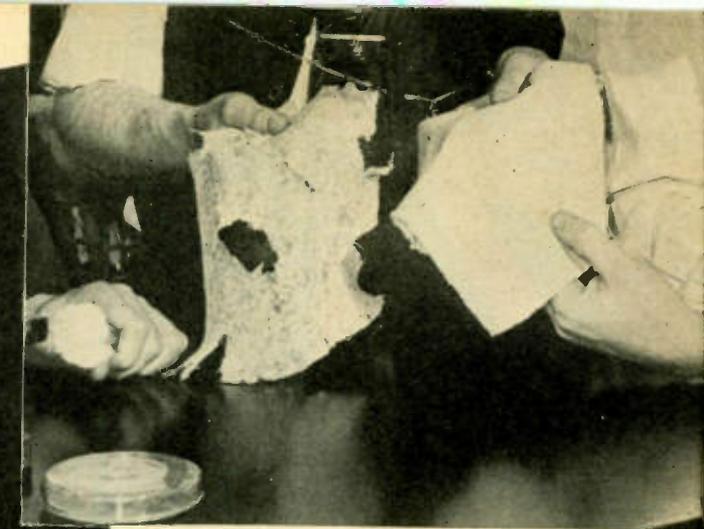
on sweaters, socks, underwear and other such woolen goods may be thrown in with the rest of the family wash. Incidentally, it will cost mills nothing to apply Resloom. By eliminating shrinkage normal in wool manufacture, it will more than pay for itself!

Syton is another Monsanto development. This is a microscopic silica-sand dispersion. In effect it gives a sandpaper coating to fabrics that is permanent, will not wash out. The particles are so tiny that they can neither be seen nor felt. One of the most obvious applications for this is in women's slips. When it is used, women will no longer have to tug climbing, twisting undergarments back to where they belong.

It will also be used to make stockings virtually runproof. The sandpaper coating on fibers makes them cling together. On a snag machine—where a tiny hook is dragged over the precious stockings—one stocking developed 60 runners. Its treated mate developed only seven.

Another new chemical, a water repellent, finds applications in both men's and women's clothing. Rain runs off treated cloth as off a duck's back. In one practical test a man wore an untreated suit out in a rain-storm. The suit was soon a soggy mess. A treated suit remained dry and well pressed.

Most parents would judge Merlon to be Monsanto's most spectacular development. In effect, this is a hard plastic coating for fibers—a varnish so thin that it cannot be seen by the eye or felt by the hand. Yet it doubles and sometimes triples the life of cotton and other fabrics. General use of this cheap stuff will mean an enormous saving in hard-usage garments—children's cloth-



Lustron (left), a new plastic that glows for six or eight hours after it has been exposed to sunlight, will be used in markers.

Both pieces of duck convos above were buried six months. Fresh-looking one of right had been treated with Monsanto's 8-Quinolinol, remarkably effective against mildew.

ing, overalls, work shirts, and hotel sheets.

A new insulating material looks like snow, pours like water. It is twice as efficient as the best insulating material now available. Too expensive for home insulation, it will find scores of space-saving specialty jobs: in refrigerators, in planes, frozen-food storage compartments, refrigerator cars.

Monsanto's sudsless "soap" is 40 percent more efficient in cleaning power than soaps now on the market. It was specifically designed for use in automatic home laundries.

The plastic that was used in wartime body armor fits perfectly into a mass production scheme. Picture sheets of cotton cloth, paper, glass fiber or other fabric flashing through a mill. Rollers coat both sides with plastic. A dozen or so of these coated sheets come together and are squeezed through a heated roller. Result—a board as rigid as plywood. This opens the way for large plastic sections previously impossible to make—wall panels, doors and such. The treated fabric may even be draped over forms and baked in an oven to make canoes, truck bodies and other intricate shapes.

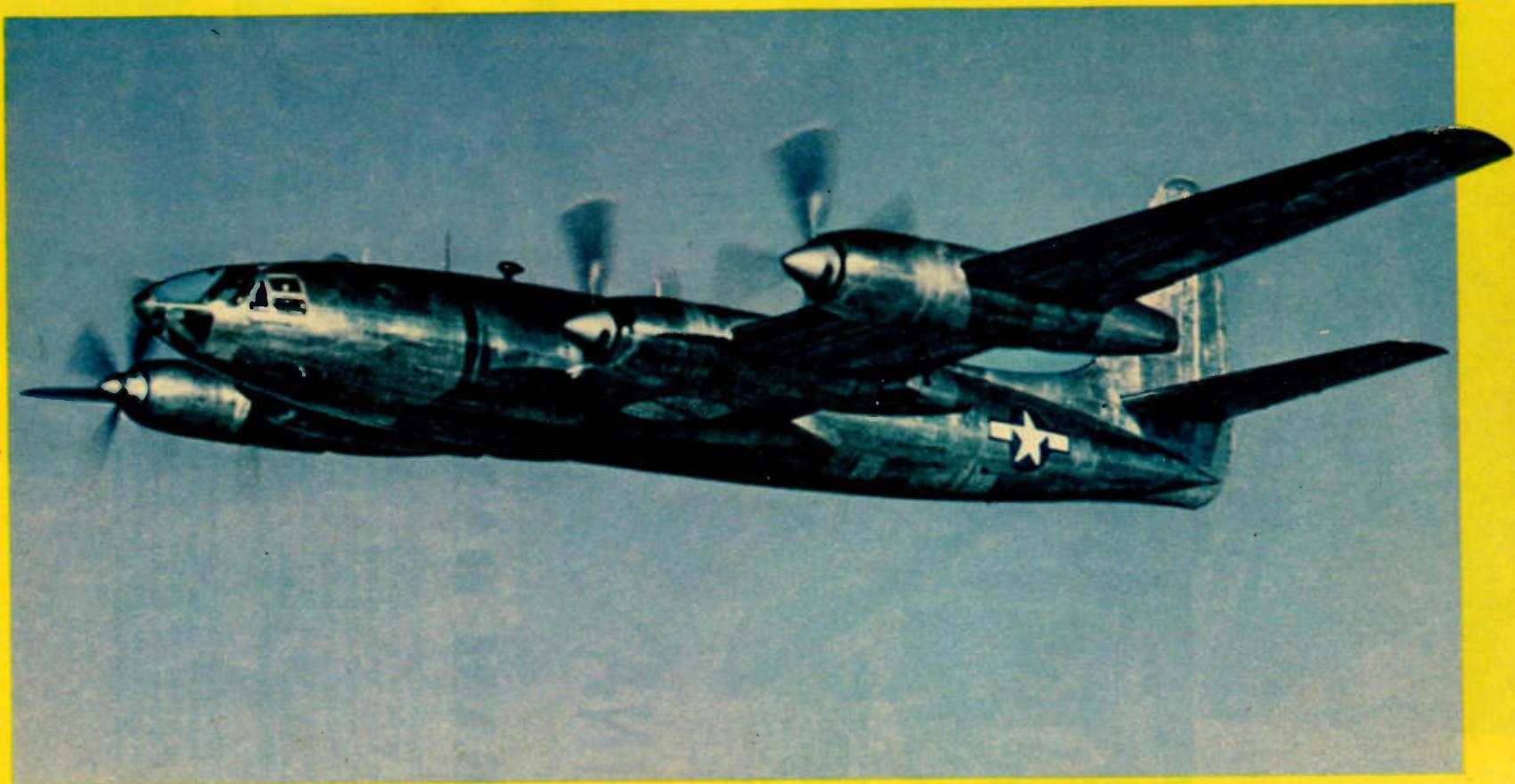
Monsanto's chemists are playing a leading role in the war on pests—both agricultural and domestic. They are making a new rat-killer (discovered by the National Defense Research Committee) ominously labeled No. 1080. It is the answer to a mystery writer's dream. It is dozens of times

more effective than any other rodenticide known because it is almost entirely without identifying color or odor. Recently, St. Louis planned a city-wide rat extermination drive. Calculations showed five pounds of No. 1080 would be enough to kill all rats in the municipality. The poison strikes so quickly that rats travel no more than five or six feet from the bait before tumbling over.

Monsanto employment has risen from 2,000 in 1929 to more than 12,000 today, its sales from \$17,000,000 in 1929 to \$100,000,000 in 1945. The things mentioned are but a fraction of Monsanto's total research output. In the past 12 months 70 new products have emerged from the laboratory—all of which will be translated into new industries, new jobs.

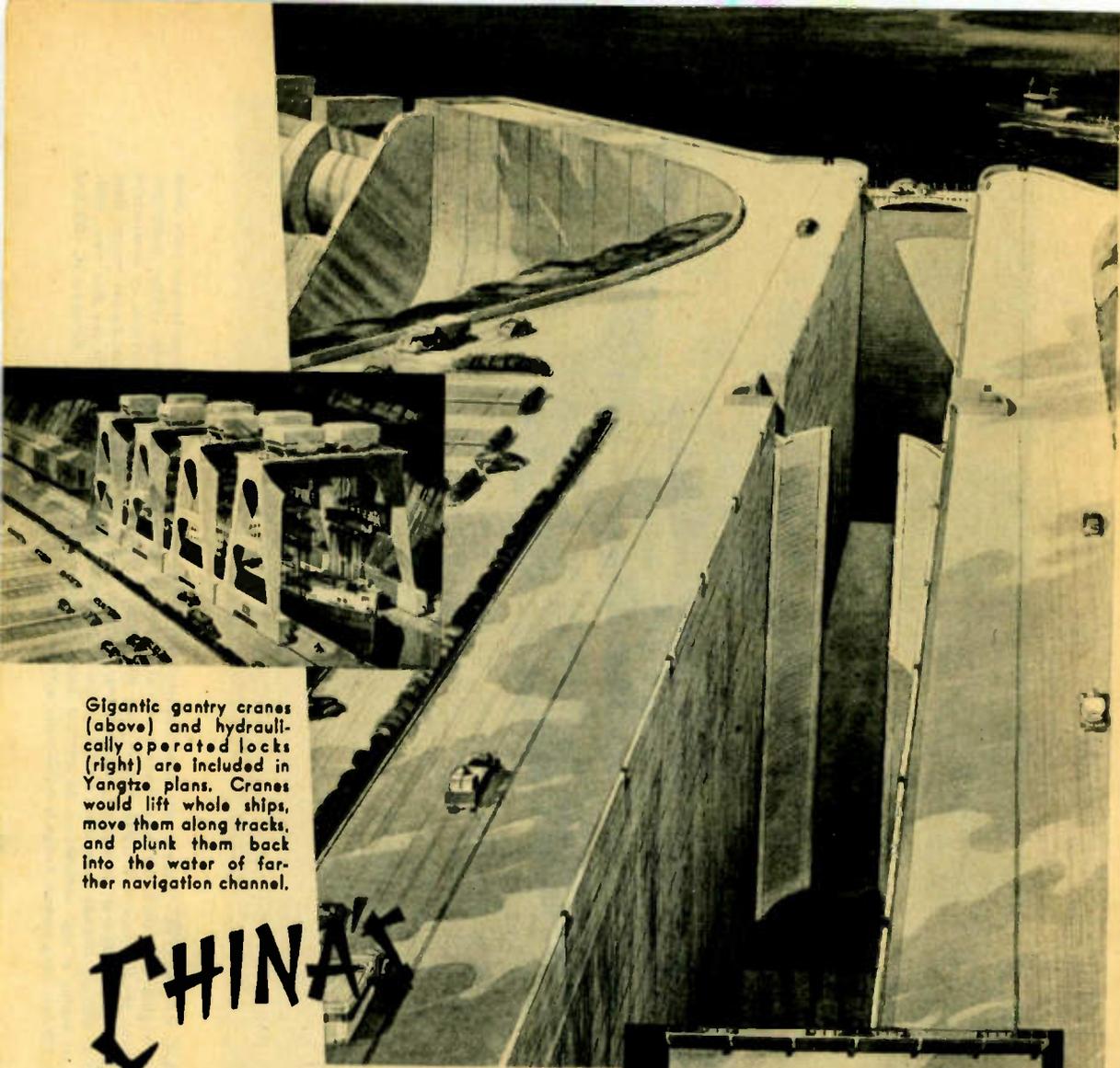
An impressive record? Certainly. But Monsanto's biggest adventure in research is just ahead. A few weeks ago the Manhattan Engineering District gave the company this assignment: *Design, build and operate the first atomic-energy plant for production of peacetime electricity at Oak Ridge, Tenn.*

This is one of the greatest challenges ever laid on the doorstep of an American enterprise. Monsanto scientists have accepted it with confidence. Late this year or early next, they believe, the unit will give forth its initial surge of electricity, marking the true beginning of a new era.



Your Pin-Up

REPUBLIC RAINBOW. Fastest passenger transport, the 51-ton Rainbow can carry 46 passengers from coast to coast in slightly over six hours, at a ten-mile cost of 12.5 cents. Externally identical with its military prototype, XF-12 (above), the Rainbow will cruise at more than 400 m.p.h. at 40,000 feet. Comfort is assured by pressurized cabin maintaining 8,000-foot atmosphere, ample lounge, smoker, and buffet accommodations. Power comes from four Pratt & Whitney engines developing 13,000 hp. Jet thrust assist, utilized commercially for the first time, adds 200 hp. per engine at high altitudes as the exhaust gases rush from the elongated nacelles. Rainbow is 100 feet long with 129-foot wing spread. Range is 4,100 miles with full load.



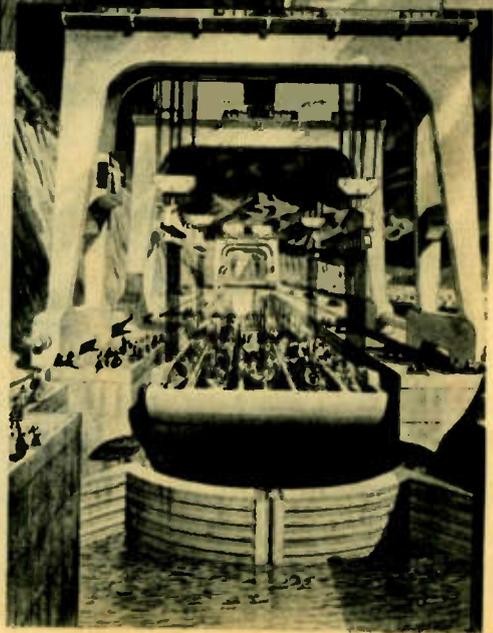
Gigantic gantry cranes (above) and hydraulically operated locks (right) are included in Yangtze plans. Cranes would lift whole ships, move them along tracks, and plunk them back into the water of farther navigation channel.

CHINA'S

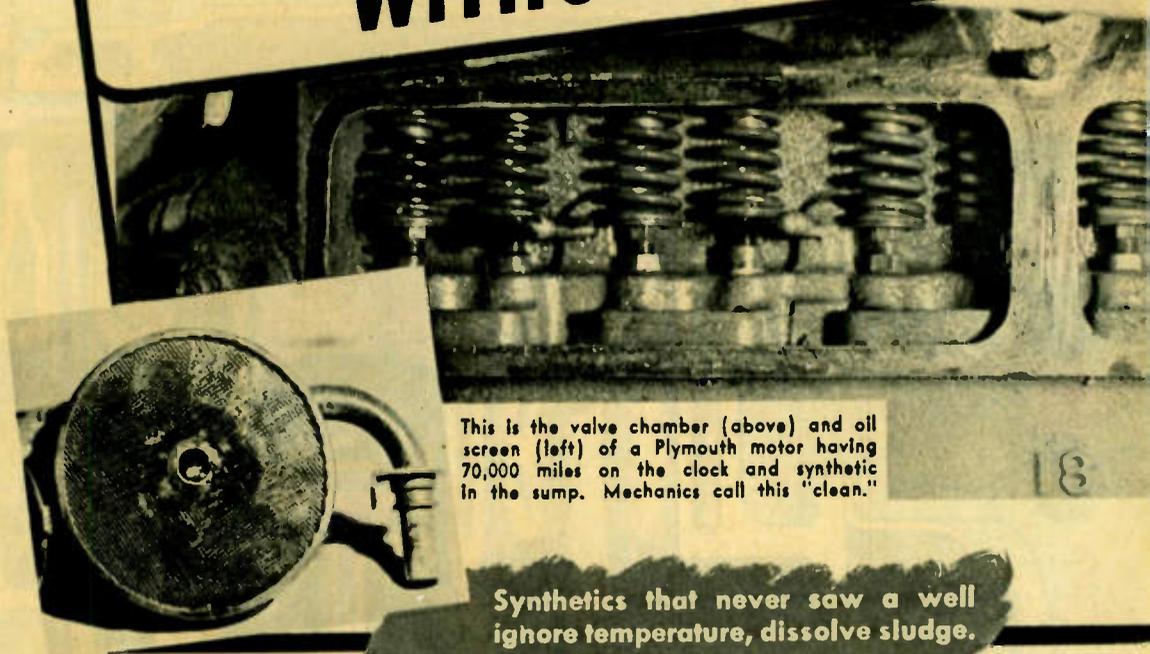
DREAM DAM

BIGGEST irrigation, power, and flood-control dam on earth is projected for China's Yangtze River about 300 miles east of Chungking. Dam will impound water to irrigate 10,000,000 acres. Hydroelectric plant will generate three times power of Boulder, Grand Coulee and Shasta plants combined. U. S. is helping China's National Resources Commission with plans.

Gantry cranes that may be used to get ships past the Yangtze Gorge dam would lift or lower them 550 feet. Dozens of sampans would be handled at once in a corrugated boat tank. Hulls of large vessels would have to be reinforced.



Lubrication WITHOUT OIL



This is the valve chamber (above) and oil screen (left) of a Plymouth motor having 70,000 miles on the clock and synthetic in the sump. Mechanics call this "clean."

Synthetics that never saw a well
ignore temperature, dissolve sludge.

By GOLD V. SANDERS

NEW lubricants without a drop of petroleum in them—made by synthesis from natural gas—bring the production of an ideal motor oil much closer. The perfect lubricant would, of course, never have to be changed, would provide easy starting on the coldest morning and equally good lubrication on the hottest day. It would not produce carbon, sludge, or other waste products that foul working parts and reduce the smoothness (lubricity) of the oil itself.

Synthetic oils, highly developed during the war and given extensive tryouts by Army Ordnance and the AAF, are able to maintain a remarkably constant degree of viscosity no matter how the operating temperature varies. The same oil may be used in winter and summer.

Since synthetic oils differ from petroleum oils chemically, in particular, the oxidation that takes place in an internal combustion motor has a different effect on them. The waste products are mostly volatile compounds, which pass out through the exhaust

pipe or crankcase ventilator. The waste products of petroleum oils are largely solids that remain in the oiling system, causing carbon and sludge that dirty a motor and reduce its efficiency.

When the synthetic oil is put in a motor already fouled by petroleum waste, reports show, it tends to clean the motor slowly by dissolving accumulated carbon and sludge. Synthetic and petroleum oils may safely be mixed in the crankcase of a clean motor, but that is not recommended for dirty motors.

A 24,000-mile laboratory test of high-grade petroleum oil and synthetic oil revealed that after 2,000 miles the engine using synthetic oil was only 2.3 percent cleaner, but after 18,000 miles it was 20.1 percent cleaner.

Prestone Motor Oil, a synthetic lubricant produced by Carbide and Carbon Chemicals Corp., is made in a number of grades for varying purposes. Grade LB-300, designed for use in the average passenger car, has been on the market in limited distribution at 75 cents a quart. Standard tests have shown that this one grade provides adequate lubri-

**Lubrication
WITHOUT OIL**

KEY



OIL UNDER PRESSURE



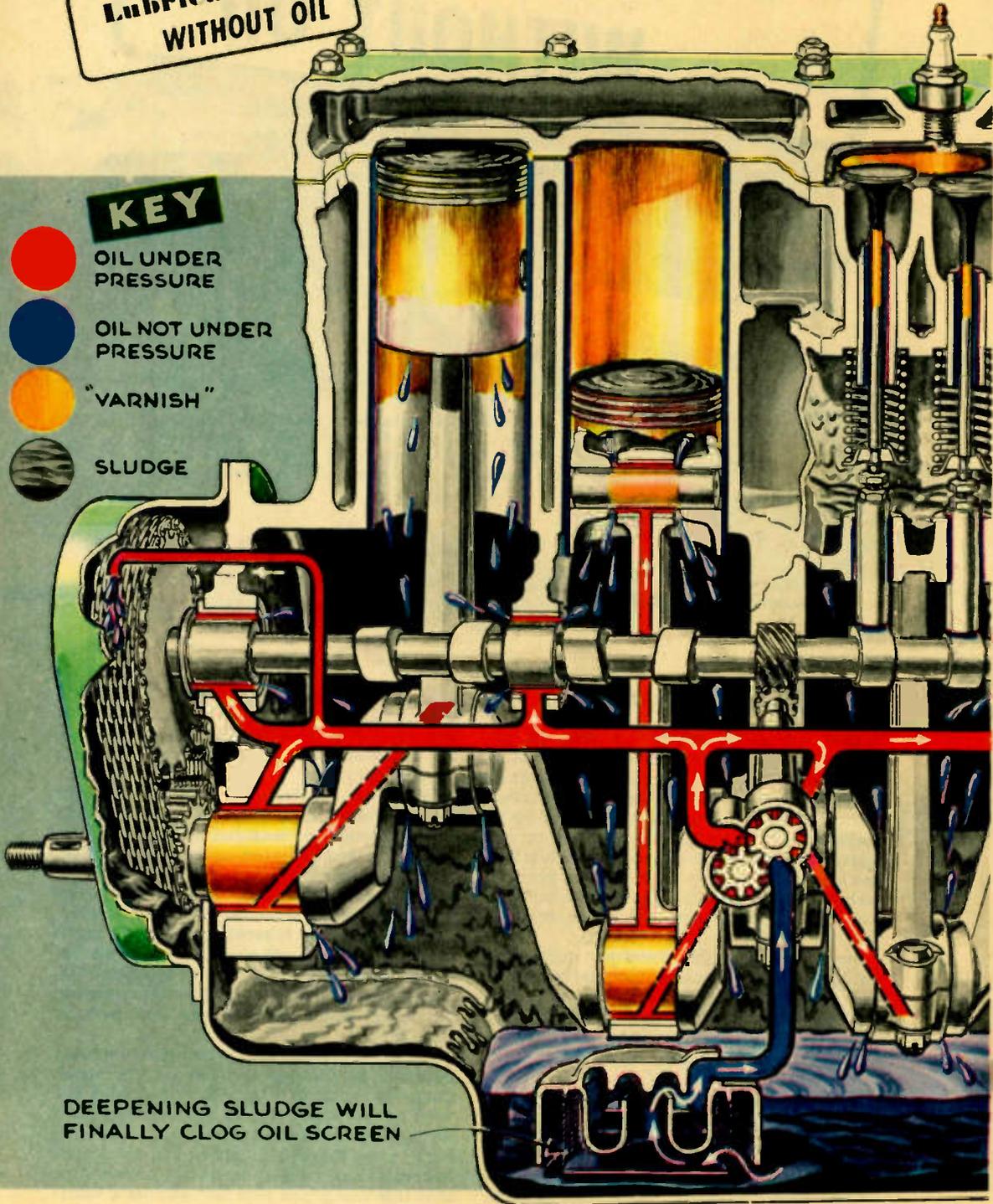
OIL NOT UNDER PRESSURE



"VARNISH"

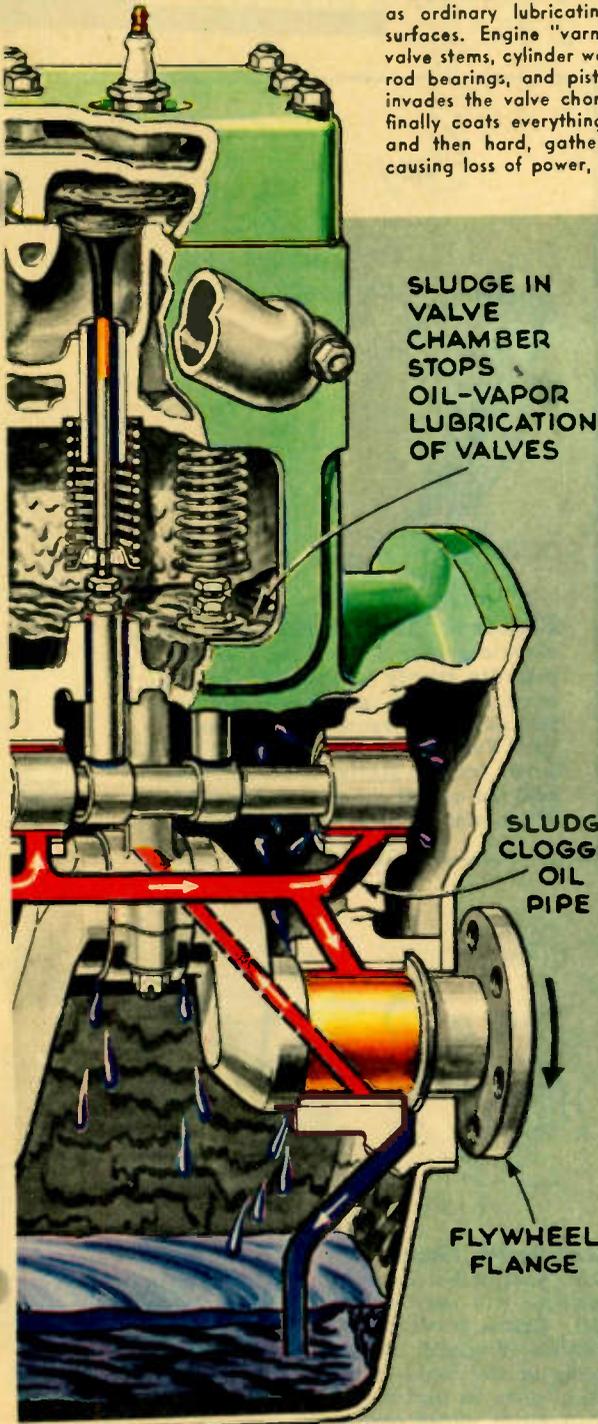


SLUDGE



DEEPENING SLUDGE WILL FINALLY CLOG OIL SCREEN

INSIDE AN AUTOMOBILE ENGINE. Here's what happens as ordinary lubricating oil is splashed over the working surfaces. Engine "varnish," a by-product of oxidation, coats valve stems, cylinder walls, pistons, main bearings, connecting rod bearings, and piston rings, making them sticky. Sludge invades the valve chamber, interfering with lubrication, and finally coats everything in the crankcase. Carbon, first soft and then hard, gathers on piston heads and valve heads, causing loss of power, "ping," sometimes pre-ignition knock.



SLUDGE IN VALVE CHAMBER STOPS OIL-VAPOR LUBRICATION OF VALVES

SLUDGE-CLOGGED OIL PIPE

FLYWHEEL FLANGE

cation under a range of conditions that would require three grades of petroleum oil (S.A.E. numbers 10, 20, and 30). Grade LB-300 has a pour point of -40° Fahrenheit, at which petroleum oils would be a solid mass, and this means easier starting on cold mornings.

These findings were reported to the Society of Automotive Engineers by three engineers of Union Carbide and Carbon Corp., which developed the products. Synthetic oils now have been tested for four years.

The engineers do not claim a lower consumption rate for the new kind of oil, though standard tests indicated a margin in its favor. They emphasize, however, that the oil left after part has been burned and dissipated is still usable, its lubricity little impaired. By adding to it as it is consumed, they say this oil could be used indefinitely, except that other things besides oxidation products contaminate motor oil. Outside dirt finds its way inside motors, leaded gasolines leave some deposit in the oil, and metal particles from the working parts usually accumulate gradually. Barring external contamination, the engineers maintain, the period between oil changes could safely be doubled by using the synthetic lubricant exclusively.

These synthetic lubricants are strictly American achievements, the result of 15 years' research. Germany developed synthetic oils, too, during the war but comparisons made by scientists sent into the Reich on the Army's heels indicate that the Germans' oils were chemically different and inferior. The producers, however, do not promise any sizable cut in the present prices. The raw material, natural gas, is plentiful and cheap enough, but the process of synthesis costs considerably more than the production of petroleum oils.

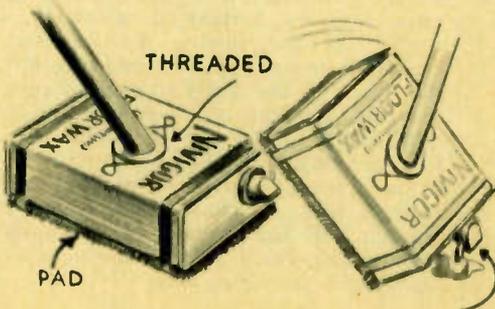
NEW IDEAS



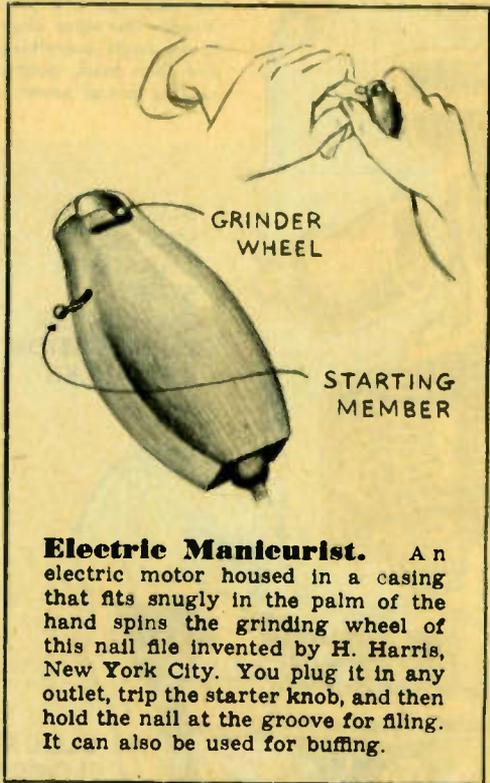
Look! No Hands! For mail carriers, gardeners, and others who must work under the summer sun, Benjamin B. Levine, of Pittsburgh, Pa., has devised a parasol that can be worn like a hat, leaving the hands free. Opened like the conventional sunshade, it has self-adjustable ribs that extend downward and are connected to a head band. This is adjustable to a number of head sizes, and may be mounted on a helmet or other headgear.

No Bending, No Stooping.

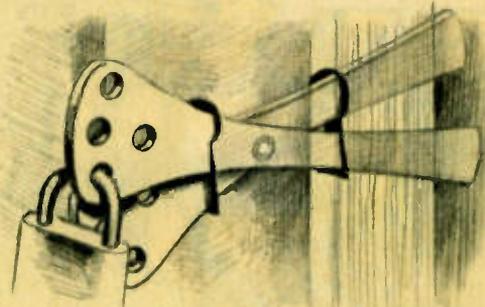
You soon may give your floors a gleaming wax finish and do the whole job standing up. Contrived by A. T. Rogovin, of New Haven, Conn., the combination container-applicator (below) has a long wooden handle that screws into the can of wax. The user tips the can slightly to spill some liquid and then spreads and polishes with the pad that is fixed to the container.



CONTACT WITH FLOOR OPENS SLOT



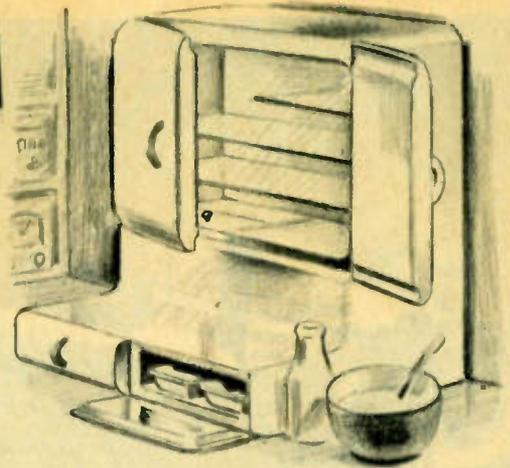
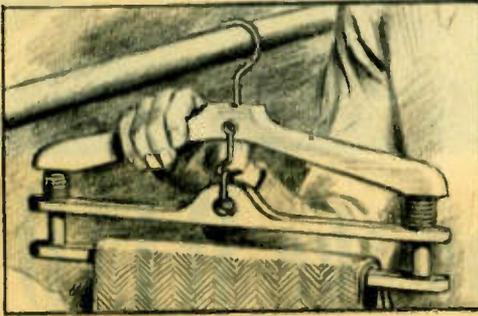
Electric Manicurist. An electric motor housed in a casing that fits snugly in the palm of the hand spins the grinding wheel of this nail file invented by H. Harris, New York City. You plug it in any outlet, trip the starter knob, and then hold the nail at the groove for filing. It can also be used for buffing.



Keyhole Guard. A pair of identically shaped blades suitably inserted in a keyhole will defy anyone to force them out, claims inventor O. J. Lofqwist, of London, England. A padlock attached in holes of the wide ends, as above, keeps them open so that they cannot be pushed through or pulled out of the opening.

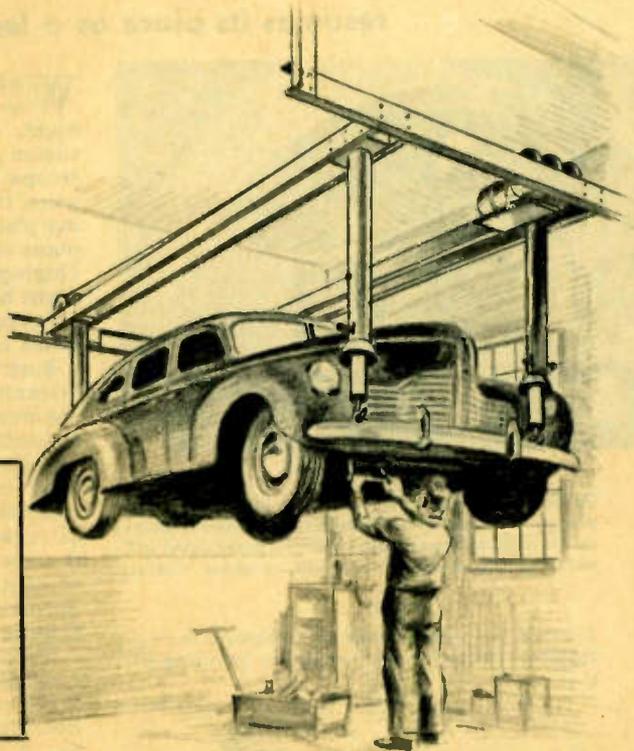
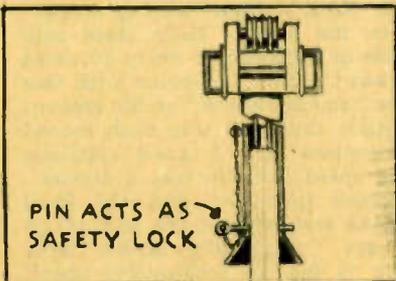
FROM THE INVENTORS

Pinning the Pants Up. The garment hanger below, designed by H. R. Ellis, of Meadville, Pa., keeps trousers from falling onto the closet floor. When pants are looped over the lower bar the hook is released from the eye on the upper bar, which is forced down by springs on the dowels, clamping pants in place.



Compact Refrigerator. The L-shaped electric refrigerator above can be hung on a wall or stood on a table. Within the shelf-like projection at bottom are the ice-cube trays. The motor is installed in the bottom rear, with the main food compartment above it. Cooling coils run inside the rear and side walls. Donald E. Dailey, Germantown, Pa., is the inventor.

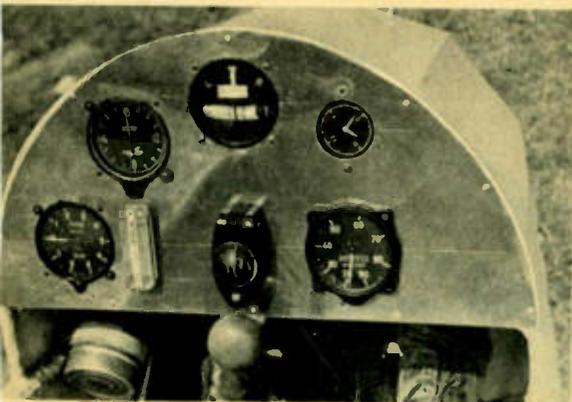
Automobile Hoist. All parts on the underside of a car are easily reached and the working space beneath the car is completely cleared for the movement of workers and their tools when the hoist invented by Elmer B. Thompson, of Des Moines, Iowa, is used. Instead of the conventional mechanism rising from the floor, the new hoist has four shafts that come down from an adjustable frame suspended from ceiling beams, to pick up the car by its four corners. A safety lock (below) guards against hydraulic failure.





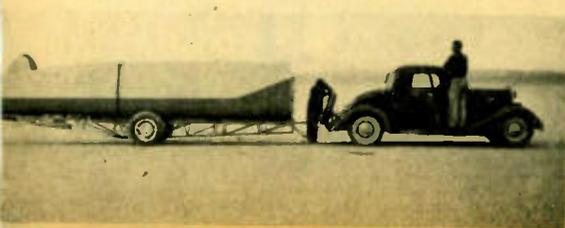
WINGS on the WIND

Soaring, a scientific study in powerless flight, resumes its place as a leading peacetime sport.



Sailplane has sensitive variometer instead of power plane's rate-of-climb indicator. Clockwise, instruments are variometer, altimeter, turn-and-bank indicator, watch, air-speed indicator, compass (center).

Knocked down and loaded on its special trailer, a sailplane (below) is transported to launching site.



WARM days of spring and summer are reviving the sport of soaring flight, curtailed during the war. Invasion gliders used by U.S. and British troops could go in only one direction when they were released by their towing planes. That was down. A soaring plane *climbs* without power. Sailplanes (high-performance gliders) in soaring flight have traveled as far as 465 miles cross-country and have reached altitudes over 20,000 feet.

Such performance is due to the "cleanliness" of their design—they are the world's most streamlined passenger aircraft—plus wing construction that permits them a high "gliding angle." That is, the best of them loses only one mile of altitude for every 20 miles of forward flight. Combined with this is a low "sinking speed," or the amount of altitude they will lose each second in motionless air. A good sailplane sinking speed is three feet a second.

Sailplane launching and the ideal conditions and some of the hazards of flight are graphically shown here. Soaring is not an inexpensive sport, but it is one of the most fascinating.

CUMULUS

A thermal is a warm updraft, and is indicated by a cumulus cloud. Warm air expands, and as it does its pressure decreases. Cold air flows toward this area, forcing warm air upward. Going up, air is chilled, loses some moisture, and cumulus cloud is formed.

Towing is best launching method. Sailplane releases when tow plane is lifted by a thermal.

Drum, or winch, launching zips a sailplane about 1,000 feet before the cutoff. Then plane steers toward a slope to take advantage of upward-moving air caused by wind striking ridge.

SOARING SITE AT FOOT OF RIDGE

START

RELEASE

WINCH

WIND DIRECTION

Weather-wise pilot finds strong upcurrents in a "cold front." Rising warm air holds plane up.

Soaring conditions are good over water. Water-warmed ascending air provides ample "lift" for gliders.

Here, obstructions cause the normal slope wind to become turbulent. This gives pilot less lift, rough ride.

COLD AIR

COLD AIR

WARM WATER

CATCHING the WIND on a DIAL

**Inexpensive Instrument
To Serve Small Airport**

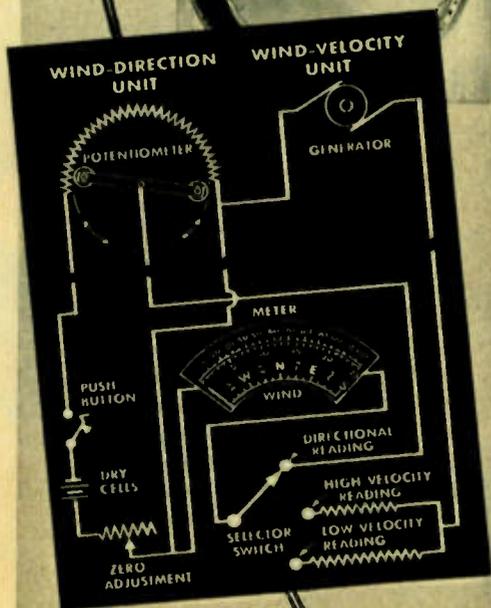
THANKS to a young Yankee inventor, the average weather enthusiast will soon be able to tell how hard the wind is blowing and from what direction without stirring from his comfortable chair by the fire. John A. Hastings, of Bass River, Mass., has devised an inexpensive anemometer-weather vane that uses simple electrical circuits to transmit information about the wind from the roof to a dial anywhere in the house.

The Weather Bureau's intricate wind-measuring instruments cost up to \$1,200 apiece. Hastings' apparatus, accurate enough for airports and yacht clubs, will cost \$100 or less.

On his invention, the whirling arms of the anemometer are tipped with curved blades instead of the usual hollow hemispheres. The arms drive a compact generator inside the body of the vane, and the generator's output, an accurate indication of wind speed, is measured by a voltmeter connected to the generator. To cut costs, Hastings uses one voltmeter, calibrated in miles per hour and points of the compass, to measure both wind velocity and direction.

Recording the wind's direction on the dial is harder to do, but Hastings found a relatively simple way to accomplish this. As the vane swings, its shaft turns a gear below. This gear meshes in a 1:2 ratio with another, which moves the revolving arm of a potentiometer—one degree for every two degrees that the wind veers. The potentiometer is in series with a couple of dry cells and the voltmeter. As the arm moves it varies the resistance in the circuit and causes the voltmeter to record a variation in voltage drop—actually, a change in the wind's direction.

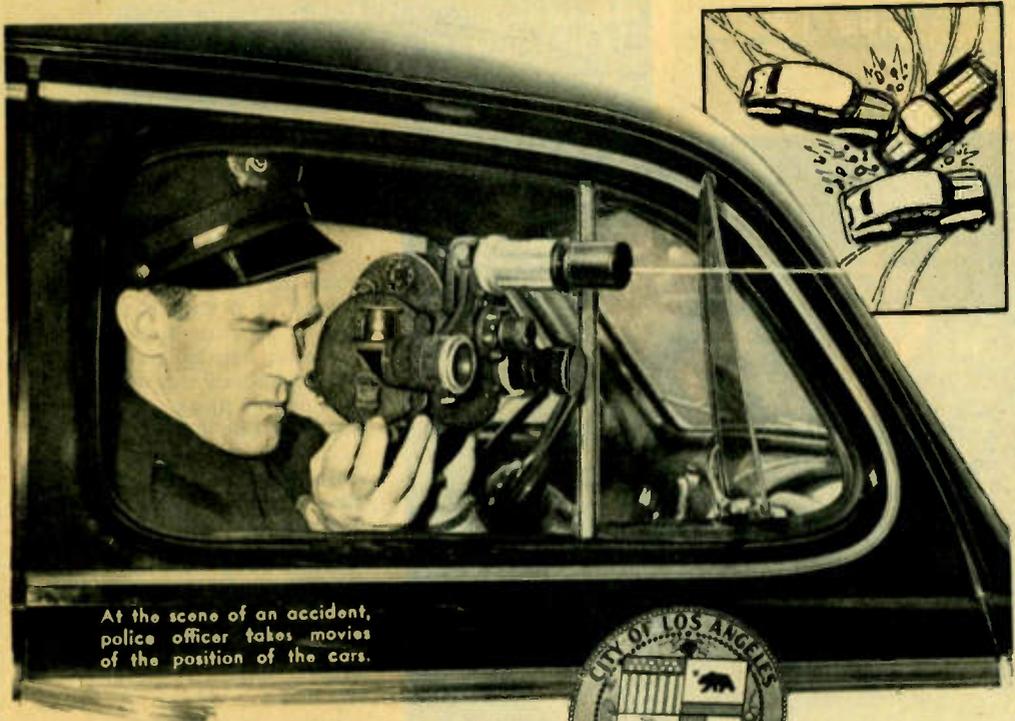
Gears at right in the base of weather vane signal wind's shifts to the potentiometer.



Hastings' potentiometer has two arms, to cope with sweeping wind changes. Both ends of the resistance unit and voltmeter scale, therefore, are South.

By pressing a button on his voltmeter, Hastings cuts it into the proper circuit to give wind speed or direction.

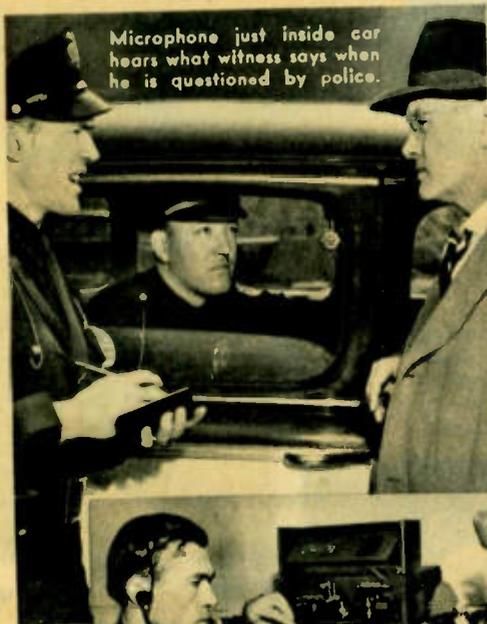




At the scene of an accident, police officer takes movies of the position of the cars.



Audible POLICE Blotter



Microphone just inside car hears what witness says when he is questioned by police.

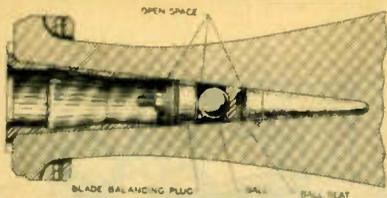
SOUND MOVIES give the Los Angeles police an additional means of recording automobile accidents. Communications equipment from B-29s is now in use in patrol cars.



Even the tone of voice is on record at headquarters.



Officer inspects the thin acetate record of a witness's evidence.



Vibration absorber was first placed in prop. butt end (left) but its present position (directly below) is more effective.

Bouncing Ball in Prop Reduces Vibration

AN EIGHT-OUNCE steel ball, bouncing up to 230 times a second in a tiny socket inside a whirling hollow-steel propeller, sets up forces that reduce by half the vibrations that engine firing action produces in the blade.

At left, Hamilton Standard's Engineering Manager, Erle Martin, points out the ball's socket to Rear Adm. H. B. Sallada, Chief of the Bureau of Aeronautics, and Rear Adm. L. C. Stevens. When the vibration absorber is installed it is covered; only a slight lump locates the ball.



Modern Trumpet for Deaf Is So Tiny That an Earring Conceals It

A HEARING AID hidden in an attractive earring is the latest device to disguise a woman's deafness. "Hearrings," as they are called by the manufacturer, Maico Co., of Chicago, naturally come in pairs, and designs are interchangeable. A transparent, almost invisible plastic tube, molded to suit the individual, carries sound from the receiver earring to the ear.

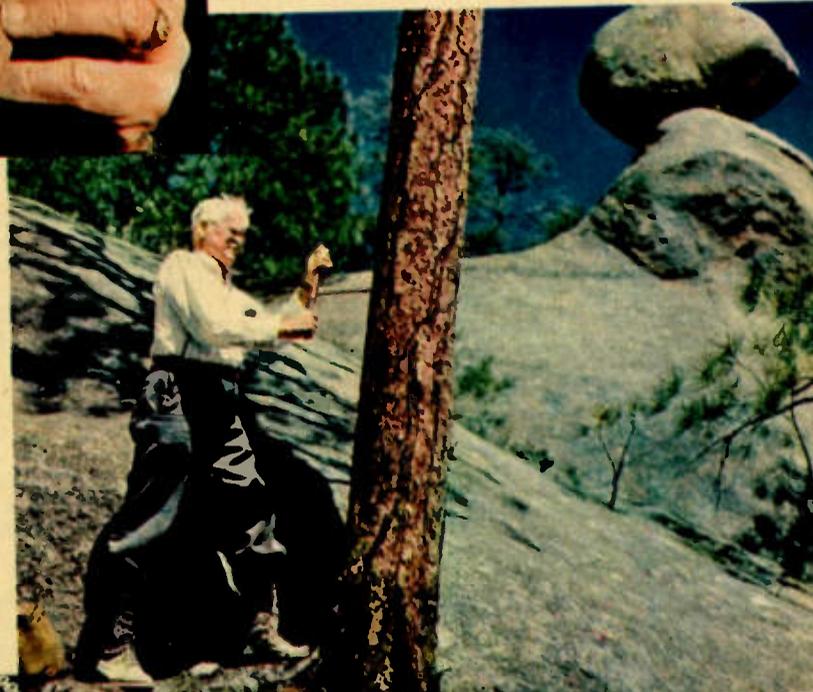
Devices to help men, especially veterans, to hear have also been receiving attention. Harvard's Psycho-Acoustic Laboratory has done basic research on an "ideal hearing aid."





Almanac in the Woods

Dr. Andrew Ellicott Douglass studies tree rings and discovers from them the trend in rainfall over periods of centuries. Thin or fat rings tell the story and furnish a basis for predictions. Here Dr. Douglass examines rings with 10-power magnifying glass.



The doctor uses a Swedish increment borer, a hollow auger for cutting out a core from a living tree to make an estimate of its age by counting the annual growth rings. This test shows development; is most valuable if used when the tree is small.

Slight differences in tree rings add up to important deductions as to rainfall and the varying growth of trees. Here is shown the use of a tree-measuring engine, a precision instrument that measures variations of 1/100 millimeter. It helps predict rainfall.



TO the many scientific yardsticks contrived in recent years to disprove Mark Twain's charge of universal concern but general neglect over the weather now is added a new barometer as old as life. Airplanes, balloons, cameras, radar and a dozen other instruments of weather data collection are joined by the tree.

Dr. Andrew Ellicott Douglass, 78-year-old astronomer and physicist who looks a bit like the author of "Huckleberry Finn," is predicting weather conditions for years ahead by studying tree rings. He is conservative in his claims for forecasting by dendrochronology (tree time), but one of his latest achievements bodes well for mankind in its unceasing struggle with drought and storm. (Continued on page 110)

Under pressure for increased World War II production, Boulder Dam's hydroelectric engineers said they could increase power output, but not without dangerously depleting the water reserves behind the dam whence comes the water that spins the power-producing machinery. Millions of people depended on that water, and there had been unusually little replenishing rainfall for 20 years.

At the Tree Ring Laboratory of the University of Arizona in Tucson arrived a station wagon, a driver, and unlimited gasoline-ration coupons. Dr. Douglass made a 10,000-mile tour of the Colorado Basin, studied tree rings, and reported:

"Twenty dry years have passed. That drought period is most unusual in the last 500 years. The drought will probably break."

Increased power output at Boulder was ordered, new machinery hummed, the war was shortened. The next year rainfall was unusually heavy!

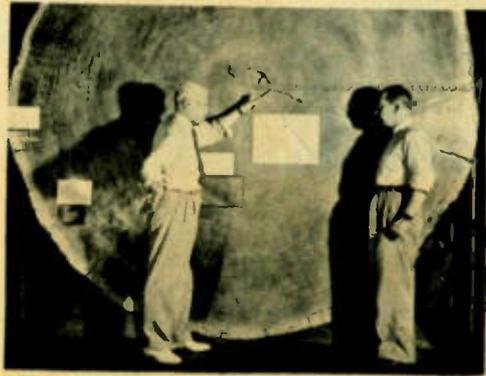
In bringing the new science toward perfection, Dr. Douglass simply makes "weather stations" out of trees. Each year a tree grows a new outer layer, called the cambium layer. This sheath is a circlet of long slender tubes that carry a tree's chief sustenance—water—upward. At the end of a year, these tubes die, are encircled with new tubes, and the cycle begins anew. A tree handicapped by a year of intense drought will produce a very thin ring; in a year of plenty the ring will be fat. Looking at the cross section, the weather during the

tree's life—two to 500 years for pine or fir—can be read. Weather records for the area will agree, year for year, with the wooden calendar. Width of an individual ring and the number of inches of rain for that year can be reduced to a mathematical proportion, and the centuries-long weather index of the tree may be read.

Dr. Douglass does not claim that this means the antics of weather can be charted exactly for years ahead. It does mean, he contends, that trends can be established. He says: "When we have available enough tree-ring weather records from all parts of the world to get an accurate picture of what the weather has been for centuries, I have great hopes that we will be able to derive from them more definite indication of what it will be for scores of years in the future."

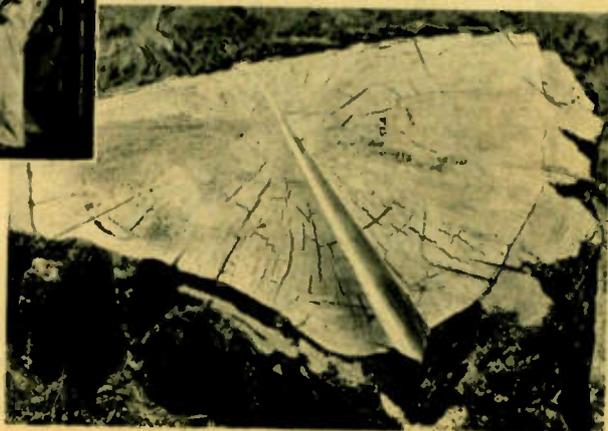
Dr. Douglass believes the enigma of future weather is linked with tree rings and solar activity. He sees in sun spots—the phenomena caused when cold masses sweep through the hot, gaseous surfaces of the sun—the cause of the earth's weather tides. These sun spots have a peculiarly rhythmic record. They last about 11 years. At the beginning, the solar twister appears with a few small spots about halfway between the sun's equator and its poles. The spots increase slowly in numbers, then rapidly, and spread widely toward the sun's equator following which they largely disappear. Then with remarkable regularity, the cycle begins again. This eerie cosmos Dr. Douglass has found to be related to the cycles of world's weather as evidence of tree-ring patterns.

Complete success of forecasting by dendrochronology would bring revolutionary benefit to man. Every branch of commerce and industry would be affected. Living would be changed, made easier and less expensive.



Dr. Douglass points out some of his findings on a section of a sequoia, and shows how they predict weather.

A chart of a century or more of weather is revealed by this cross section of a large tree, with the width of the rings as an indication of the rainfall absorbed during each year.



"Meditation on the Passion" was signed by Andreas Mantegna (as the photo below shows) but art experts believed Vittore Carpaccio actually painted it. Infra-red photography proved that they were right.



New Light on

Old Masters

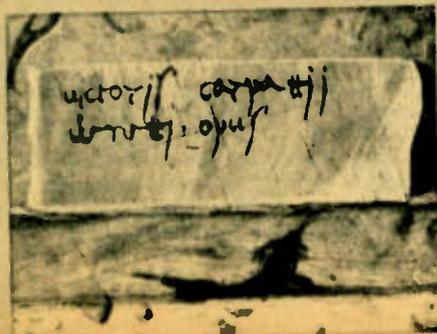
By HARTLEY E. HOWE

THANKS to science you can see the world's great paintings in the same glowing colors used by the masters who painted them centuries ago. New formulas and plastics at New York's Metropolitan Museum of Art bring old masters back to the bloom of youth and keep them that way. The microscope and X ray reveal details of how the painter worked. Chemical analysis helps date a picture accurately—and sometimes discovers a fake identification.

When a picture comes to the Museum's painting clinic, the brushwork and paint structure are first studied under the microscope. Microchemical analysis of tiny pieces of pigment or base, taken from the edges, gives further data. To learn what is beneath the surface, X-ray pictures are taken by the traversed-focus technique, providing a shadowgraph of the entire paint structure. Photographs made with less penetrating infra-red rays lay bare the secrets of the intermediate layers of paint: how the artist repainted parts of the picture. Information about the top layer of all.



The first infra-red photo vaguely but unmistakably revealed Carpaccio's signature two layers of paint below Mantegna's. After overpaint was removed, it showed up clearly (below) in a second infra-red photo.





The original, fervent colors of El Greco's "View of Toledo," painted 300 years ago, come to life where the famous canvas has been cleaned by an acetone.

the varnish, is gleaned from ultraviolet examination; fluorescent areas frequently show where the varnish has been patched.

The experts next turn their skill to preserving the painting. Old varnish is removed with special solvents and the picture is gently cleaned. Loose paint is carefully reattached. Damaged areas that mar the picture may be minimized by careful filling

in with new paint, but no attempt is made to "restore" the picture to its original condition. New backing reinforces the wooden panel or canvas. Finally the surface is given a thin, invisible, protective coating of polyvinylacetate. Sprayed on, this synthetic plastic resin remains permanently colorless and clear, unlike varnish, which darkens, becomes brittle and often shrinks.



Measuring the distance between cracks in a painting is one of the first steps in treating it at the "Met."

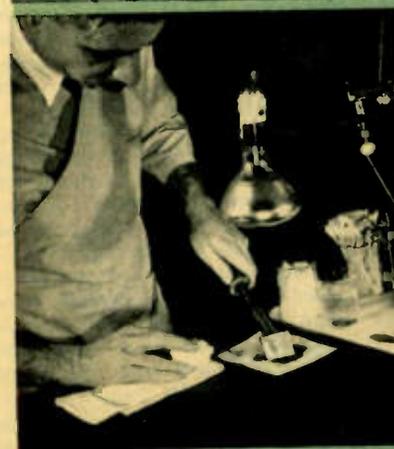
Assistant Curator Murray Pease wraps painted panel, laid face to face with X-ray film, in light-tight paper. It is done in the dark.



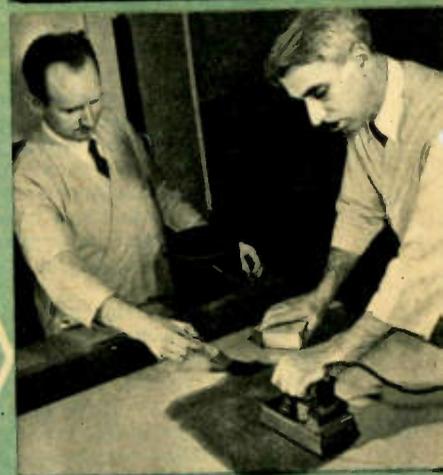
Painting and film are whirled on turntable as X ray is taken. A clearer radiograph is obtained by using this medical technique.



After varnish has been removed, Curator Pease cleans painting with a swab dipped in special detergent. Dark square is grime.



Replacing loose point. The surface is heated with an infra-red bulb and adhesive is worked down through the cracks with an iron.

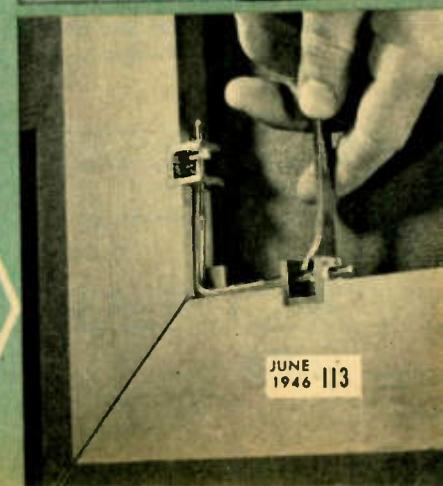


New linen is attached to back of painting by forcing a wax-resin thermoplastic (Museum formula) through to paint's underside.



On the 5- by 9-foot bed of this Museum press, jacks hold the painting flat while its relining adhesive sets.

Painting is remounted on a stretcher frame, specially constructed. Threaded bolt devices at the corners provide just the right tension.



COLOR PRINTS *from your*

NEW discoveries in color printing have now brought that phase of photography well within the scope of the home darkroom. Contact color prints can now be made with no special equipment, and enlargements are possible with an ordinary condenser or diffusion-type enlarger. The entire process requires but an hour and a half, only the first 15 minutes of which need be spent in darkness or with a green safelight.

Essentially the simplification in color printing is due to a new printing paper—Anso Color Printon. With it the amateur can print in much the same way he does in black and white. It eliminates many of the tedious steps of older processes, such as the making of three separate negatives, the preparation of three positive images in color from them, and the transferring of the color images to paper.

No one should assume, however, that all he need do is to obtain a supply of this new material and retire into a darkroom with his chemicals and the first color transparency that comes to hand. Just as in black-and-white work, knowledge and experience must be gained before really good prints will result. The amateur must first learn the few fundamentals of the new process and how to recognize the type of color transparency most suitable for color pictures.

Anso Color Printon consists of three light-sensitive emulsion layers coated upon a single flexible white opaque base. When it is exposed by light passing through the color-film transparency, blue light registers in the top emulsion, green light in the center emulsion, and red light in the bottom emulsion nearest the opaque base.

Each emulsion layer contains chemicals that form dye images during processing. After the processing, each layer contains a dye image of a color complementary to that of the light by which it was exposed. That is, the top layer contains a yellow dye image, complementary to blue; the center layer a magenta image, complementary to green; and the bottom layer a cyan, or blue-green, image, complementary to red. These complementary dye images filter light reflected from the white base, and the picture is seen in natural color closely approximating that of the original subject.

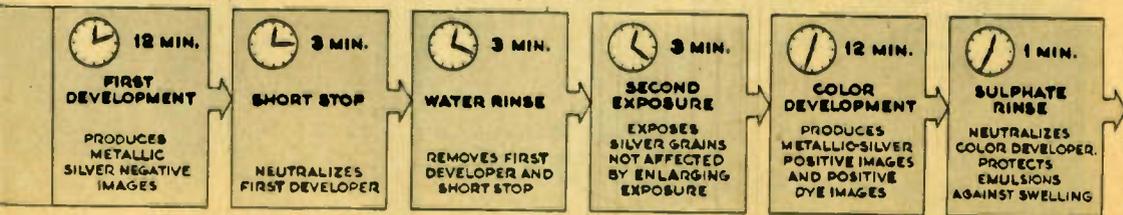
Developing is by reversal, a method comparable to that of processing home-movie films. All the steps in the developing procedure and the time required for each are shown in the drawings below and on the facing page. Processing may be done in trays or on individual sheet-film hangers suspended in tanks of any convenient size. Tanks or trays of glass, bakelite, hard rubber, or enameled steel are suitable.

Since eight processing solutions are used, nine trays or tanks—eight for solutions and one for washing—provide maximum convenience. But if space or equipment is limited, processing can be carried out quite easily with only three trays.

There is little opportunity for error in processing if the steps listed in the series of drawings are followed carefully. In selecting the transparency to be printed and in exposing it, individual judgment must be exercised just as in black-and-white printing. Choose color transparencies that have been correctly exposed and processed (see PSM, Feb. '46, p. 104). Prints of top quality cannot be expected from transparencies that are dark or dense from



A No. 212 enlarger lamp 2' away gives the second exposure. Examine print through filters to find which to use.



own enlarger

By
KENNETH S. JOHNSON

underexposure or weak and washed out from overexposure. Avoid also transparencies having excessive contrast. Deep shadows and clear areas lacking in detail are more objectionable in a print viewed by reflected light than a transparency viewed by transmitted light.

Amateurs familiar with color photography know that color films are balanced in manufacture to give suitable color reproduction when exposed in light of a definite color quality. If the film is exposed under other lighting conditions, it is necessary to use filters to achieve correct color balance in the transparency. A comparable principle applies in exposing Printon either by contact or in the enlarger. The basic light must be of the approximately correct quality for transparencies of normal color balance, and it is adjusted to individual conditions by means of filters.

Standard for Printon are a No. 212 General Electric photoenlarger lamp, a sheet of heat-absorbing glass, and an ultraviolet-absorbing filter. The heat-absorbing glass protects the transparency from damage from heat of the lamp, and the filter absorbs unwanted ultraviolet rays. A standard lamp may be installed permanently in the enlarger since it is suitable for both color and black-and-white printing.

AnSCO color-compensating filters may be used for making any necessary adjustment in the color quality of the standard enlarger light. A complete set contains three yellow gelatin-filter foils (Nos. 23, 24, and 25), four magenta (Nos. 33, 34, 35, and 36), and three cyan (Nos. 43, 44, and 45).

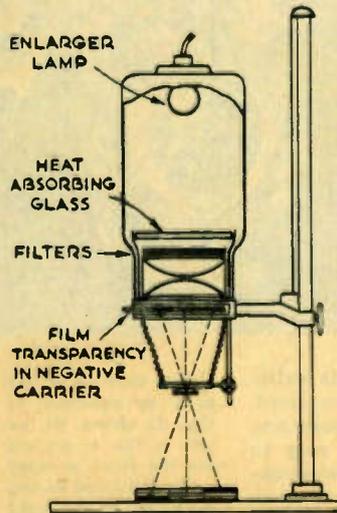
The first step is to balance the color quality of the light. Once this is done, no further experiments should be necessary as long as transparencies of normal color balance are used.

Select a good transparency of normal color balance for a test and place it in the negative carrier with its base, or shiny side, toward the enlarger lamp. Adjust the enlarger until a sharp image of the desired size appears on the easel. Then make a test strip or print exactly as is done in black-and-white printing, using one of the extra sheets of Printon provided in each package for this purpose. Each succeeding section should be given an exposure twice that of the preceding section. The speed of Printon is slightly less than that of fast enlarging papers.

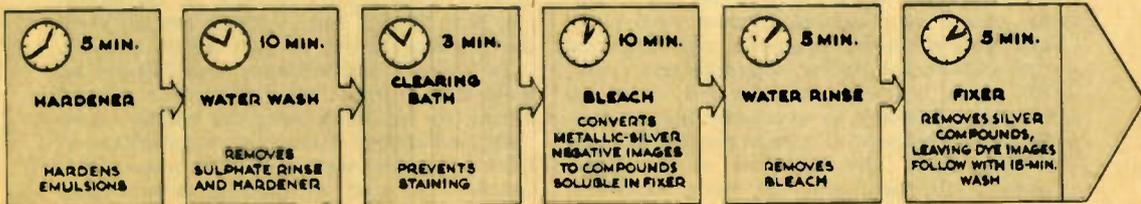
If you have a photometer of the grease-spot type, it can be used to estimate exposure of a test print by reading an important highlight area of the transparency such as the flesh tones of the face in a portrait subject. The paper speed number to be used will depend, of course, upon equipment, processing methods, and the photometer used. Either test strips or test prints serve as a future guide to both exposure and color balance.

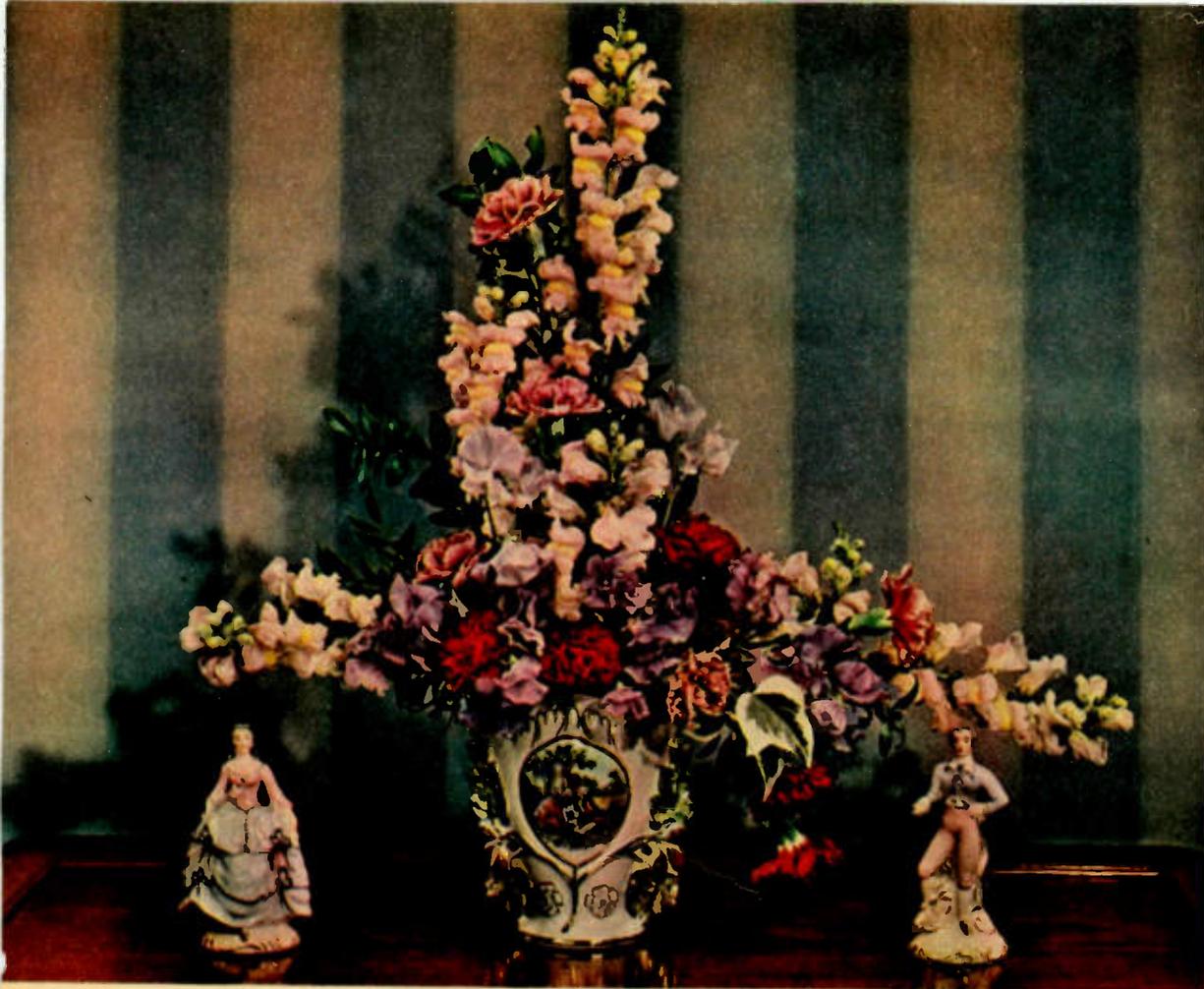
The proper exposure is easily determined by examining the over-all density of the test piece. An area showing satisfactory density, regardless of color quality, has received correct exposure, and the time used for the test can be used for the final print unless filters are added.

Any necessary change in color quality of the light will be indicated by the correctly exposed



Here is the setup for the enlarger in making color prints. Light passing through the transparency acts on just the one proper emulsion layer in the three-layer material. A glass stops heat, and filters correct color.



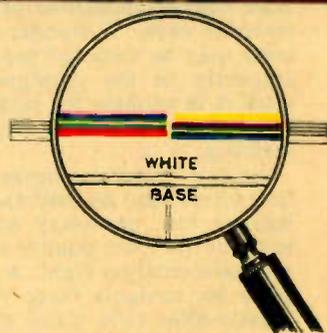


section of the test. If color is satisfactory, nothing further is required, but if there is an over-all coloration, a filter will be needed. One way to determine which to use is by examining the area through the various filters in your kit. The one or combination that gives correct color quality should then be added to the optical system of the enlarger.

As a guide in selecting filters, the general rule is to use one that supplies the color lacking in the print. For instance, a print having an over-all bluish cast is lacking in yellow, the color complementary to blue, and a yellow filter of the proper degree should be used. For an excess of magenta, correct with cyan and yellow filters; for cyan, use magenta and yellow; for yellow, magenta and cyan; for green, magenta; and for red, cyan. It is also necessary to overcome inequalities in color balance of abnormal transparencies.

Each filter absorbs some of the light passing through, and the basic exposure must be increased when filters are added.

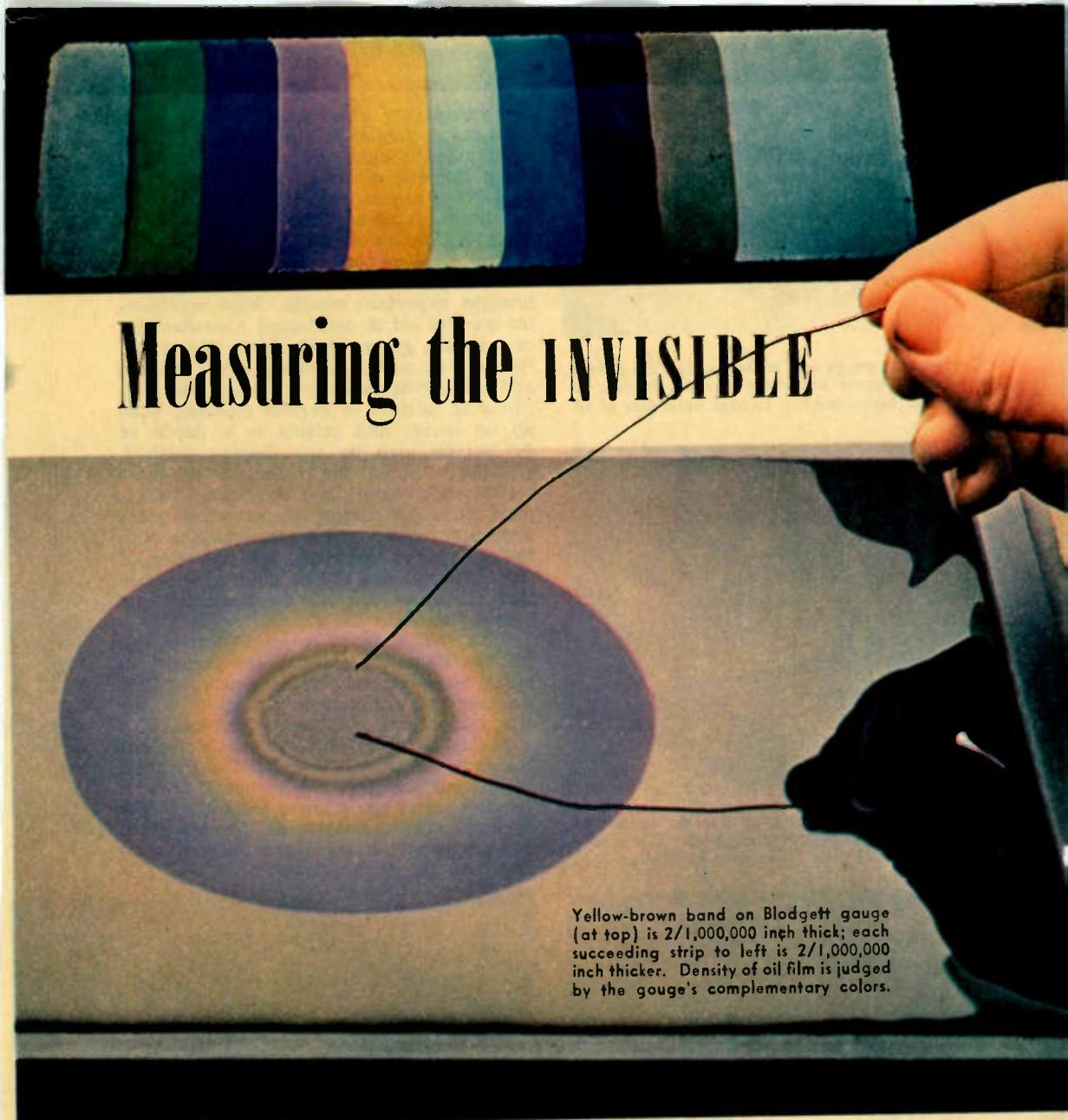
Colors show up in the print as naturally as they do above. At the left in the drawing are the three primary colors recorded during exposure; at the right are the dye images of the three subtractive primary colors formed by processing. The base reflects light.



Filters with numbers ending in 3 call for a 15-percent increase, those with 4 for a 30-percent increase, and those in 5 for one of approximately 60 percent. If, for example, Nos. 23, 34, and 45 filters are all used, the exposure must be just about doubled.

In general, any ordinary negative-drying method is suitable for color prints. Rapid drying by fan helps keep the whites clean.

Dry-mounting tissue is unsatisfactory. Rubber cement works well on plain salon boards. On mat mounts or cutout desk folders, the upper corners are taped.

A hand is shown holding a thin wire that is positioned over a circular oil film on a surface of water. The oil film exhibits concentric, iridescent color bands. Above the water, a horizontal strip of a color gauge is visible, consisting of several vertical bands of different colors: teal, green, dark blue, purple, yellow, light blue, and dark blue. The title 'Measuring the INVISIBLE' is printed in a large, bold, serif font across the top of the image.

Measuring the INVISIBLE

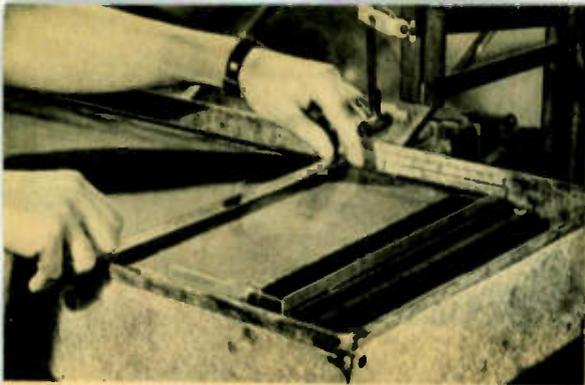
Yellow-brown band on Blodgett gauge (at top) is $2/1,000,000$ inch thick; each succeeding strip to left is $2/1,000,000$ inch thicker. Density of oil film is judged by the gauge's complementary colors.

Color gauge that had scientists stumped for centuries determines thicknesses of $1/250,000,000$ inch.

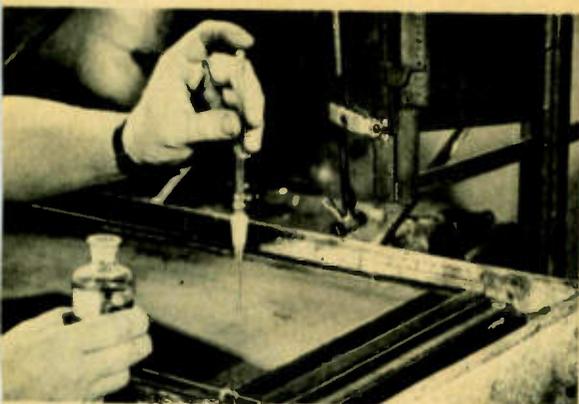
FOR centuries scientists have known that the colors of thin transparent films had nothing to do with pigment, but were due to an optical effect directly related to the thickness of the film. But it was only recently that a practical gauge, making use of this trick of light, was devised. Using

the same principle, gauges that suit special requirements can be made that would indicate a thickness of $1/250,000,000$ inch!

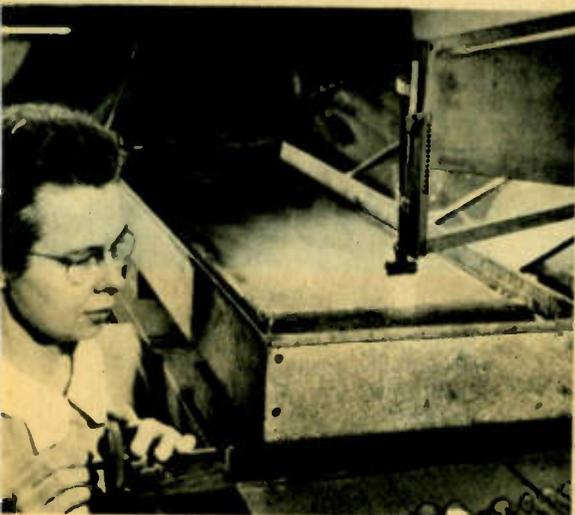
While investigating the behavior of oil films so thin that they were absolutely invisible, Dr. Katherine B. Blodgett of General Electric placed a drop of stearic acid on the surface of a trough of water containing calcium carbonate. By reaction with the calcium, it quickly became an ultramicroscopic layer of calcium stearate. Then she found she could build up successive layers of the film on a glass slide and



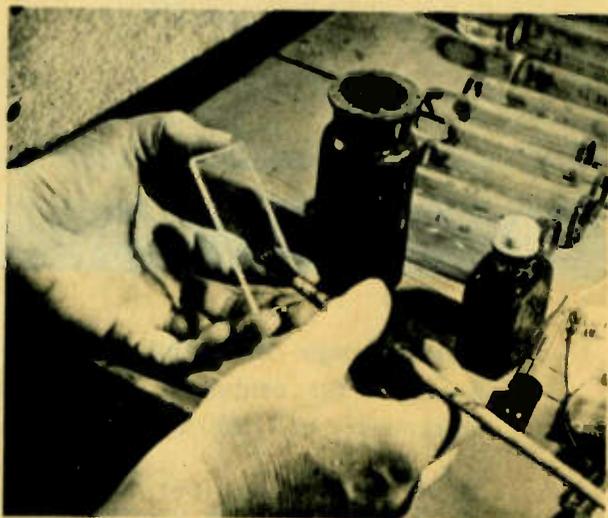
Coatings for gauge are "picked up" off the surface of distilled water containing calcium, barium, or cadmium. Metal rod first scrapes water free of oil.



Drop of stearic acid spreads over the surface to form a film $1/10,000,000$ inch thick. Chemically clean glass slide then is clamped to dipping arm.



Slide goes down and is pulled out 10 times, taking on coating $2/1,000,000$ inch thick. With adjustments and more dippings, nine color bands are made.



Looking colorless and transparent, slide is coated on one side with black paint. Held to white light at 45-degree angle, it is an exact thickness gauge.

that 21 layers reflected a yellow-brown color, 41 showed a dark purplish-blue, 61 a brilliant light blue, and so on. With each layer, the film showed a visible change in hue. Now, anyone who wishes to measure the thickness of any film within its range needs merely to compare the color of his film with the nine color steps on the gauge.

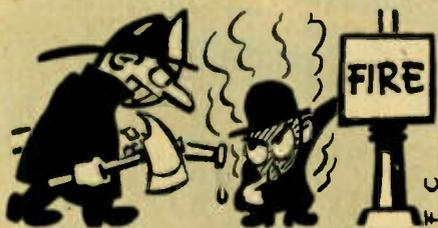
Already, research with this gauge has brought important results. Most spectacular was its aid in developing nonreflecting, or invisible, glass, which made clearer the "seeing" of aerial cameras, range finders, and submarine periscopes during the war. Films of calcium or barium stearate, built up on lenses and prisms to a depth of $4/1,000,000$ inch by the dipping method, effectively killed the reflection of most visible light from their surfaces. Today, most films for coating nonreflecting glass are made by vaporizing some fluoride onto the surface of the glass, but the color of the coating, when it has attained the correct thickness, can still be determined by comparison with the gauge.

With this instrument, metallurgists can tell the thickness of an oxide coating on many metals merely by comparing colors. Another use has been in the study of the size and nature of different proteins.

The colors of oil films on water are not the same as those shown by the Blodgett gauge, but are their complements. This is because water has a lower refractive index than the oil film floating on it, while glass (of the gauge) has a higher refractive index than the films adhered to it.

IT'D LIKE TO SEE THEM MAKE...

Everybody has his own pet idea of some gadget he would like to see in general use. What is YOURS? Popular Science Monthly will pay five dollars for every such suggestion published.

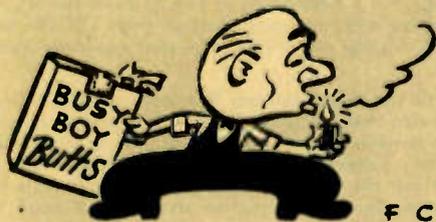


False-alarm Deterrent. When you pulled the lever in a fire-alarm box, a mechanism would hold your hand there until the engines arrived. Then you would direct firemen to the blaze. The idea comes from Alvin Teitelbaum of Brooklyn, N. Y.

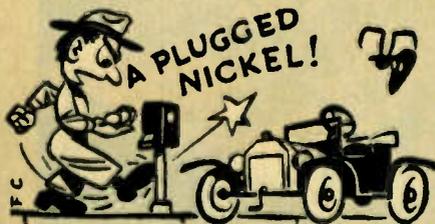
Soft-spoken Rouser Clock. A gentle phonographic attachment that would waken a sound sleeper without jolting him suddenly. Harvey Ackerman, of Brooklyn, N. Y., would like to see them make it.



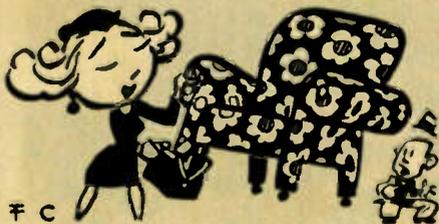
Money Changer for Parking. Embarrassment of having no nickel for parking meter would thus be saved, thinks Willie Muessig, of Aurora, Ore.

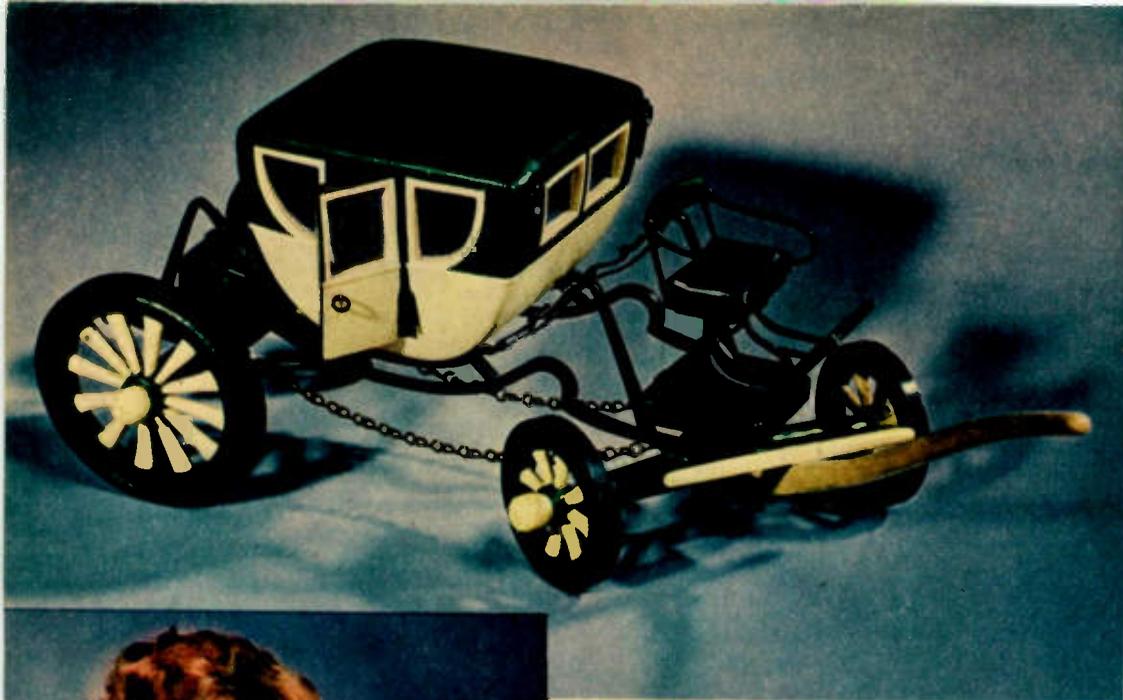


Economy-size Cigarette. Half standard length for the convenience of the addict who has leisure for only a couple of drags at a time. A. Armstrong, Missoula, Mont., is the originator of the plan.



First Aid to Aching Feet. A folding stool or chair that could be carried in one's pocket or handbag. It should be capable of quick and easy assembly for use by those who have to wait in theater queues, nylon lines, or other places where there are long delays and seating accommodations are not provided. The chair should be made of some lightweight material that will stand up under the average person's weight. The suggestion was made by Miss Ocala D. Hales, of Raleigh, N. C.





Three Projects of the Month for Craftwork Hobbyists

George Washington rode here—or did he? The histories don't agree on whether the coach at Mount Vernon is an exact duplicate of the First President's, but it was the model from which this mantel-size one was designed. Drawings and a description of how to build the 5½" by 10" mantelpiece coach are given on page 176. The body is wood, fittings are metal, and seat coverings velvet.

Aromatic red cedar and tea tiles are combined to make the serving tray shown at left. The tiles are set in routed recesses and are useful as well as ornamental, since they permit the carrying of hot teapots and the like without marring the wood. End compartments hold glasses or silver. Construction steps are on page 163.

Something different in chessmen was the idea behind the designing of this set. All pieces are made entirely in the lathe, being turned from 1" hardwood doweling, as described on page 174. The base coat of enamel is also put on in the lathe with the spindle rotating slowly.



GAS TURBINE for AUTOS

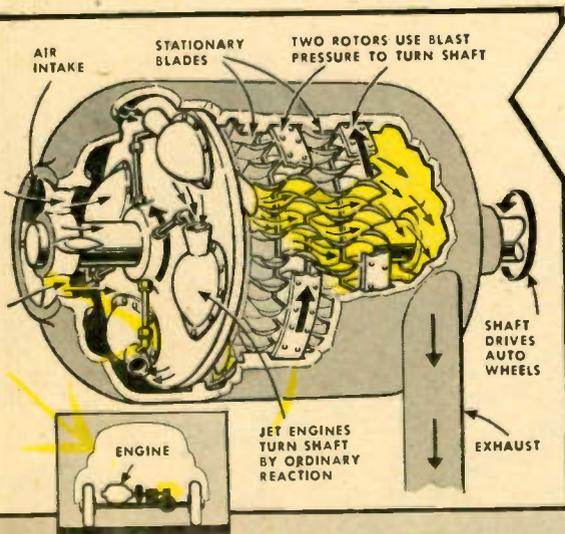
A GAS turbine not much larger than the bulge in the rear-axle housing of present cars may be the auto engine of the future. A simplified jet designed by Robert Kafka and Robert Engerstein, of Carney Associates, New York engineering firm, has made this possible. They estimate that a compact 100-horsepower turbine can be built to deliver 40 miles to the gallon from low-grade gasoline or kerosene.

Their turbine has two main parts—the jet units and the turbine wheels. Each jet has two combustion chambers, which alternate in firing at 30 or more pulses per second.

Four jet units are mounted around a wheel in the gas turbine. In operation they have a pinwheel effect on this wheel. Pressure from the expanding jet gases drives the turbine

blades. About half the power from the gas turbines used in aircraft today goes to drive a supercharger, but no such drain on power is necessary in this engine. Eliminating the supercharger also allows the turbine to be throttled. A simple carburetor regulates the fuel-air mixture.

Several other conventional automotive units are used with the turbine. A cranking motor spins it over for starting and a spark plug furnishes the ignition needed for that purpose. Clutch and transmission give closer control over engine speeds. But the gas turbine is simpler than present auto engines. When further refinements are made, advocates believe that car manufacturers seeking simplicity in engines may find gas turbines their most practical answer.

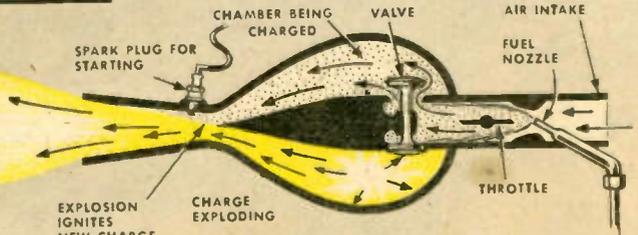


Gas turbine for an auto would look like this. Four jet units, similar to model below, are mounted around wheel. Nozzles go through wheel and exhaust against turbine blades.

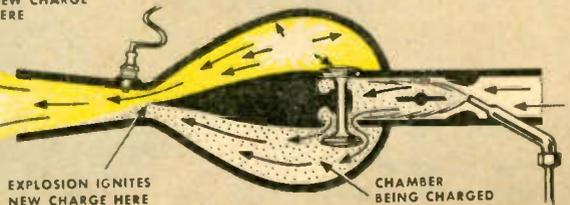


First working model of the gas-turbine nozzle looks like an automobile horn with puffed cheeks.

Firing one chamber blasts the valve shut, sends burning gases out the nozzle. As they pass the opening in the other chamber, they exhaust it, draw in fresh fuel.

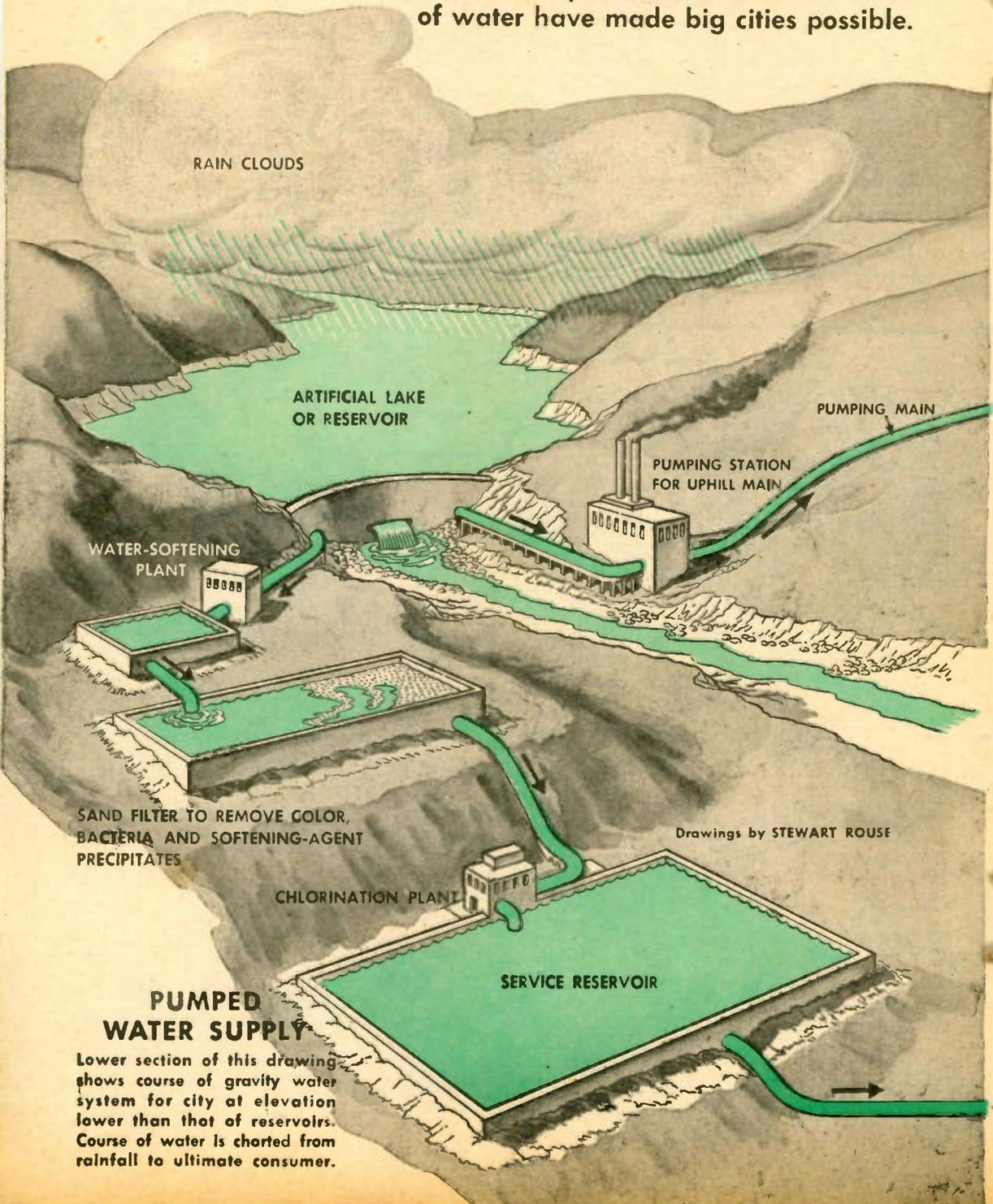


Fresh fuel continues to fill that chamber until flame in the nozzle ignites it, blasting back into the chamber, shutting the valve, and repeating the firing sequence.



clouds to faucets

The control, purification and distribution of water have made big cities possible.



RAIN CLOUDS

ARTIFICIAL LAKE
OR RESERVOIR

PUMPING MAIN

PUMPING STATION
FOR UPHILL MAIN

WATER-SOFTENING
PLANT

SAND FILTER TO REMOVE COLOR,
BACTERIA AND SOFTENING-AGENT
PRECIPITATES

Drawings by STEWART ROUSE

CHLORINATION PLANT

SERVICE RESERVOIR

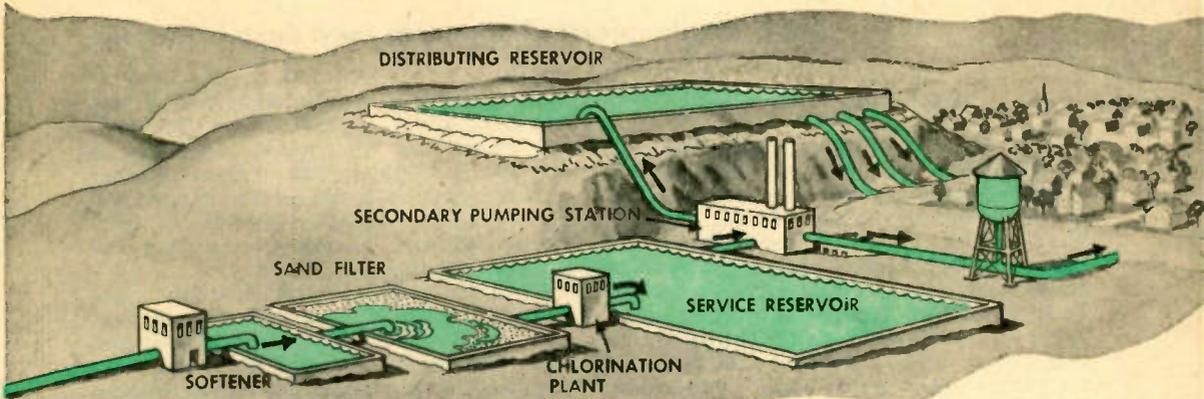
PUMPED WATER SUPPLY

Lower section of this drawing shows course of gravity water system for city at elevation lower than that of reservoirs. Course of water is charted from rainfall to ultimate consumer.

THIRSTY people merely draw a glass of water from any convenient faucet. That is why we take water for granted.

But the water-purification techniques that have made it possible for our biggest cities to exist were developed comparatively recently. Water that could not have been considered for human consumption 15 or 20 years ago is now made safe. Two of the several standard systems of water supply are illustrated here from source to faucet.

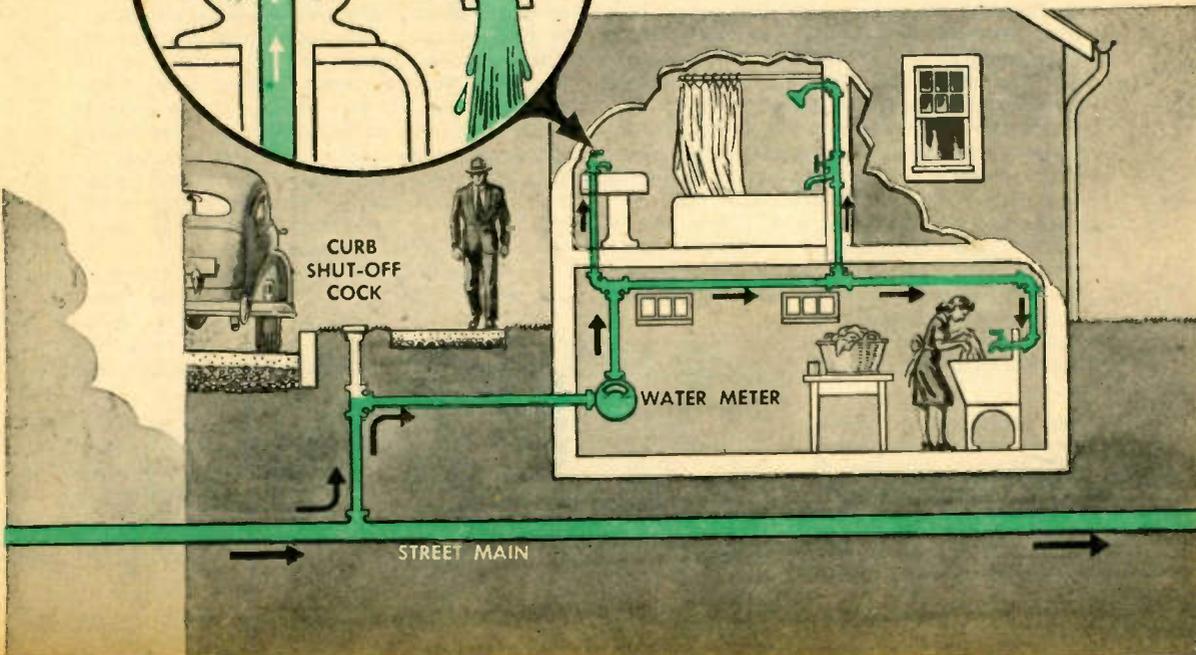
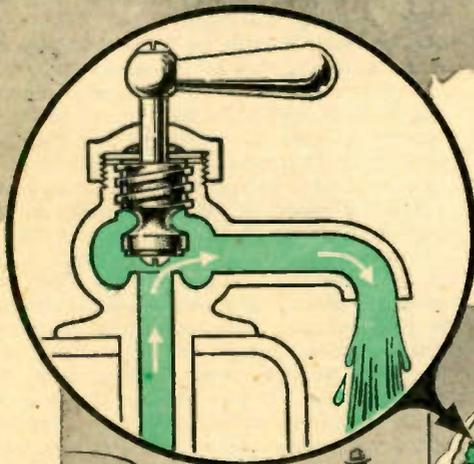
Water-supply engineers have many problems to solve, but their objective is always to furnish an adequate amount of water that is clear, free of water-borne disease or chemical poisons, reasonably soft, of good taste and without properties injurious to metals used. Engineers must also provide devices to prevent interruption of service and to take care of such emergencies as fire. This often means duplicating mains, basins and pumping machinery.



GRAVITY WATER SUPPLY

When the town is higher than the original reservoir as shown on left page, water must be carried uphill by pumping stations, but the processes of softening, filtering and chlorination remain the same.

Community distribution system is identical for both gravity and pumped water supply. Drawings on these pages are simplified diagrams of how city water finally reaches the householder.



Superfuels *waiting for* TOMORROW'S CARS

But a simple, practical engine to burn them is lacking.

By GOLD V. SANDERS

THE motorist today is octane-conscious. He knows how his motor knocked and struggled when gasoline was reduced a few points on the octane scale during the war, and he noted with joy and relief how the old motor lost its ping-ping and perked up when those mysterious octane qualities were put back in his fuel. He has heard a lot about power-packed fuels created by the petroleum industry to boost the speed and range of warplanes. How about some of this 100-octane and better gasoline for his car?

Superfuels are ready and waiting. They could greatly increase the motorist's mileage per gallon and step up his car's power. All he needs is a reasonably cheap motor that can assimilate this rich new kind of gasoline and extract its power vitamins from it.

As built now, automobile motors generally get no more power from 100-octane than from 80-octane. Even if motors capable of digesting these superfuels were built tomorrow, the petroleum chemists would still be ahead of the automotive designers. They have gone far beyond the hundred mark in concocting new fuel blends and have had to invent a new scale of measurement because they ran clear off the octane scale.

But the difference between a modern airplane engine and the conventional power plant under the hood of a car is immense. Engineers who comprehend this difference shake their heads when asked how long it will take auto designers to catch up with the fuel available for their use. Some engineers doubt whether it ever will be accomplished.

An automobile motor is built to a budget and to operate on a budget; war-

How octane rating is determined: iso-octane represents 100; heptane represents 0. A motor fuel with an octane

planes were built almost regardless of cost to get the utmost in performance. The roaring giants that ate up the superfuels in bombers and fighters cost at least 10 times as much per horsepower as auto engines and had to be overhauled every 700 to 1,000 hours. Motorists cannot spend money like a nation fighting for its life.

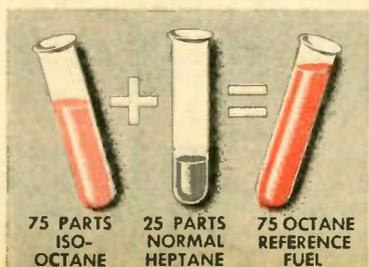
To take advantage of higher-octane gasoline, auto engines must have higher compression ratios, or have the fuel blasted into them by powerful superchargers. The compression ratios of some automobile engines already are as high as those of the most powerful airplane engines, but in the latter the pressure is built up to about twice that of an auto engine's by the supercharger.

Is it practical to put such superchargers in automobiles and build all parts of the motor strong enough to withstand the increased pressure? That remains to be seen. A really efficient supercharger turns at seven to nine times the speed of the crankshaft, must be built to high precision, and costs a lot.

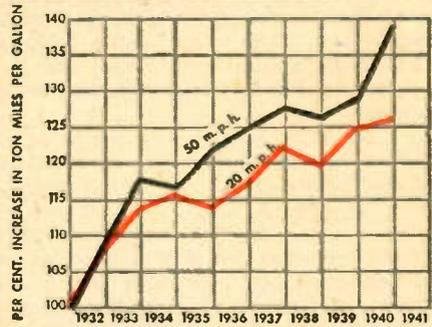
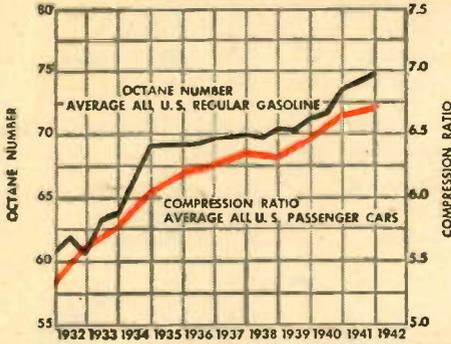
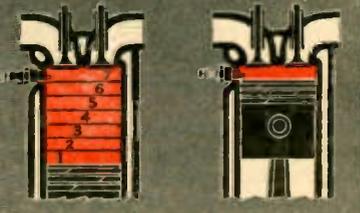
The motorist may have to wait a long while to use 100-octane gasoline, but he is already benefiting from wartime advances in fuel refining. Regular-grade gasoline in filling-station pumps all over the country averages 76.7 in octane rating now. This average was 75 just before the war and dropped to 70 during the war. Premium grade now averages 82.3; before the war it was 78 to 80 and its lowest war average was 75.8. Other important properties that give quick starting and rapid acceleration have been increased in proportion.

At war's end, the refineries were turning out more than 20,000,000 gallons of 100-octane gasoline a day. New techniques and the sacrifices in quality that

number of 75 has an anti-knock quality equal to a mixture consisting of 75% iso-octane and 25% heptane.



A compression ratio of 7 to 1 is diagrammed here. The volume of the air-gas mixture in the combustion chamber at the bottom of a piston stroke (left) is compressed to one-seventh at the top of the stroke (right).



Compression ratios of stock cars have risen as the octane number of available gasoline has climbed, and mileage per gallon has kept pace.

LARGER MANIFOLDS



WOULD PERMIT GREATER FUEL INTAKE

SUPERCHARGERS



WOULD PACK IN MORE AIR TO THE STROKE

LARGER VALVES



WOULD HELP HIGH-COMPRESSION MOTORS "BREATHE" BETTER.

HIGHER COMPRESSION



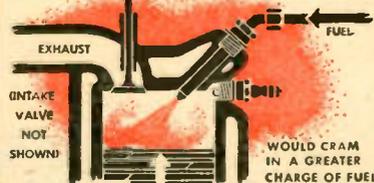
WOULD UTILIZE MORE OF THE POTENTIAL POWER OF HIGHER-OCTANE GASOLINE

OIL-COOLING RADIATORS



MAY BE NEEDED BECAUSE OF HIGHER TEMPERATURES

FUEL INJECTION



WOULD CRAM IN A GREATER CHARGE OF FUEL

MOTORS MUST BE REDESIGNED in one or more of the ways outlined above, before motorists can enjoy the benefits of higher-octane fuels.

were endured by civilians made this possible. Aviation now cannot use more than a tenth of this potential production, however, so the components are going into richer blends for auto engines.

Automotive and petroleum engineers say that the present grades of gas are more than good enough for today's motors. Only a few can get full advantage out of 80-octane or above. Many get as much power and mileage out of the regular grade as from premium grades. You might obtain some 100-octane gas from an air line or a refinery and put it in your car, but the result would probably disappoint you.

Octane rating means only one thing: the ability of a fuel to stand pressure and heat without detonating. The great gains in power that both planes and automobiles achieved during the past decade came almost entirely from the creation of gasoline with less tendency to knock, plus motors with higher compression, in which to burn it efficiently.

High-octane gasoline is no more "explosive" than any other, no more dangerous, has no more thermal units in it. Its octane rating does not give easier starting; that comes from other ingredients.

Tetraethyl lead is still the most effective ingredient for stepping up octane rating. It is added to nearly all automotive and aircraft fuels because, within certain limits, it increases octane rating at less expense than any of the hydrocarbons, or any of the many other ingredients that have been tried. Unfortunately, there is a severe shortage of lead at the moment. Though probably temporary, it may result in lopping off some of the octane numbers that have been added to our motor fuel in recent months. Or we may have to pay somewhat more for gasoline of a given octane number until the shortage has been overcome.

The supermotor capable of using the new superfuels efficiently may be some distance away, but tomorrow's motors still may deliver more power or mileage from a gallon of new gasoline blends. The improvements of 1947 and 1948 are expected to continue a trend that began 10 years before the war.

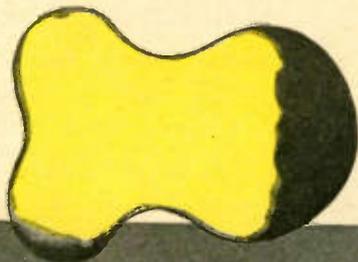
Compression ratios of stock automobile

motors rose from an average 5.3-to-1, in 1931, to 6.7-to-1 in 1942 and 1946 models of standard makes. With few exceptions, the compression ratios in 1946 models are the same as before:

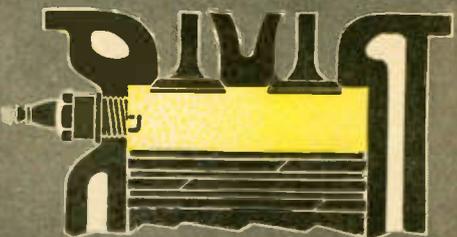
Buick 40 and 50	6.3 to 1	Nash 600	7.1
Buick 70	6.6	Nash (large)	6.8
Cadillac	7.25	Oldsmobile	6.5
Chevrolet	6.5	Packard 6	6.71
Ford	6.7	Packard 8	6.85
Lincoln	7.2	Pontiac	6.5
Mercury	6.7	Studebaker	6.5

The 1942 compression ratios in a few cars not listed above follow:

Chrysler	6.8	Plymouth	6.8
DeSoto	6.8	Hudson 6	7.25
Dodge	6.7	Hudson 8	6.50



Photograph, taken through a quartz window, of engine combustion without knock. Fuel mixture, as drawings below show, burned progressively from the spark plug outward.



Since 1931 the average octane number of regular-grade gasoline has climbed from 58 to 70. The two lines of steady progress—octane numbers and compression ratios—moved upward in a significantly parallel line across engineers' graphs, shown on page 125. This advance has resulted in greater ton-miles per gallon in the same period.

In designing for the future, all automotive experts know that so far as octane rating is concerned, they can have just about whatever they can use. Individual manufacturers are naturally keeping their own ideas under their hats, but it is reasonable to expect that compression ratios will at first take another normal step upward.

The highest ratio in stock cars now is 7.25 to 1. Engines with ratios of 8 to 1 and up to 9.4 to 1 were used, however, in a recent series of tests conducted by the Ethyl Cor-

poration. New blends of gasoline, never tried in an auto motor before, were furnished for these road tests by 11 large oil companies. The octane numbers or other properties of the fuels were not disclosed, but engineers know that for such compression ratios motors must have gasoline of near 100-octane or they will knock themselves to pieces.

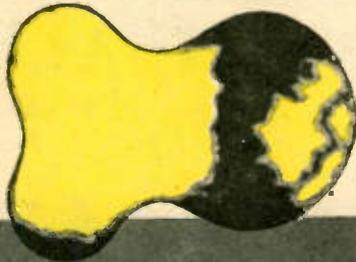
Even with the required knock-suppressing fuel available, every increase of compression presents new problems. The increased heat and pressure may break piston rings, bearings and crankshafts, so motors must be made more rugged. More efficient cooling must be provided. Higher temperatures are more destructive of lubricating oil, so more heat-resistant oils must be provided. In short, a motor must be completely redesigned before it can stand the extra strains involved in extracting the full power out of a gallon of high-octane fuel.

But despite these problems, the availability of supergasolines is a challenge to automotive designers. If they find it impracticable to boost compression ratios much they may devise new kinds of superchargers, different manifolding, or valves that will enable motors to gulp down bigger charges of fuel-air mixtures.

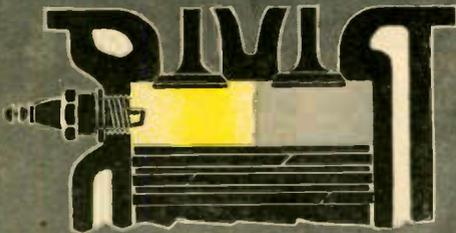
The goal for auto manufacturers to shoot at now is a motor that can realize the potential power of 100-octane gasoline. When they have that, they will have made a start toward utilizing triptane or possibly other new fuels of still more remarkable performance.

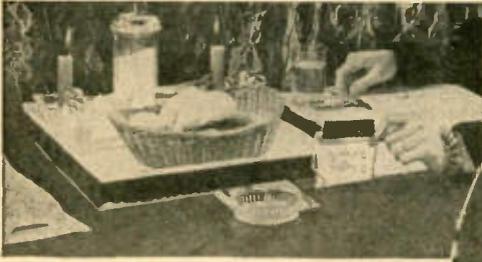
What it is possible to get out of these hydrocarbons under suitable conditions was demonstrated recently at General Motors laboratories. Using triptane with tetraethyl lead added, experimenters produced power four times as great as that of 100-octane gasolines, eight times as great as that of the 60-octane fuel we all were using 10 or 12 years ago.

This impressive feat was accomplished under highly special laboratory conditions employing every means of squeezing out the potential power. To duplicate it in a simple and practical engine is quite a different matter, but it may be done.



Photograph of an engine knock. The drawings reveal how a spontaneous explosion has taken place when normal combustion was incomplete. This wastes fuel; pressure injures motor.





A New York restaurant has substituted machinery for waiters. The diner needs only to write out the order and drop the card into a slot in the table, as above (see PSM, Apr. '40, p. 126). In a basement kitchen the food is prepared and, course by course, served through the center of the table, which operates like a dumb-waiter (right) by hand or hydraulic power, compressed air, or electricity.

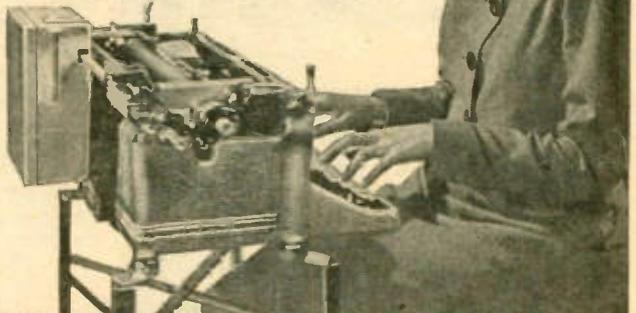
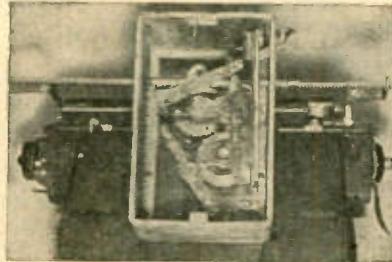


LIVING AUTOMATICALLY

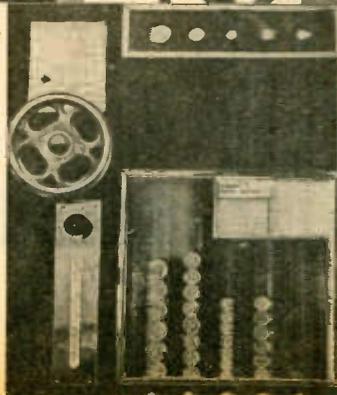
New machines ready to serve at the drop of a coin.



The Transmeter Ticket Vending Machine prints, dates, records and delivers a railroad ticket in a few seconds. The commuter merely sets dial (right) to point of destination and inserts fare. Inventor R. V. Anderson, New York, plans transmitters to sell tickets for theaters and sports events.

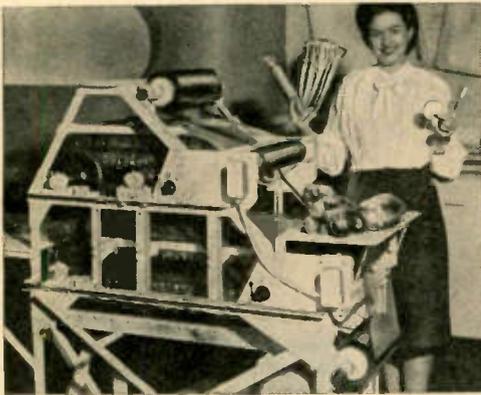


This coin-operated typewriter will be available in hotel lobbies, railroad stations, and even drug-stores. When a dime is inserted, the machine unlocks, setting a meter that measures 325 lineal inches—enough to fill a standard letterhead single-spaced and address an envelope or two. Marlyn C. Ford of Jacksonville, Fla., devised the automatic machine.



U. S. Experts Study "Viper," Nazi Come-Apart Interceptor

THE "Viper" (below), a jet-powered German interceptor, is being scrutinized by technicians of the U. S. Air Technical Service Command. Rocket-launched against Allied planes, in less than a minute it climbed to 30,000 feet, where its pilot discharged the 24 rockets, cut the nose loose, and parachuted to earth. The rear half also was parachuted down to save the engine.



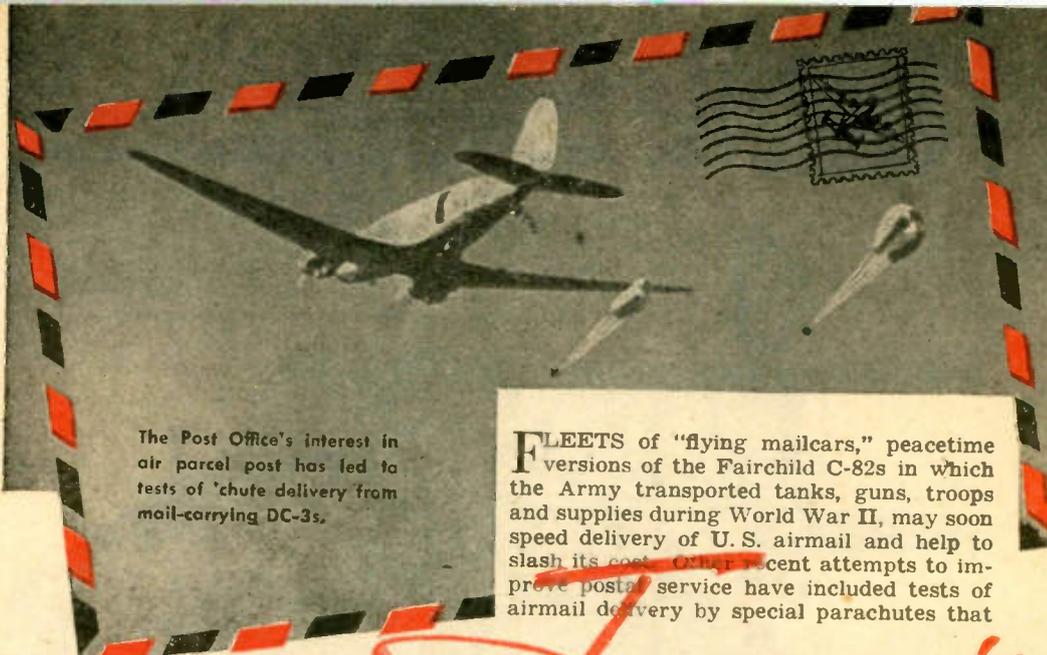
Airtight Wrapping of Variety of Goods Is Speeded Up

HIGH-SPEED, moistureproof wrapping of anything from fish to toothbrushes, from vegetables to claw hammers, from cosmetics to small machines is done by the device at the left. It wraps the objects in Pliofilm, a Goodyear product, at rates up to 20 a minute, utilizing electrically heated rollers for warming the film and sponge-rubber belts that cushion it tightly around the surfaces and force all air from within the enclosures. Food or mechanical objects packaged in this manner are safe from decay and rust up to several years.

Movies For Passengers on Long Plane Hops

FULL-LENGTH movies, newsreels, or shorts can be shown to airplane passengers by a new self-contained projection unit (right). Developed by the Air Transport Command and Army Signal Corps, the outfit also provides radio broadcasts and recorded music from sound films, a program being heard either through a loudspeaker or individual headsets. Plane movies entertained many of the war wounded who were evacuated over thousands of miles by air.





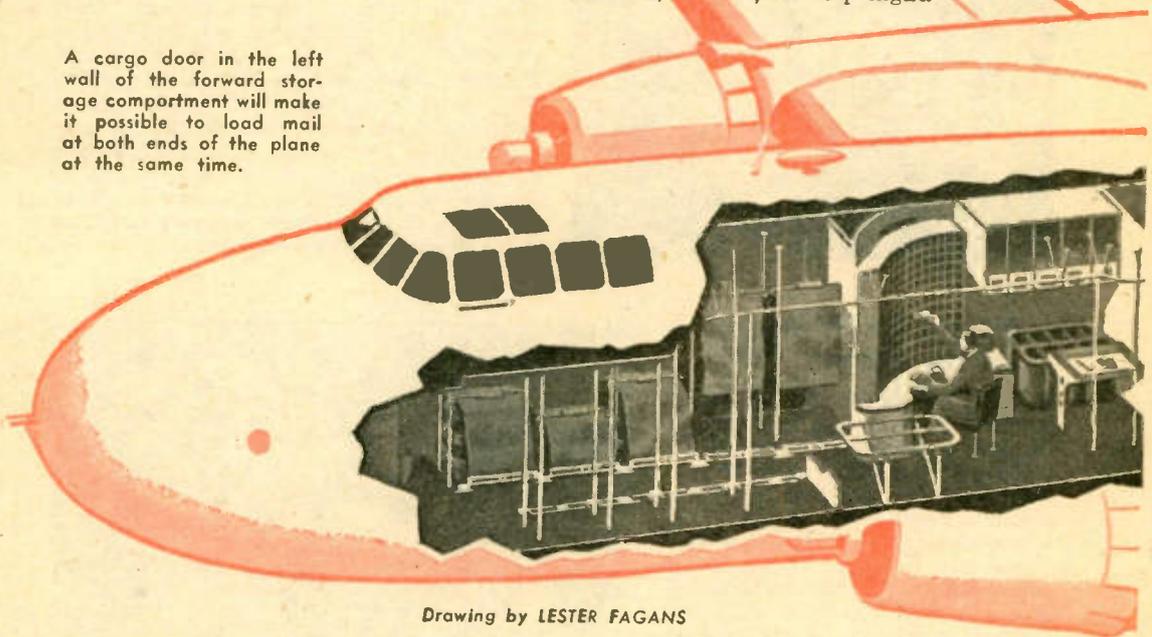
The Post Office's interest in air parcel post has led to tests of 'chute delivery from mail-carrying DC-3s.

FLEETS of "flying mailcars," peacetime versions of the Fairchild C-82s in which the Army transported tanks, guns, troops and supplies during World War II, may soon speed delivery of U. S. airmail and help to slash its cost. Other recent attempts to improve postal service have included tests of airmail delivery by special parachutes that

Tomorrow's

do not sway. Fairchild engineers have named their huge, two-engined cargo plane the Packet, and have designed light, sturdy equipment for its squared interior to permit mail to be sorted in flight. The Packet will carry seven tons of mail on short hops, six tons on 500-mile, nonstop trips, four tons on a 1,200-mile, nonstop flight.

A cargo door in the left wall of the forward storage compartment will make it possible to load mail at both ends of the plane at the same time.



Drawing by LESTER FAGANS



A shipment of silver, in the hold of an ordinary mail plane, ready for delivery from the air by wobbleless parachutes.

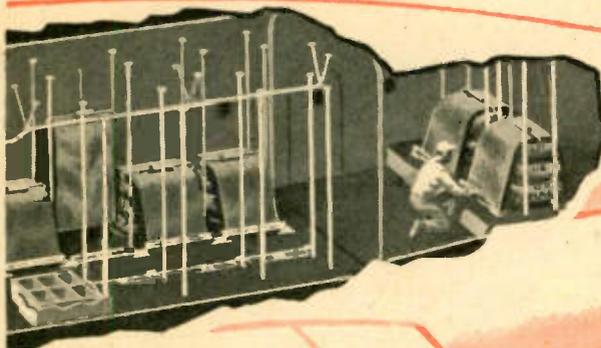


MAIL TRAINS

The huge cargo hold (right) of the Packet is 38½ ft. long, 8½ ft. wide, and 8½ ft. high, except under the pilots' cabin.



Double doors in the rear of the big Fairchild cargo plane (below) open at truckbed height, making it easier to load and unload quickly.



The "flying mailcar" is designed to be divided into three sections. In the middle of the plane, clerks will sort mail at a curved letter rack and an tables of lightweight metal and plywood. In bumpy air they can steady themselves with the aid of an overhead rail. Mailbags will be stored in forward and rear compartments, registered letters locked in drawers.



AMERICAN CAMERAS

FOR THE first time in more than four years new cameras are beginning to appear in the market. And almost without exception the best of them are "Made in America." World War II has given an impetus to a trend that began 20 years ago. No longer will photographers look abroad for the finest cameras and lenses. American manufacturers have not only equaled traditionally fine European equipment; in several ways they have surpassed it.

Fundamental to this development has been the achievement of adequate production capacity of the finest optical glass, long almost a European monopoly. At the same time, the recent invention of completely new, rare-element glass has made possible the design of lenses of higher speed and better definition than previously thought possible (PSM, Mar. '46, p. 122).

For the time being, however, the difficulties of reconversion plus consumer demand will delay any dramatic new developments in cameras themselves. Most of the familiar models will be back unchanged except for the addition of built-in flash synchronization and antireflection lens coatings. Emphasis is on reflex cameras, often combined with the increasingly popular $2\frac{1}{4} \times 2\frac{1}{4}$ size. Stereoscopic fans will find more attention being paid to their specialized type of photography.

Outstanding among the new reflexes is the new Ansco luxury model, due shortly on the market. It's a twin-lens job, takes a dozen $2\frac{1}{4} \times 2\frac{1}{4}$ negatives on 120 (B2) roll film. The taking lens is a coated $f/3.5$ Wollensak anastigmat with a focal length of 83 mm., and the cock-and-release-type shutter has speeds ranging from one-half to $1/400$ second. The set and release controls are on the sides of the lens panel, and the shutter-speed markings can be read when the camera is in operating position. Other features are an all-metal body, automatic film transport, double-exposure prevention device, and eye-level optical view finder to supplement the ground glass.

Eastman Kodak is also bringing out a small reflex camera in the same $2\frac{1}{2}$ -inch square negative size, using 620 roll film. Both viewing and taking lenses are Kodak $f/3.5$ anastigmats of 80-mm. focal length, and the taking lens is coated to minimize reflection loss. The new Flash Kodamatic Shutter provides shutter speeds ranging from $\frac{1}{2}$ to $1/200$ of a second, and can be adjusted for accurate synchronization of all flash bulbs. The focusing, as in all twin-lens

War-Born Skills Take Lead from European Products

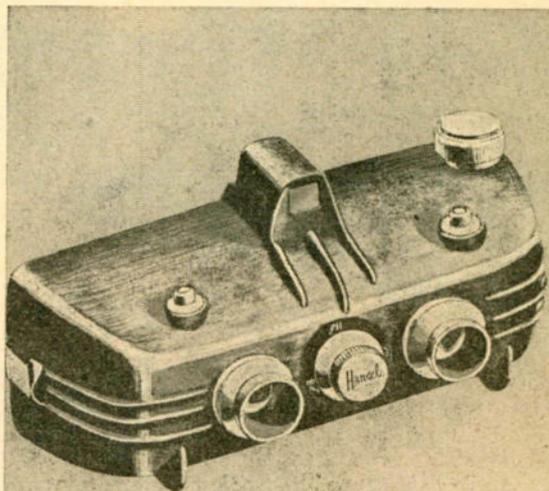
By HARTLEY E. HOWE

reflexes, is done on the ground glass, the viewing lens being geared to the taking lens: focusing range is from $3\frac{1}{2}$ feet to infinity. The camera also has a built-in depth-of-field scale, indicated compensation for focusing while using infra-red film, and die-cast aluminum body.

The Kodak Medalist II will be among the outstanding cameras. It is essentially an improved version of the original Medalist. Differences include an improved film transport system that prevents double exposure and automatically cocks the shutter. The winding knob has been raised to where it is easier to get at and can be more easily gripped. Furthermore, the body shutter release is now operative when the accessory back—used for ground-glass focusing and sheet film—is in place.

Following the current trend, the Medalist II has built-in flash synchronization and a coated lens. To speed up operation, click stops have been added to diaphragm and shutter scales, and the depth-of-field scale, which is combined with the focusing scale, has been redesigned for easier reading.

At least two American companies are now



The Haneel Tri-vision camera takes either six stereo pictures or 12 singles.

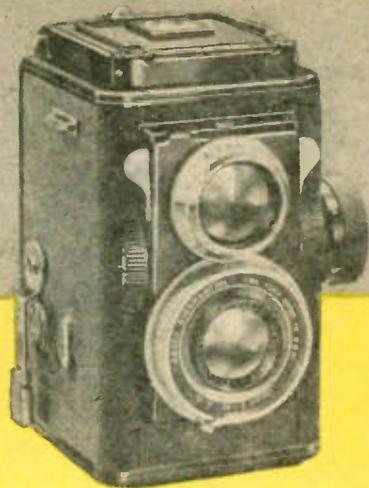
STEP OUT

taking advantage of the rising interest of amateurs in stereoscopic photography. The Stereo-Realist, built by the David White Co., has two Ilex-Paragon 35-mm. coated lenses, f/3.5, in shutters with speeds from one second to 1/200 of a second, and built-in synchronization. Camera body is all-metal construction with a hinged lens cap to cover the two lenses. Companion viewer has achromatic lenses and self-contained illumination.

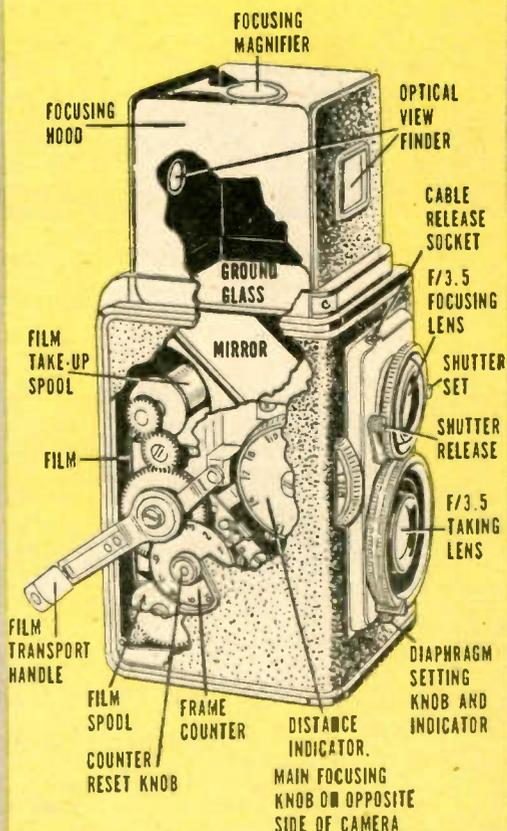
The Haneel Tri-vision Camera and viewer are less expensive. The camera has three diaphragm openings: f/8, f/11, f/16, with a shutter speed of 1/80 of a second. The two lenses are color-corrected and coated to prevent reflection. The camera uses 828 roll film on which it makes six stereo pairs. By capping one lens, 12 single negatives can be made on the same amount of film.

The Fairchild Camera and Instrument Company, specialist in aerial cameras, has also entered the hand-camera field. Although designs are still in the formative stage, the company has decided to begin early manufacture of at least three different types: a reflex, a range-finder type, and a third camera still in design process.

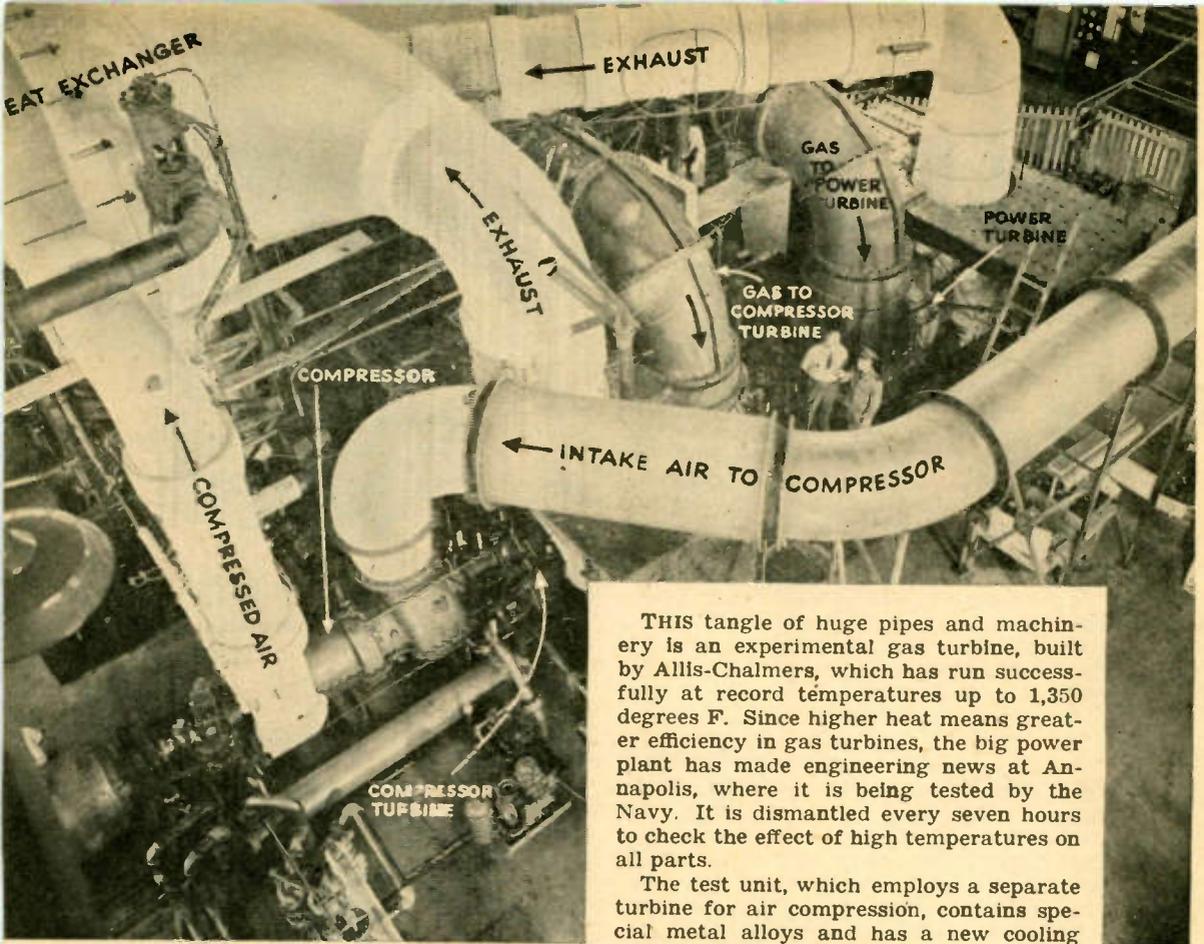
At present the Graflex Corporation is producing only the 4 x 5 Anniversary Speed Graphic and Graphic View cameras, both prewar models; but the Speed Graphics are equipped with coated lenses mounted in shutters with built-in flash synchronization.



New Anso luxury model reflex, diagramed below with the viewing hood raised for focusing.



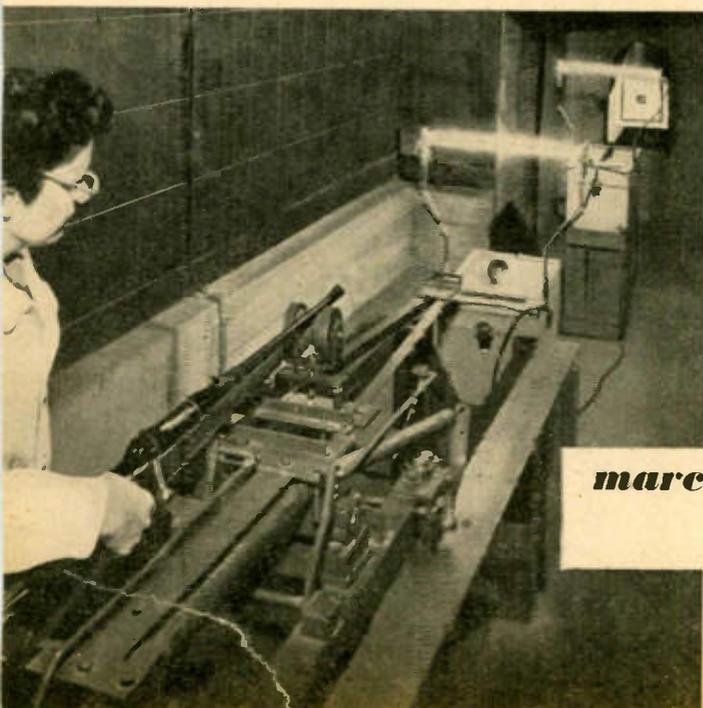
Medalist II has refinements over first version, including flash synchronization and a coated lens.



Experimental Gas Turbine Runs At Record High Temperatures

THIS tangle of huge pipes and machinery is an experimental gas turbine, built by Allis-Chalmers, which has run successfully at record temperatures up to 1,350 degrees F. Since higher heat means greater efficiency in gas turbines, the big power plant has made engineering news at Annapolis, where it is being tested by the Navy. It is dismantled every seven hours to check the effect of high temperatures on all parts.

The test unit, which employs a separate turbine for air compression, contains special metal alloys and has a new cooling system by which air is blown on the turbine blades at points where heat might damage the metal. Pipes shown above handle 40,000 cubic feet of air per minute.



Bullets Now Tested By Electronics

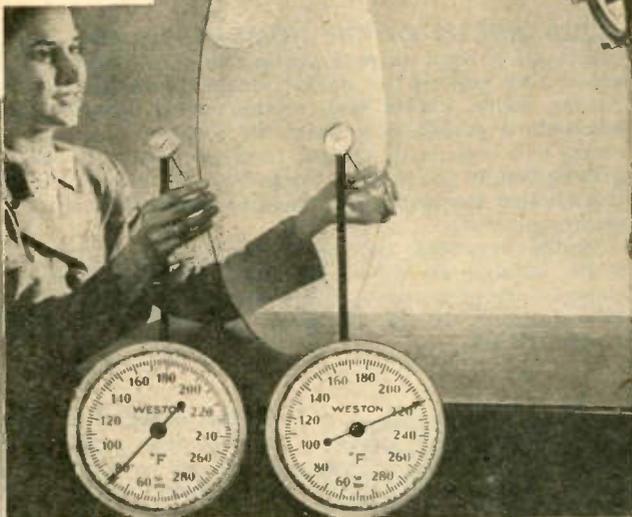
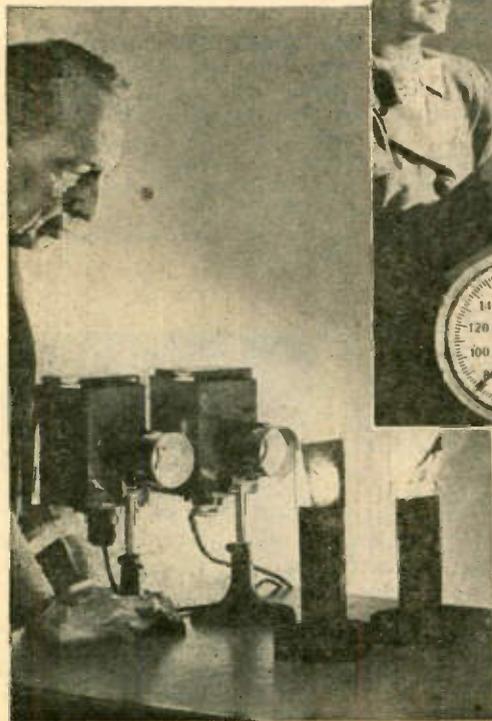
BOTH the accuracy and velocity of ammunition can be tested at one time by an electronic device, which counts in 100,000ths of a second. The "counter chronograph" starts counting as a bullet whines over one photoelectric cell, stops counting when it passes a second cell at a specified distance. Neon bulbs (left) light the cells.

march of **SCIENCE**



Australian Device Makes Maps Of the Ground It Covers

THE odd apparatus at left is the Australian "co-graph," which automatically maps the ground over which it moves. Named for its inventor, Lt. Col. H. J. F. Coe, the machine can be operated by a pedestrian or set up in a trailer (PSM, Dec. '44, p. 134). The co-graph obtains direction by being oriented with a sensitive compass; gets distance from a calibrated ground wheel. Drive from the wheel turns a paper-carrying roller under a fixed pencil, and thus a course is plotted to scale. The co-graph's upper part—sighting tube, compass, mirror, and map-making equipment—weighs only 10 pounds and is strapped to the user's body.



New Glass Absorbs Most Heat Yet Transmits True Colors

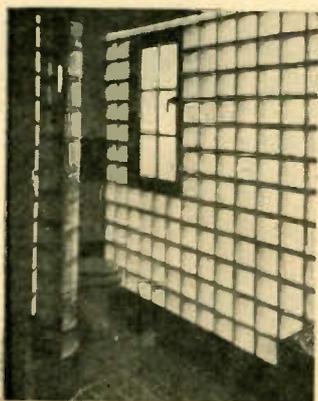
A NEW glass, made by American Optical Co., absorbs nine-tenths of the heat from a projector and yet transmits color accurately. Spotlight at right above has heated the near side of a circle of this glass to 220 degrees F., while temperature behind stays at 80. Left, film on right-hand pedestal burns while glass protected film nearer light is unharmed.

HOME OWNERS



SCALE MODELS OF THE HOME you are planning can be made right on your dining-room table with the aid of a kit now on the market. Included are grooved footing strips, cutout wall sections with doors and windows, a scaled base sheet on which to arrange them, and cutouts of typical furniture—such as the grand piano in the hand of the girl above—so you can tell whether the rooms you visualize will take the furniture you own.

Unlike drawings and conventional floor plans, a model requires no special training to construct, and changes are of course possible without erasure. The Plan-A-Home Model Company, of Elkhart, Ind., makes the kit.

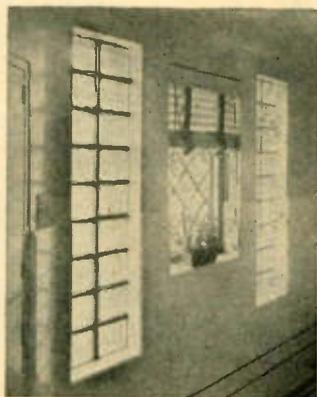


GLASS BLOCKS in panels are the suggestion of the month for modernizing and brightening an old bathroom. These translucent blocks, $3\frac{3}{8}$ " thick and 6", 8", or 12" square, may be used in an opening broken through an interior wall (such as over the bathtub), in a present window (with a ventilating pane included), or in both. In an interior wall, they bring light to or from an adjacent room. Insulux blocks are made by Owens-Illinois Glass.

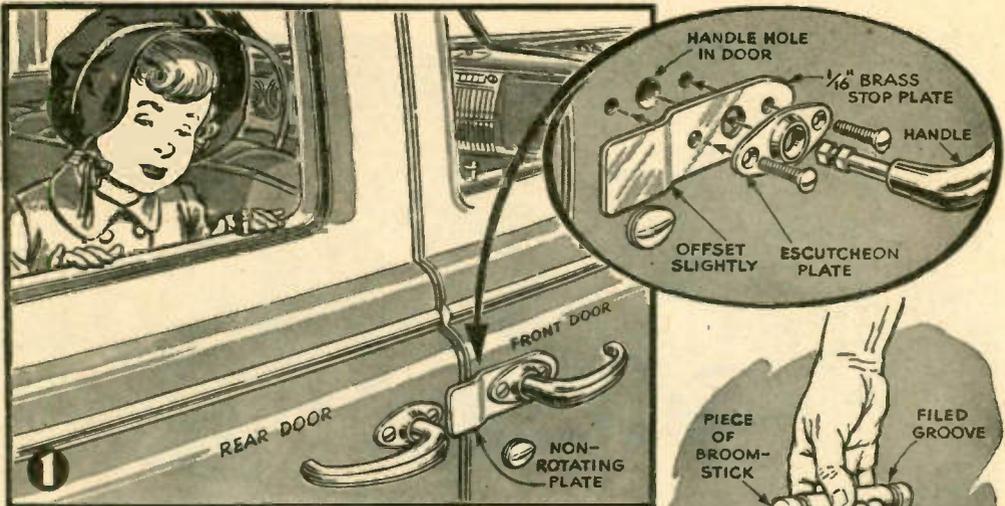
AIR FLOW through forced warm-air heating systems is registered on the dial of the indicator shown below. The device is inserted in a $1\frac{1}{2}$ " by $2\frac{1}{2}$ " slot cut in the main duct and mounted with self-tapping sheet-metal screws. It is adjusted to read 100-percent flow with clean air filters and the system functioning properly. Lesser readings will then indicate mechanical or other trouble, or that cleaning is again in order. The Dollinger Corporation, of Rochester, N. Y., is the manufacturer.



NO-ROACH FLOORING, a copper-powder and magnesium oxychloride cement called Hubbellite, has been developed by Dean S. Hubbell, of the Mellon Institute of Industrial Research, Pittsburgh. It is a repellent covering that can be applied $\frac{3}{16}$ " to $\frac{1}{4}$ " thick on any floor surface, including ordinary wood.

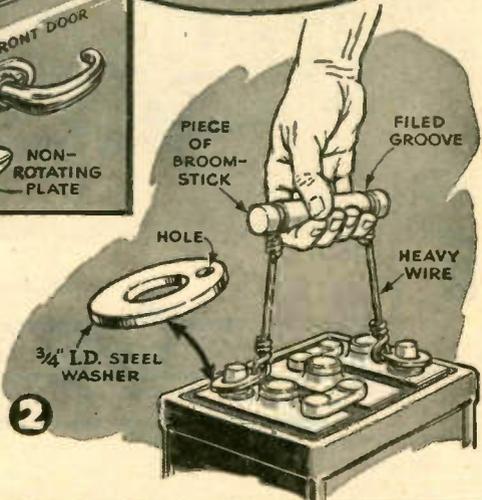


USEFUL AUTO HINTS

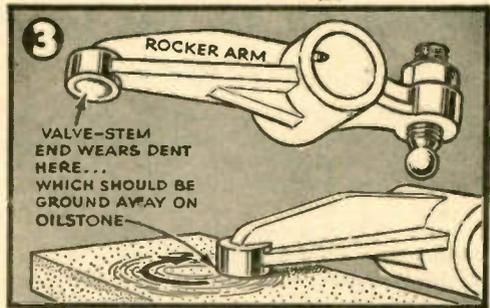


1 A REAR-DOOR STOP ends the danger of children accidentally opening the rear door and falling out. When the front door is closed, the rear door cannot be opened; the front door must be opened first before the rear door is freed. Notice that the stop plate doesn't turn with the handle, but is just clamped fast.—D. H. BERGMAN

2 LIFTING A BATTERY out of a car is an awkward job without a battery carrier. However, it's not hard to build a carrier from two washers, some heavy wire, and a piece of broomstick. The two washers should be large enough to fit over the battery posts, and small enough to give a purchase on the posts when lifted from the side. Instead of a broomstick, a sturdy hardwood dowel can be used.—E. L. RUSSELL

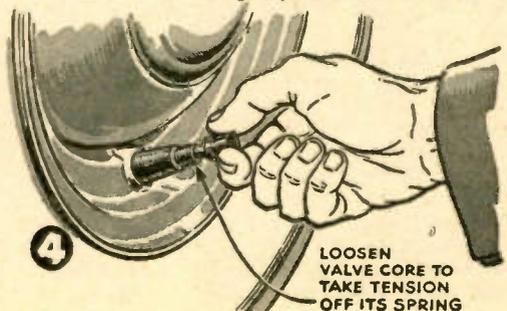


3 VALVE NOISES sometimes persist in overhead valve engines despite careful adjustment. The trouble is often in the rocker arms. During thousands of miles of operation, the beating of the rocker arm on the valve stem sometimes wears a depression in the rocker-arm face. Then the feeler gauge bridges the depression and gives a false clearance reading when the valve is adjusted. To remove the noise, remove the rocker arm and grind down the face carefully until it is flat.—A. H. WAYCHOFF

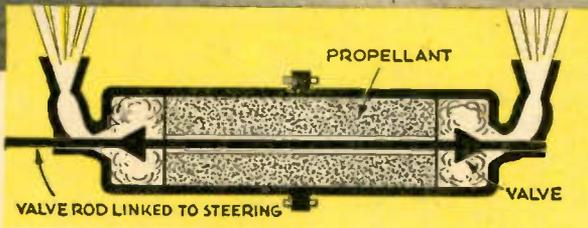
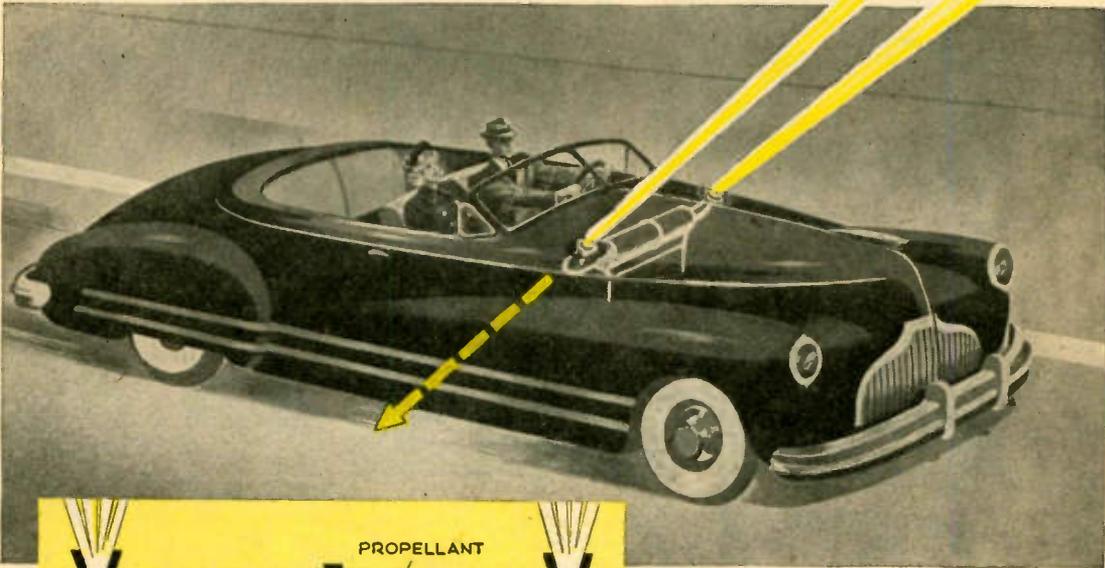


Drawings by STEWART ROUSE

4 PUMPING UP A FLAT tire takes less back-bending if the valve core is loosened a couple of turns. When the pumping is finished, the core can be tightened again with little loss of air.—W. N. LAWRIE



Rocket Brakes for Emergency Stops?



Sputtering up from under the hood, jet brakes stop a speeding car in record distance. At left is a schematic diagram of a propellant chamber having two nozzles. The valve rod with its jet-controlling cones helps to steer.

POWERFUL JETS CAN STOP CAR IN HALF NORMAL BRAKING DISTANCE

By Capt. G. C. MacDonald

ROCKET propellants, cased in special jet housings under the hood, may be used on future passenger cars and trucks as spectacularly efficient emergency brakes.

What is believed to be the first vehicle using jet emergency brakes has already been tested at the Allegany Ballistics Laboratory, Cumberland, Md., with the writer serving as test driver. An ordinary jeep, provided with a safety belt and a steel pyramid for protection in case of upset, was fitted with two jet thrust units mounted beside the hood at an angle of 45 deg. Segments of the wheels were painted white to permit high-speed camera analysis of wheel behavior during stopping.

In a series of test runs, the jeep decelerated at twice gravity, or 64 feet per second. This is a rather severe stop, and a design for passenger-car use should employ somewhat less thrust. Braking comparisons are charted schematically on the facing page; cars A, B, and C are assumed to be travel-

ing at 60 m.p.h., and are braked hard at the black line at the left. Car A, with ordinary brakes in excellent condition, requiring 160 feet to stop; car B, which has a jet-thrust brake, stops in 80 feet; and car C, included for comparison, shows the performance of the test jeep.

Even more dramatic results are achieved when jet brakes are compared with ordinary brakes under slippery driving conditions. Calculations indicate that on an icy highway a jet-equipped car could stop in a fifth of the distance required by present cars. It should be noted that the angle at which the thrust nozzles are placed not only produces a backward thrust, but it also presses the wheels harder on the ground and thus increases the effectiveness of the wheel brakes.

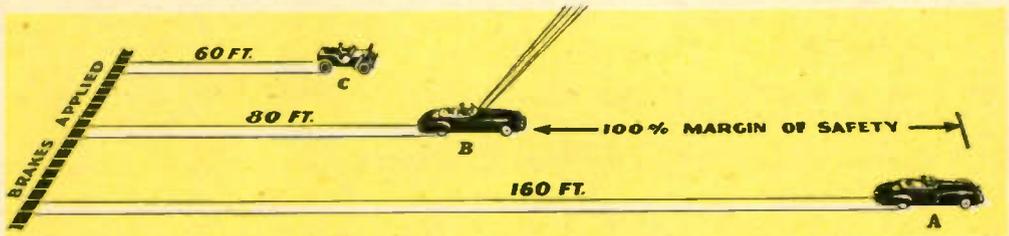
As developed under the leadership of Dr. R. E. Gibson, director of research at the Laboratory, the rocket-brake project was not intended to find a substitute for conventional brakes. Instead, the purpose was to study the possibility of augmenting standard

brakes in emergency situations, and to provide protection on icy surfaces and in the event of brake failure. Replacement of the propellant, which is entirely consumed in one application, may cost between \$10 and \$25; but it should be pointed out that even a minor collision involving a smashed-in radiator grille and front fender can very readily involve far greater expense, even assuming no one is injured. Considering the consequences of a mountainside runaway of a trailer truck, caused perhaps by a ruptured air line, the cost of even the large propellant charge necessary is a bargain in disaster insurance.

The installation used in these tests was much bulkier than what is contemplated for possible commercial use. A single propellant chamber, mounted crosswise at the rear of the engine compartment, is a more likely design. The jets would pass through the hood via a pair of "blow-out plates." A sliding valve rod, linked to the steering gear, would provide a means of steering the car during the stop. If for instance the wheels are swung to the right, the rod would move to the left, cutting down the left jet. This

feature is especially desirable since locked front wheels won't steer effectively, a fact that now contributes to many accidents on icy roads and when curves are entered at excessive speed. Electrical firing of the rockets would probably be used, triggered by extreme pressure or extreme travel of the brake pedal.

Certain disadvantages must be recognized. The propellant offers an additional hazard in case of an automobile fire. However, a fusible plug melting at a low temperature would protect the chamber from bursting, though it would not prevent the propellant from burning with about the same effect as several gallons of gasoline. In the event of a collision that both upset the car and fired the rockets, a zone of 10 feet or so in front of each nozzle would be dangerous, due to the high temperature and velocity of the jet gases. If the car remained upright, the jets would blow off harmlessly. Accidental firing of the rockets when the car is either motionless or moving slowly might be risky. This could be eliminated with a centrifugal switch that would only cut in the firing circuit at a predetermined minimum speed.



Above, a comparison of an ordinary car at 60 m.p.h. with one having jet brakes and with the test jeep.

Below, the writer makes a trial stop. The pyramid is to give protection in case the jeep turns over.

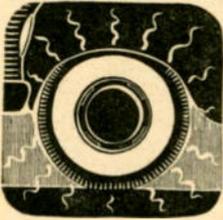


six pointers on SUMMERIZING YOUR CAR

WATCH THESE FOCAL POINTS TO LICK WARM-WEATHER TROUBLES

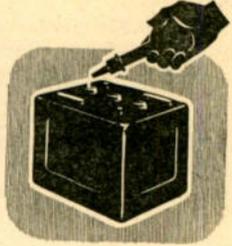
1 TIRES. In summertime tires will get hot.

Watching tire pressures may keep them a little cooler. Low pressure causes the tire casing to flex more violently than normal pressure. Violent flexing builds up heat in the tire and may cause a breakdown in the tire sidewall. Another way to keep tires cooler is to resist the temptation to bleed them when they're hot and show a higher pressure than the tire is supposed to carry. Bleeding will reduce the pressure, but will increase the temperature. Check pressures when the tire is cool—early morning, or late evening.



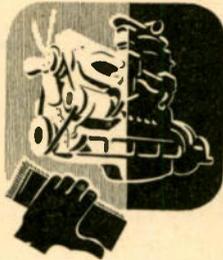
4 BATTERIES get thirstier in summer. This

doesn't mean the water level should be raised, but that the water must be added more often. Proper level is still $\frac{1}{4}$ " to $\frac{3}{8}$ " above the separators—winter or summer. Too much water can cause the battery to overflow when it charges. Spilled electrolyte corrodes the battery carrier, cables, and terminals. Keep the vent plugs tightened down. On some batteries if the plug is loose, the valve in the filler hole will jiggle up and down and pump electrolyte out of the battery. Vents should be kept open so the battery can breathe.



2 ENGINE. Grease and oil on the outside

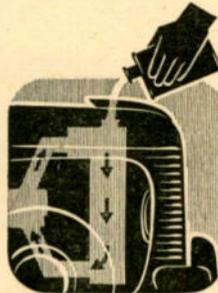
of the engine block will raise the engine temperature. The block plays a part in the cooling system by carrying out the heat from the water jacket to the air being blown over the engine. Grease and oil on the engine pick up dust and form a blanket of insulation around the engine. This insulation keeps the heat inside and doesn't let the metal dissipate it to the air. Overheating may score and burn engine parts.



5 COOLING SYSTEM. Most drivers have

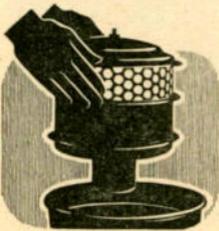
finished spring cooling-system cleaning, drained the antifreeze, and flushed the system. In some areas rust inhibitor was scarce.

It is still not too late to add inhibitor. Rust forms more quickly during high-speed summer driving than during winter driving. A clean radiator core is also part of engine cooling. Leaves, bugs, and bent fins all cut down the radiator area, and retard efficient cooling.



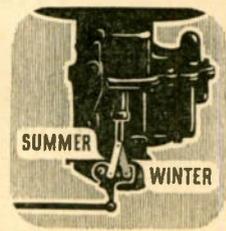
3 AIR CLEANERS. Dust that gets inside the

engine can wear down close-fitting parts as effectively as an emery wheel. Air cleaners are built to scrub the air clear of dust before the air gets inside. The cleaners work best when they're clean. A dirty filter lets dirty air into the engine. Dunk the element in gas or solvent and blow dry with compressed air. (Manufacturers advise going easy with the air pressure—too much can pack the filter element and ruin it.) In oil-bath cleaners, try to keep the oil at the specified level. Change oil that feels gritty.

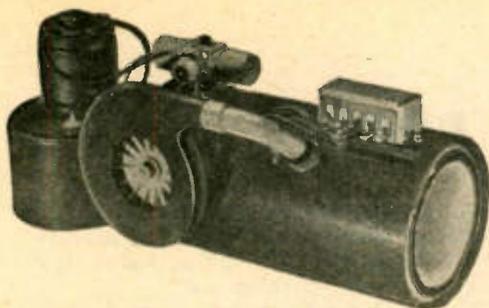


6 SPECIAL ADJUSTMENTS. Some cars

have manual adjustments to be made for summer driving. On Fords, and some other cars, the carburetor has a summer position. The accelerating-pump rod should be moved to hole No. 1. Other cars have a manifold heat-control valve to be adjusted for summer driving. The control has an "off" or "summer" position marked on the side of the manifold. In the automatic-type manifold heat controls, check the spring to see if the valve is operating. A broken spring causes an engine ping.



AUTO IDEAS



AUTOMOBILE HEATERS haven't been in the "new ideas" category for many years. The "South Wind" Heater (above), made by Stewart-Warner Corp., is new. It's mounted under the hood, and has an air intake near the radiator. The heater burns gasoline to warm the air, which is sent back through ducts to outlets at the windshield and under the front seat.

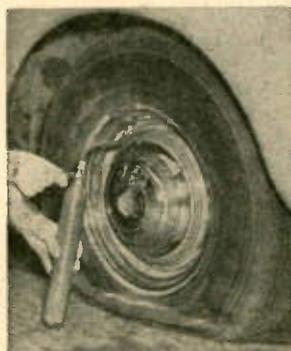
1946 ROTZELL SEDAN is the answer by Edward P. Rotzell, Philadelphia mechanic, to the shortage of new cars. He built this low-slung job from parts of half-a-dozen makes. Here he's off through what once was the window of his shop, to road-test his car.



MOTOR SCOOTERS are getting lighter and cheaper to run. The "Scootercycle" made by Mead Cycle Co., Chicago, uses aircraft tubing for the frame, and ready to ride weighs only 83 lb. Future plans are to reduce the weight to 50 lb. It is said to run 100 miles on a gallon of gas. The engine is $1\frac{1}{2}$ hp. and develops 35 m.p.h. Levers under the handle bars operate gas and brake pedals. The clutch is automatic, leaving the feet free. A wire delivery basket can be mounted over the front wheel.



▲ FIGHTING A FIRE



◀ FILLING A TIRE

"BOTTLED POWER" in a small cylinder has been marketed to help drivers in two automobile emergencies—fires and flat tires. The "power" is carbon dioxide, well known as an effective gas for putting out fires, but new as a gas for filling tires. A small hose connects the cylinder to the tire valve. According to Beacon Devices, manufacturer of the gadget, the gas actually prolongs tire life by preventing oxidation of the rubber. The gas is odorless and will not stain clothes.



GUS goes to the races

By MARTIN BUNN

TOWARD four on a warm Friday afternoon Gus Wilson looked out his shop window at a pelting rain. "This is going to keep up all night," he predicted to Stan Hicks, the Model Garage grease monkey. "There'll be wet grounds and no ball game tomorrow."

Just about that time, out at the old Lakeview half-mile track eight miles away, Jack Dunn came into the tack room of a stable. It was here he kept his string of half a dozen selling platers and one good stake horse with a bad leg.

A little old Negro looked up expectantly from a bit he was polishing. "No good, Henny," Dunn told him. "We came in fifth—seven lengths back of the money."

Henny shook his head. "That oats fellah was roun', Mistah Jack," he said.

Dunn grunted, walked to the window, and watched the pouring rain. "We've got to win a good purse soon, or we're done for," he muttered. "Looks like it'll rain hard all night, and that's what the weather man says. If it does, the footing at Empire Park's going to be fetlock deep, and Air Hero ought to be able to do it."

Henny nodded. "Ah was jes' thinkin' that, Mistah Jack," he agreed.

Dunn swung around, went to the deal table that served him as desk, found the Empire Park condition book, and thumbed through its pages. "Here we are . . . 'Brookdale Handicap—\$3,000 added—mile and a sixteenth.' Demerara's the horse to beat, and Air Hero can do it. I wouldn't risk that tendon on a hard track for another two weeks, but in mud . . . How's that Army truck?"

"Runnin' fine, Mistah Jack," Henny said.

"Post time for the Brookdale is 4:30," Dunn told him. "Keep Air Hero quiet in his stall as long as you can, but start in time. Don't make it too early, or he'll fuss himself into a lather with waiting, but don't be a minute later than 4:15."

And just about then at Empire Park, 10 miles the other side of our town, two sharp-faced characters were conferring under the grandstand. "I tell you, Brownie, he's a real mudder, and with the track soft Dunn will start him," one insisted.

Brownie swore. "Best chance of the season for a cleanup gone. With Air Hero out, Demerara would be sure. And I ain't betting heavy dough if it ain't sure, Al."

"Yeah," Al blinked. "How much is it

worth for Air Hero to show up too late?"

Brownie looked at him hard. "It's worth two hundred," he said. "But no rough stuff—the Pinks are watching me."

"There's no rough stuff to a truck stalling," Al answered. "I used to be a mechanic—and a good one—in the old days."

SATURDAY was sunny, so Gus hopefully phoned the ball park, but the game had been called because of wet grounds. Joe Clark, his partner in the Model Garage, was sympathetic. "Why don't you go to Empire Park?" he urged. "Do you good to get outdoors."

"Not me," Gus laughed. "One-horsepower nags are too slow for me. I've seen all the top race drivers since Barney Oldfield pour out real speed."

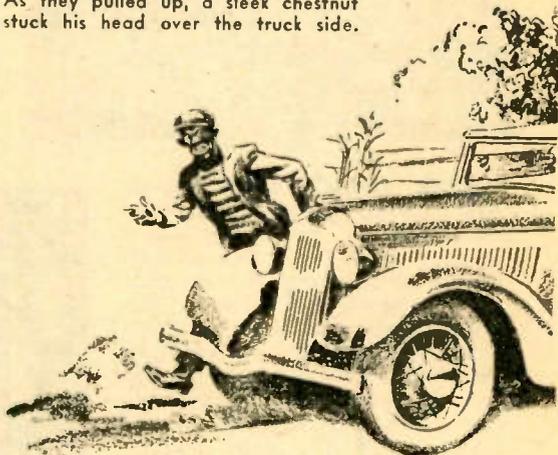
Joe went back into the office and Gus set about tuning the 2½-ton 6 x 6 truck Chris Blauvelt had bought from military surplus. He was still at it when he was interrupted by a breathless voice saying: "Excuse me, mistah! Excuse me, mistah!"

He looked up at a little Negro whose face glistened with muddy sweat and who gasped from near exhaustion.

"Take it easy," Gus warned, and pushed the little man into a chair. "Feel better now?" he asked after the old man had had a cup of water. "Who are you?"

"Ah's Henny Gilpin, mistah. No one knows me no mo', but Ah was a right good

As they pulled up, a sleek chestnut stuck his head over the truck side.



jockey when I rode for old Mistah Jack Dunn."

"O. K., Henny," Gus said. "Now tell me what's the matter."

"It's mah truck, mistah. She stalled, and I run a long ways befo' a gen'man gave me a lift. He 'lowed maybe yo' all could get it started."

"Sure, I'll get it started for you," Gus assured him. "But what was the idea of half-killing yourself with running?"

"Ah got Air Hero in it," Henny moaned.

"Who's he?" Gus asked, puzzled.

Henny pulled himself together. "Ah works for young Mistah Jack Dunn—the Big Pine Stable," he explained. "Our stake hoss, Air Hero, is entered in the Brookdale Han'icap at Emplah Park, an' Mistah Jack's dependin' on me to get there by 4:15."

"Oh, I see," Gus said. "But you can't be blamed if your truck stalled."

"Mistah, yo' gotta un'er-stan'," Henny urged desperately. "Unless Air Hero win, Mistah Jack's gonna be sold out." He looked at

the shop clock. "Deah Lawd," he murmured. "It's mos' quarter to foah."

Gus was tossing tools into his roadster. "What kind of truck is it?" he asked.

"She's an old Army truck—jes' like the one yo' is working on," Henny said.

Something Blauvelt's driver had told him clicked in Gus's mind. "What happened before it stalled?" he demanded.

"She jes' gasped a time or two."

"That *could* be it," Gus muttered. He bent over the truck engine for a moment, and when he straightened up he slipped something into his coverall pocket. Then he jumped into the roadster. "Come on."

Gus took a couple of short cuts and covered the three miles to the stalled truck in quick time. As they pulled up, a sleek chestnut stuck his head over the side and curled his lip in an equine greeting for Henny. A stableman stood near by.

At Gus's order, they crowded into the cab,





Gus at the wheel. They went off smoothly. "It won't run far," Gus said, "but I'll fix it when it stops." He got up to 40, bypassed town, and the engine died.

Gus jumped out, lifted the hood, examined the oil-bath air cleaner on the crankcase oil-filler pipe, and shouted: "I *did* guess right!" He pulled the filter element he had taken from the Blauvelt truck out of his pocket and fitted it into the air cleaner. A car came up from behind, slowed down as its thin-faced driver stared at them, and speeded up again. Henny wrung his hands. "Please, *do* somethin'."

"I've *done* it," Gus yelled, and they started.

It was exactly 4:15 when they pulled up at the paddock gate. A man ran over to them. "The truck stalled, Mistah Jack," Henny told him as he lowered the ramp, "an' this gen'man fixed it."

Jack Dunn's quick eyes looked Gus over as a bugle blared. "Just in time—there's the saddling call." He led the horse down the ramp. "You've done me a good turn, Mister. How much do I owe you?"

Gus rubbed his chin and looked around the Park. "Oh, a couple of bucks and a ride back to my car would square us," he said.

"Two bucks sounds mighty modest to me, Mister," said Dunn. "I'll do better than that—I'll see that ten bucks goes on Air Hero for you. Okay?"

Gus assented with a laugh. Dunn unpinned his badge and tossed it over. "This'll get you inside," he called as he walked off.

The betting concourse was crowded, and Gus found himself near two men talking earnestly as they waited in the \$50 line. "I tell you, Brownie," said one of them, "I fixed that truck good. That cluck Henny wouldn't never have started it if he hadn't got that—" He broke off to stare at Gus.

By then the two men were at the betting window. A buzzer droned and the slide was slammed down just as Brownie tried to shove a sheaf of bills inside. "Ten on Air Hero, ten on Air Hero," he shouted.

"Scram," he was told. "Window's closed."

Brownie cursed, and Gus followed him through the crowd. As they reached the paved "lawn" in front of the grandstand, there was a roar: "They're off!"

A black horse got out in front. "Deme-

rara! Demerara!" roared the huge crowd.

Gus recognized the chestnut in the bunched horses chasing Demerara. They rounded the first turn, and on the backstretch a big gray began cutting Demerara's lead—and with the gray went Air Hero. At the last turn, the gray was gaining on Demerara, and Air Hero's head was even with the gray's shoulder. As they swung into the homestretch, there was a hush. The gray had caught Demerara, but Air Hero had moved faster and was even. Down the stretch he fought it out with the gray, then shot away to win by a length.

Brownie strode up to Gus, shaking with rage. "You asked for this!" he shouted, and swung hard. Gus sidestepped and sent a sharp left hook to his unshaven jaw. Brownie was picking himself up groggily when a track policeman collared him.

"Nice left, Mac," the cop told Gus. "We've been hoping he'd start something."

SOME of us Model Garage regulars dropped in at the shop that evening, and Gus told us his experiences at the races.

"How did you know what was wrong before you saw the truck?" Doc Marvin asked.

"That model Army truck has a peculiar air cleaner that's part of the crankcase ventilating system," Gus explained. "If the filter element is removed from the air cleaner, the crankcase breather is sealed up. With no air getting into the crankcase, and the air in it being taken out by the ventilating system, a partial vacuum develops in the crankcase. Finally it gets strong enough to hold down the fuel-pump diaphragm. Then no fuel flows into the carburetor, and the engine dies. Air seeps back into the crankcase, and after a while you can start again, but the same thing happens, and the engine dies again. Blauvelt's driver almost lost his stripes in the Army for it once."

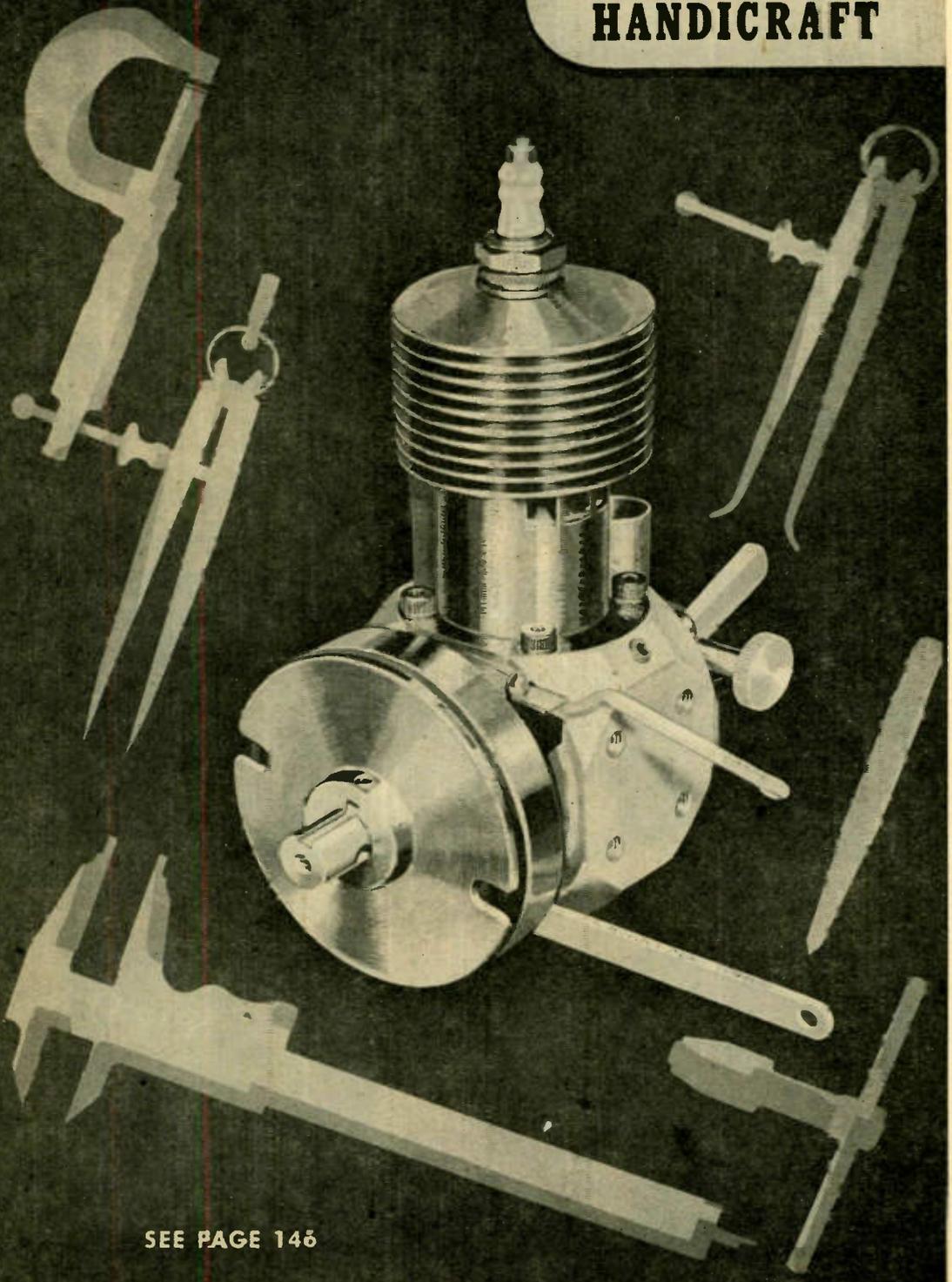
Gus pulled a roll of bills from his pocket and carefully divided it in two.

"Here are the winnings from the bet Dunn placed for us. It was Model Garage funds, so Joe and I'll split. There's just one thing I wonder about."

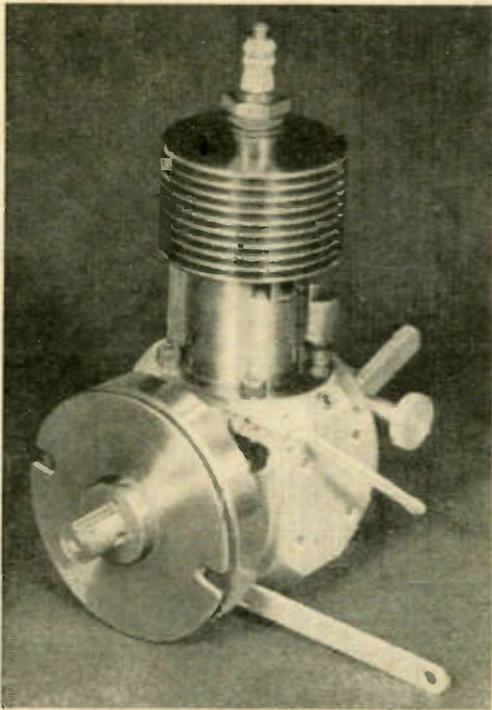
"What's that?" asked Joe.

"What you would have said," Gus grinned, "if the nag hadn't won."

MECHANICS AND HANDICRAFT



SEE PAGE 146



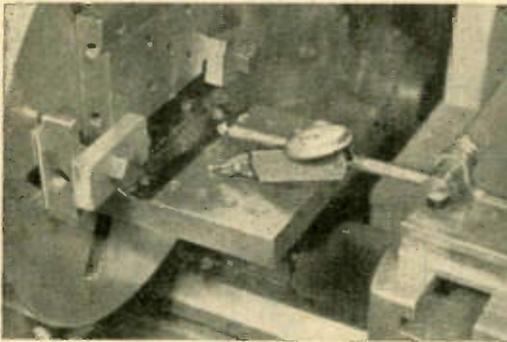
tiny SUPER

No castings are needed for this speedy ball-bearing gas engine. Reliable and easy to start, it will power a model plane, car, or boat in flashy style.

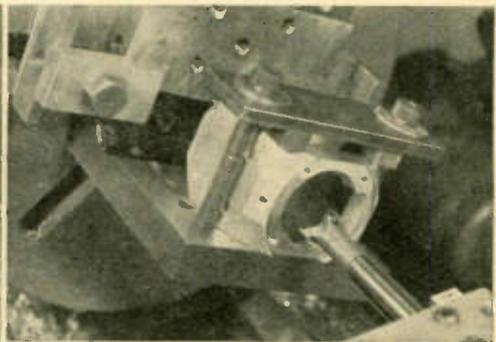
By J. C. MAGEE

PART I

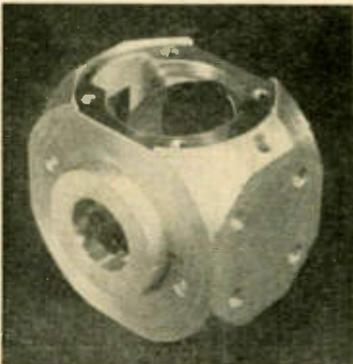
HIGH-SPEED GASOLINE ENGINE			
BORE	1"	R. P. M.	13,000
STROKE	1"	WEIGHT (less flywheel)	15 oz.
DISPLACEMENT	12.7 cc.	HP.	1/4
OVERALL HEIGHT	4 1/4"	COMPRESSION RATIO	15 to 1



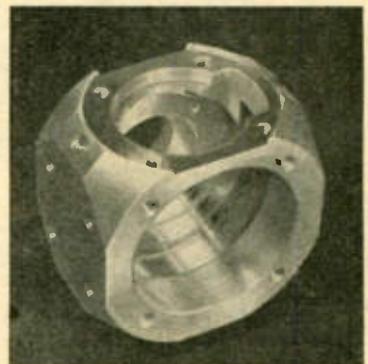
An angle plate mounted on the faceplate holds the crankcase. The indicator checks for squareness.



Then the crankcase is bolted to the angle plate, and the fit for the cylinder is carefully bored.



Two views of the crankcase with the machining completed. At left, the crankcase from the front at the angle shown in the assembly at top.



And at right, a view of the crankcase from the rear. The groove that can be seen inside the bore can be cut with a homemade tool.

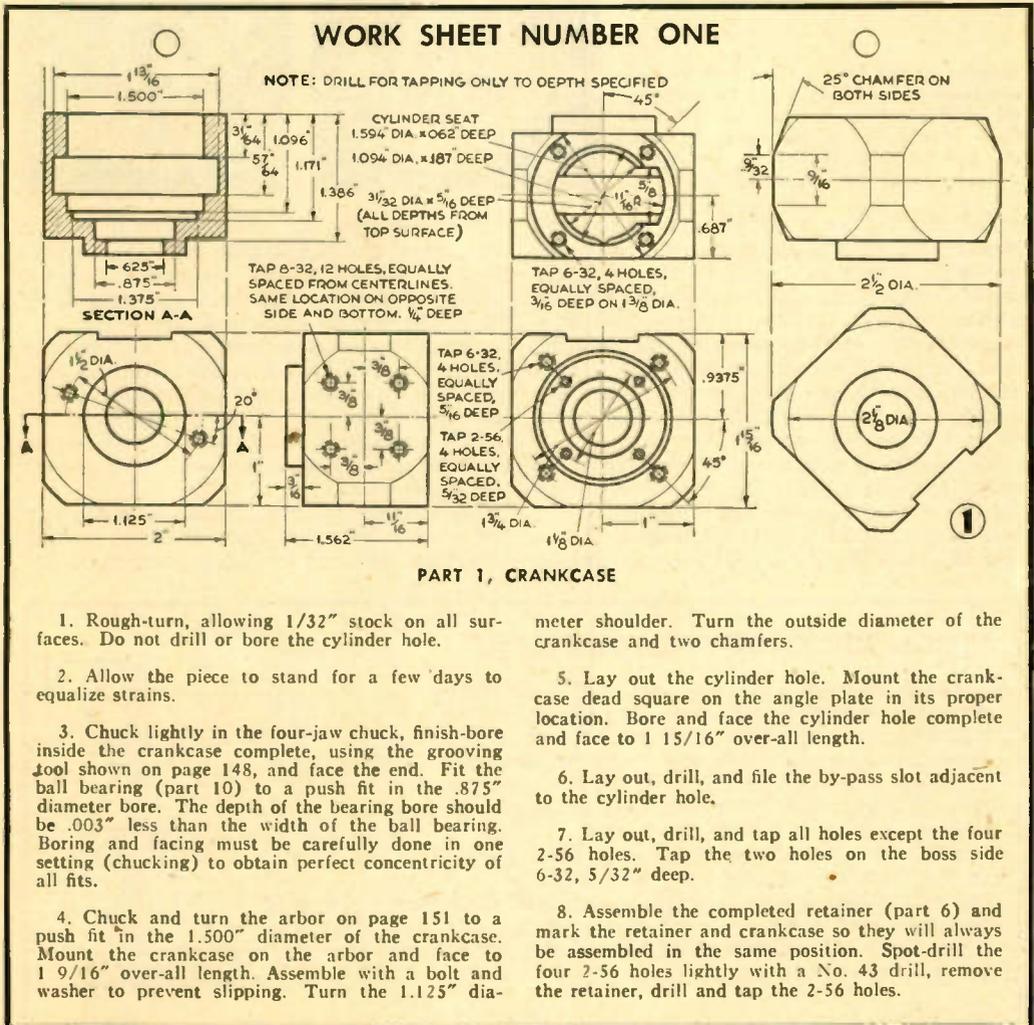
ENGINE *hits 13,000 r.p.m.*

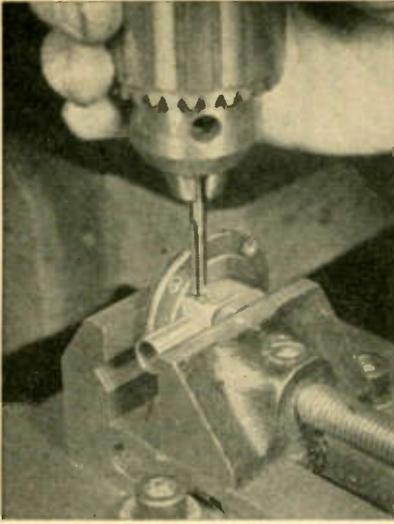
THIS is just the model gas engine you have been waiting for. And after you've built it, you can, if you wish, put it up on the mantelpiece for all to admire. But you won't do that, for it will rev up to 13,000 without a murmur and supply plenty of power and speed for a model car or model boat. With a propeller adapter, it can be used as a power plant for an iceboat or a large model airplane. It requires no castings, is sturdily designed, and starts easily, but remember that performance can only be proportional to the care and workmanship you put into its construction.

The solid crankshaft is mounted on two

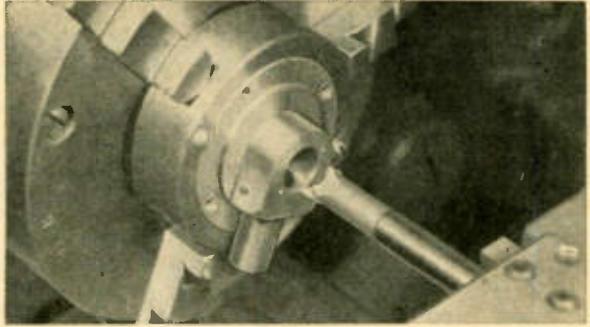
ball bearings, one on either side of the crankpin, an arrangement that provides perfect support for the crankshaft while it travels at high speed. A rotary valve is an integral part of the crankshaft. This allows a greater charge of gas mixture to be drawn into the crankcase at each revolution than the cylinder port common in two-cycle engines, so the engine will develop more speed and power. The connecting rod is solid phosphor bronze with a separate bearing cap at the big end to provide for adjustment in case of wear.

Three work sheets are given on this and the following pages. They contain a de-

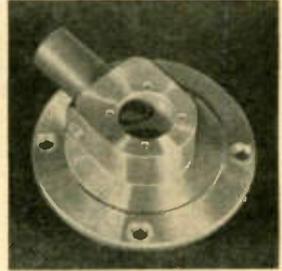
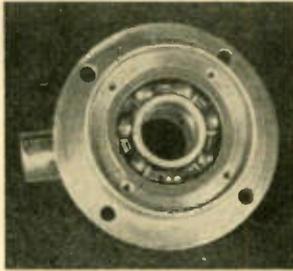




Tapping of the needle-valve hole in the crankcase cover is best done by hand in the drill press, as above. Just at the right, a rear view of the cover showing the ball bearing, and at the far right, a front view of the completed cover.



Here is the setup for boring the .502" diameter in the cover held in a nest. Stub arbors and nests assure concentricity of fits when machining can't be done in one chucking.



tailed, step-by-step explanation of the operations required for making the crankcase assembly. Don't be floored by the fact that some of the dimensions are given to three decimal places. Unlike the work done in a large shop where one mechanic makes only one part, you will be making the entire engine and will have some leeway. What you really want is to be sure that mating parts fit each other without play.

Thus when a crankcase bore of 1.500" is called for and a 1.499" diameter is specified for the crankcase cover, the important thing is to keep within the .001" allowance. If you should make the bore 1.501" by mistake, a

1.500" diameter for the cover will correct the error, and the engine will run as perfectly. Generally, the machinist finds it easier to bore to size first and then turn down the mating piece to fit the bore.

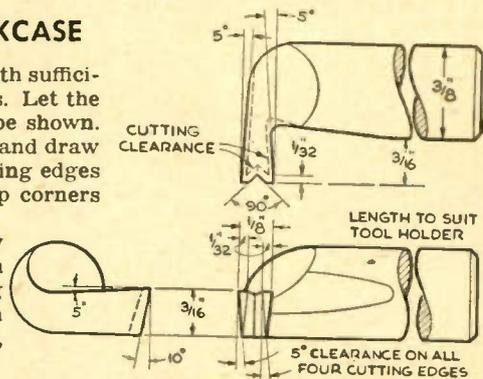
Rough-turning provides an opportunity for you to become acquainted with the part to be machined and the tools that have been ground for the job. Since 1/32" stock is left on for the finish cut, all bores will, of course, be 1/16" undersize and all outside diameters 1/16" oversize.

In roughing out the crankcase, face down both ends first to 1/8", thereby leaving 1/32" on each end for finish turning. A 1/2"

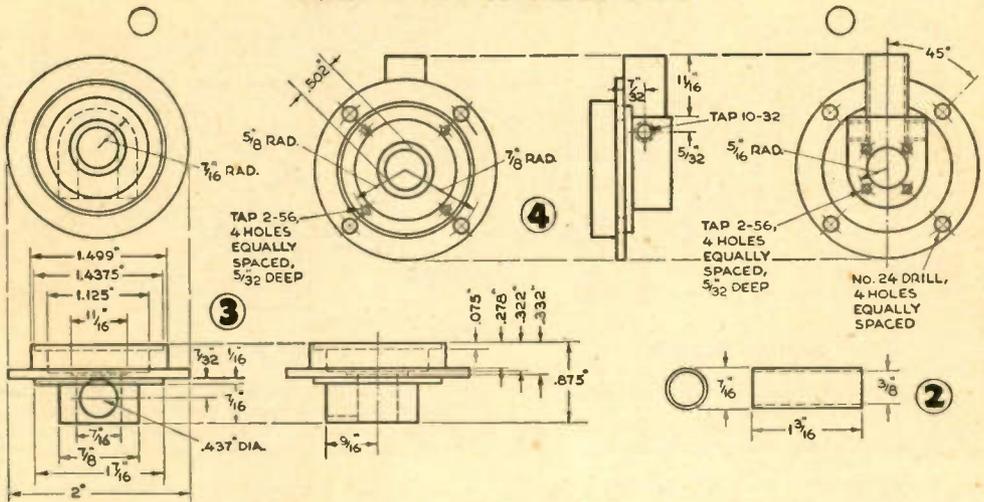
TOOL FOR GROOVING CRANKCASE

FORGE the gooseneck on 3/8" drill rod with sufficient stock on the end for the cutting edges. Let the tool cool slowly, and then file to the shape shown. Reheat to a cherry red, quench in water, and draw to a light straw color. Touch up the cutting edges on a grinding wheel and round the sharp corners slightly with a fine hand stone.

The tool is fed into the work gradually as the carriage is run back and forth slowly between stops. Its fishtail cutting edges prevent chatter, permit feeding in freely while the work is being traversed, and produce a fine finish.



WORK SHEET NUMBER TWO



PART 2, INTAKE TUBE

1. Face to 1 3/16" long and remove burrs.

PART 3, CRANKCASE COVER

1. Rough-turn, leaving 1/32" on surfaces.
2. Let stand a few days to equalize strains.
3. Chuck on the back end, finish-bore inside, turn and face the 1.499" diameter and shoulder. Fit the ball bearing (part 11) to a push fit in the 1.125" diameter bore. The depth of the bearing bore should be .003" less than the width of the ball bearing. Be sure the 1.125", 1.437", and 1.499" fits and shoulders are concentric and square with each other.
4. Chuck lightly on the 1.499" diameter, finish-bore the outside, and face to length.
5. Mill or file the intake and needle-valve boss and remove burrs.

6. Lay out, drill, and ream the intake-tube hole to a press fit (.0005" interference) with the intake tube (part 2).

PART 4, CRANKCASE-COVER ASSEMBLY

1. Oil parts 2 and 3 lightly and assemble.
2. To facilitate boring, file out the portion of the intake tube that extends into the hole.
3. Chuck and bore the nest, shown in the drawing on page 151, to fit the 1.499" diameter. Mount the cover in the nest and bore the .502" diameter concentric with fits on the opposite side.
4. Lay out, drill, and tap all holes except the four 2-56 holes around the 1.125" diameter bearing bore. This operation is the same as in part 1, step 8, using the part 5 retainer. The 10-32 tapped hole for the needle valve is drilled and tapped straight through from one side so the holes will be in alignment.

diameter hole is then drilled straight through while the piece is still chucked. More stock can be removed by drilling if a 1" or 1 1/4" drill is available, but be careful not to drill too deep. Next, bore the 1.500" diameter hole to 1 7/16" by 1 3/32" deep, the 1.375" bore to 1 5/16" by 1 11/64" deep, the .875" bore to 13/16" by 1 25/64" deep, and the .625" bore to 9/16". The 1/32" left on the face from which you work automatically leaves 1/32" at the bottom of each bore for finish-boring.

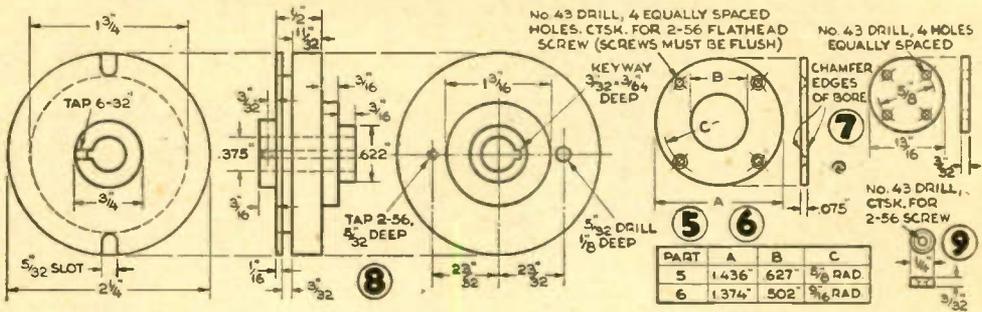
Some care will be required in making the 1 13/16" diameter groove, or it may end up in the wrong place. Work from the same face, which is already 1/32" oversize, and add 1/16" to the 31/64" dimension, thus locating the near edge of the groove 35/64" from the working face and the far side

57/64". If this sounds involved, study it out with pencil and paper.

Use the grooving tool shown in one of the drawings with a spacer block the width of the groove minus the width of the tool (11/32" — 1/8") or 7/32". Place the spacer between the lathe stop and the carriage and put another stop against the right-hand end of the carriage. This will restrict the carriage to the proper travel for the width of the groove. A piece of brass carefully clamped to the lathe bed will serve for the right-hand stop. You can use a scale for the measurements, but spacers are more reliable and are as easy to use as a scale.

The crankcase is next turned end for end in the chuck and trued up, and its 1.125" diameter is then turned to 1 3/16" by 3/16" deep. Because of the 1/32" extra stock on

WORK SHEET NUMBER THREE



PART 5, RETAINER

1. Clamp the duralumin sheet on the faceplate, drill and bore the hole to size.
2. Face to correct thickness and chamfer.
3. Part the piece out $1/32$ " oversize.
4. Mount on a stub arbor and turn the outside diameter to size and concentric with the bore.
5. Lay out, drill, and countersink.
6. Remove all burrs and sharp edges.

PART 6, RETAINER

1. Follow the same procedure as in part 5. Be sure to make this part last so the stub arbor can be rechecked and turned down each time.

PART 7, COVER

1. Clamp the duralumin sheet on the faceplate, take a light facing cut, and part out to size.
2. Lay out, drill, and remove all burrs.

PART 8, FLYWHEEL

1. Chuck the piece in the lathe, allowing $5/8$ " of the stock to extend beyond the jaws. Rough-turn the outside diameter, part in the starting-cord groove, finish-face, turn the shoulder, and bore to size.
2. Rechunk and rough out the opposite end complete, allowing $1/32$ " for finish turning.
3. Turn and polish a stub arbor to fit the bore snugly and mount the flywheel on the arbor.
4. Finish-turn complete, including the outside diameter, and polish. All surfaces must run true.
5. Cut a keyway, or drill and tap for a setscrew, and remove burrs.
6. Lay out, drill, tap, and remove burrs, including the two $5/32$ " holes at the bottom of the slots.
7. File out two slots for the starting cord.

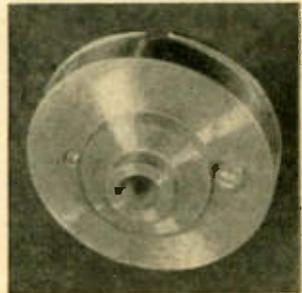
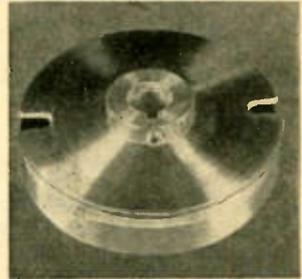
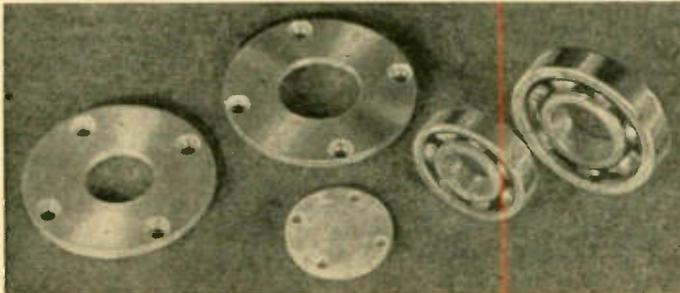
PART 9, TIMER CAM

1. Drill, countersink, and part off.

the face, the shoulder must be turned the full $3/16$ " length shown in the drawing. It is not necessary to rough out the maximum outside diameter or the chamfers, but it will do no harm.

Stub arbors and nests provide a sure method of obtaining concentricity between fits when they cannot be bored in one chucking. Such pieces are made of scrap stock chucked in the lathe and turned and polished to fit snugly the

Below are completed retainers, a cover, and ball bearings. At right are views of the flywheel from the front and back. The starting-cord groove and slots can be seen in the front view of top, and the assembled timer cam in the lower photo.



part that will be mounted on or in it for turning. An arbor or nest cannot be used again after it has been removed from the chuck unless it is turned down smaller or bored out larger for the next job. Be sure to oil mating surfaces before using.

The importance of concentricity between fits cannot be overemphasized. Wherever possible, all diameters should be turned or bored at one chucking. However, the .502" diameter on the crankcase cover must be concentric with the fits on the opposite side, so concentricity is obtained by mounting the cover in a nest and locating from the 1.499" diameter and shoulder for boring. Concentricity is necessary here so the rotary-valve end of the crankshaft will float free in the .502" bore and the latter will not act as a bearing or cause interference when the motor is running.

By a push fit for the ball bearings is meant one that will allow a ball bearing to be pushed into its housing with the fingers—a snug fit. The best way to obtain this fit is to use the ball bearing for a gauge. Mount it on a makeshift handle between two washers that will keep it clean.

Hold the ball bearing square when attempting to fit it, for if it is cocked it may cause you to misjudge the size of the bore and lead to taking off too much stock. The depth of the bores is .003" less than the width of the bearing so the retainer will hold the bearing in its proper position. A ball bearing is a precision unit and must be handled carefully and kept meticulously clean both during the fitting and the final installation.

Directions for making the model gas engine are being presented in three installments to provide plenty of space for a full discussion of each part. The parts to be taken up next month include the cylinder, piston, and connecting rod.

The ball bearings, bar, rod, and sheet stock called for in the list of materials can

TAP DRILLS

Be sure to use the proper hole size for tapping. For convenience and to prevent error, the tap drills to be used for the various tapped holes are given here.

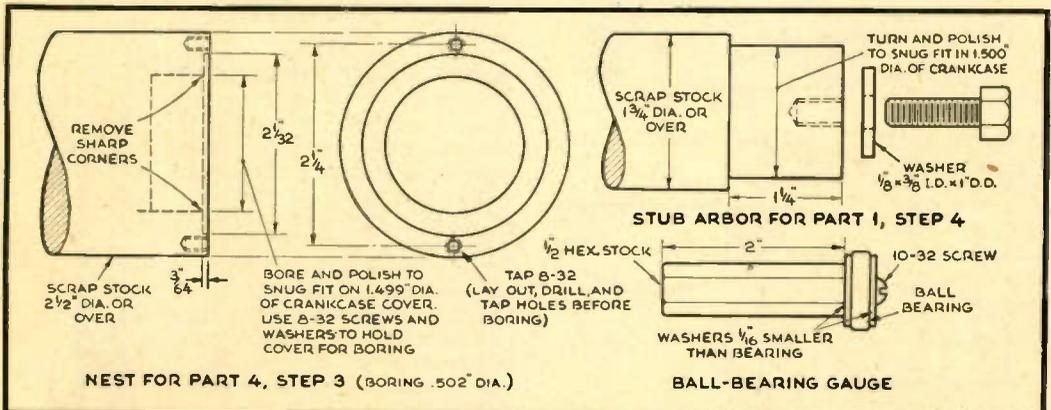
Tap size	Tap-drill size	Pct. of thread
2-56	No. 50 (.070" dia.)	70
4-40	No. 43 (.089" dia.)	71
6-32	No. 36 (.1065" dia.)	78
8-32	No. 29 (.136" dia.)	69
10-32	No. 20 (.161" dia.)	71
⅜"-24	.333" dia.	75

Note: The four 6-32 tapped holes around the cylinder seat of the crankcase hold the cylinder in place and absorb the shock when the engine fires. Tap carefully to obtain maximum thread strength.

LIST OF MATERIALS

Part No.	Description	Size
1	Dural bar	2" sq. by 1 ¼"
2	Brass tubing (.032" wall)	7/16" O.D. by 1 ¼"
3	Dural rod	2" dia. by 1 ¼"
5	" sheet	3/32" by 2 ¼" sq.
6	" "	3/32" by 2 ¼" sq.
7	" "	3/32" by 2" sq.
8	Machine steel	2 ⅝" dia. by 1 ¼"
9	Fiber or bakelite	¾" dia. by 1"
10	Ball bearing	.375" bore, .875" O.D., .218" wide
11	" "	.500" bore, 1 ¼" O.D., .250" wide

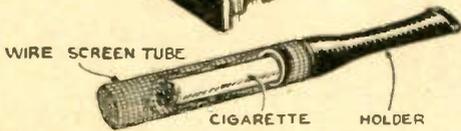
probably be obtained by most readers from the larger hardware stores, jobbers, salvage or war-surplus stocks, or mail-order supply houses. However, as an accommodation for those who cannot obtain the materials elsewhere, a kit containing the ball bearings, timer points, timer-cam stock, and alloy-steel screws and wrenches is available. Some of the bar and rod items needed can also be supplied.



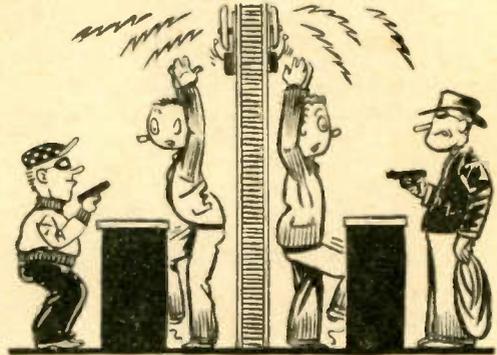
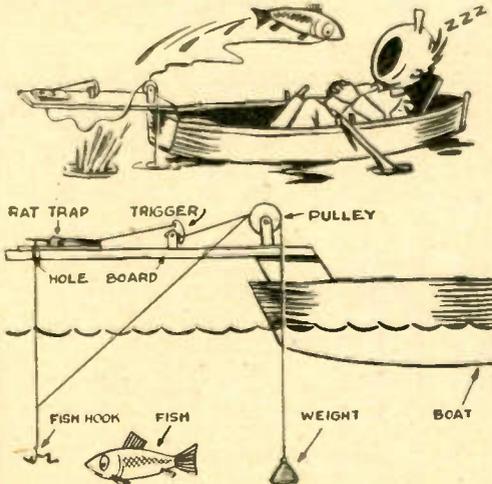
WHAT'S YOUR **INGENUITY** QUOTIENT?

Have you pulled off a smart one lately? We will pay for each contribution accepted for this page showing ingenious solutions of problems in the home, shop, garage, or camp. It doesn't matter if it's wacky—if it works.

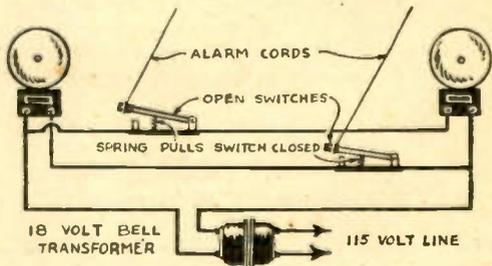
A FIRE-FIGHTER AT HEART, I tried to cure my wife of the smoking-in-bed habit. Defeated—naturally—I rolled and soldered a wire-screen tube. Encased as shown, the cigarette can't come into contact with the bed covers—**IRA MINOR.**



FISHING IS FUN, but it also feels like work when I want to sleep in the summer sun. To combine my two hobbies, I rigged up this lazy-fisherman's friend. Tugging at the hook, the fish springs the rat trap, which releases the weighted line and promptly yanks him aboard.—**RUDY DEMIAN.**

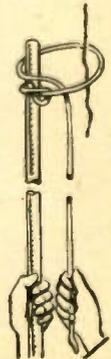


EVER ARGUE WITH A GUN? People who do sometimes get hurt. So when a flurry of holdups threw some of our local storekeepers into a dither, a couple of us turned to mutual aid. A bell in my store is actuated by a spring-closing switch in the one next door, and vice versa. Extra switches can be added in parallel with the first. Breaking the alarm cord completes the circuit and gives the alarm. If the other fellow doesn't have his hands full—or up—maybe he'll send for the cops.—**MAL BLUMBERG.**



REACHING FOR THE MOON?

No. It only seems like that when a dangling wire or cord remains a few feet away from your longest stretch. Trying to pull in a hanging antenna lead-in outside my window made me think of this scheme. I looped a piece of heavy cord at one end of a long pole, gave the free end of the cord a tug, and had the out-of-reach wire neatly lassoed. In a second I had my hands on the elusive wire.—**RUFUS P. TURNER.**



WHITTLED

model of the Nazi "BURP GUN"



The Schmeisser MP 40 was Germany's fast-shooting version of our Tommy gun.



This model, with folding shoulder stock, was standard equipment for Hitler's paratroopers. Infantry officers got a modified type.

ures 32½"; its weight, without the magazine, is 9 lb.

The model shown here is half size, but the drawings can be scaled larger or smaller as desired. For a half-size model, trace the enlarged drawing onto 1" by 4" by 12⅝" white pine or similar wood, and jig-saw roughly to shape. Scribe a center line all around the blank so that the cardboard templates can be fitted to the same contour on both sides.

Start carving from just behind the barrel sight, working toward the back. Razor-sharp carving tools, a wood-burning iron, a few files, and an assortment of sandpaper are all the equipment you'll need. Keep a keen edge on all your knives and work slowly and carefully.

After the barrel has been shaped, you will be ready to carve the magazine receiver, as shown at *I*, and the magazine itself, *J*, which is a separate piece of white pine doweled to the receiver. A cross-hatched disk 1/16" thick is glued and bradded into place at *K*.

The channel for the bolt *O* is routed on the left side only, and the bolt handle *D* is

By CARL G. ERICH

AMONG the memories that American soldiers brought back from the European war are some sounds whose echoes will never die: the constant drone of aircraft; the whine and crash of artillery; and the deadly, spluttering sound of the Schmeisser machine pistol that won for it the name "burp gun".

Firing pistol ammunition at a rate of up to 540 rounds per minute, the gun is fed by a vertical magazine holding 32 rounds. With the folding shoulder rest extended, it meas-



The right side of the Schmeisser model, above, repeats the basic design of the left side, but with fewer details.

cut separately and glued in place. Sling assemblies (*C* and *R-1*) consist of narrow slots; *C* was made separately and glued onto the barrel. The ejector plate on the right side of the receiver *I* is simulated by means of a shallow V-cut as shown.

Make the shoulder stock *H* separately. This may require two or four pieces of wood exclusive of the butt plate *T*. Grooves *H-1* are burned around with an iron. Plate *T* is joined to the arms by means of tiny sheet-metal angles. Fasten the stock to *R* with a short dowel, and, on the left side, cover the dowel with a 3/16" cap as at *G*. The shoulder plate *T* either may be fitted rigidly to the stock, or pivoted to simulate the swivel action of the original gun.

Carve the trigger, trigger guard, and forward sight last, working against the grain as much as possible to give strength to these

fragile members. If they should split, the parts may be glued together.

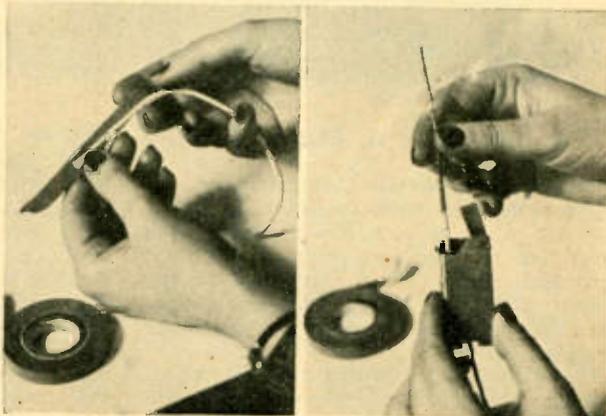
To give the model an authentic metallic appearance, apply a coat of liquid stove polish to all parts except the handle *P* and the stock *N*. After the polish is dry, rub on a liberal amount of powdered graphite, and cover with clear varnish. The varnish will soften and blend the graphite. When dry, rub very lightly with fine steel wool, and apply some more graphite. This treatment gives the metal parts the appearance of blued steel.

On the original, the frame and grip are made of plastic; to imitate the appearance of these parts, finish *N* and *P* with a dark brown enamel.

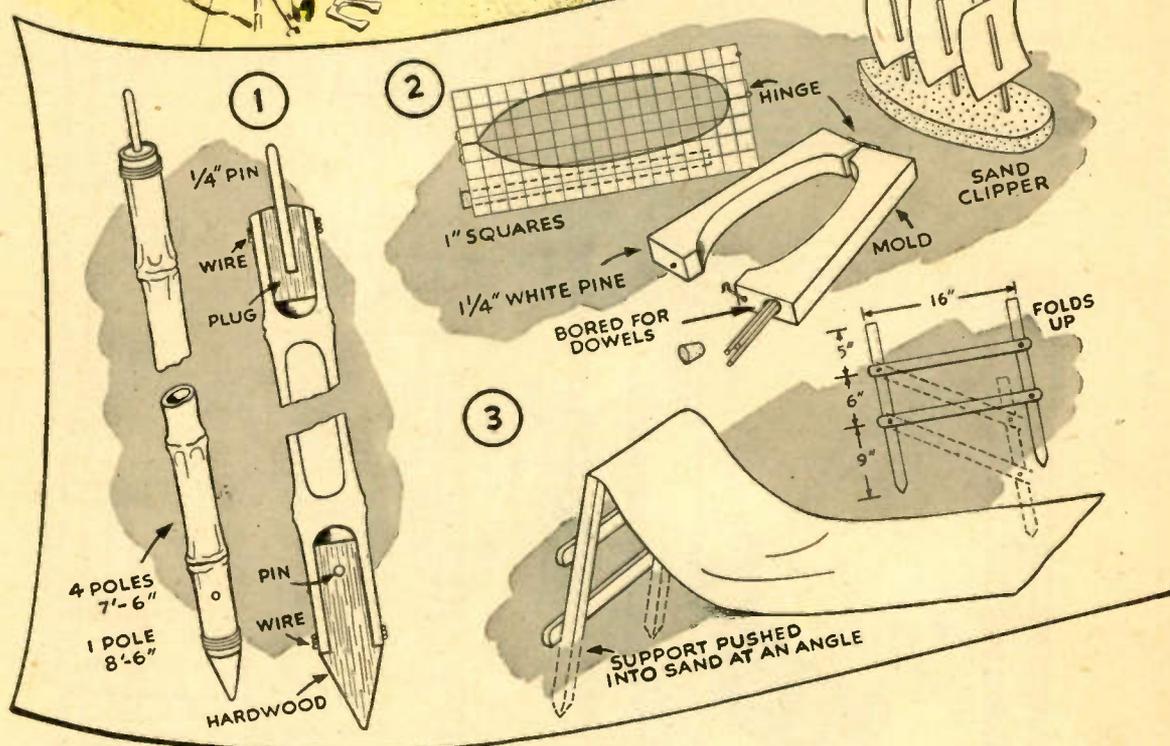
An interesting feature of the original was the lack of wood, construction being entirely of pressed steel and plastic.

Cellulose Tape Makes It Easy to Put Wick in Lighter

FRUSTRATION may be your lot if you try to thread a new wick into a cigarette lighter without some method of stiffening the wick. Using a wire as a prod will do the job, but the trick shown at the right is generally easier. Tear off several inches of cellulose tape, attach to one end of the wick, and roll the tape into a spiral point. When the wick is threaded in place, tear off the tape.—**BOBBIE BAUGHN.**



Beach



PACK your beach kit with items like those shown above, and no one can complain of discomfort at your next outing. A shelter awning put up on bamboo poles, as indicated at the top left, will protect the family from too much sun at one time and also keep your belongings dry in case of an unexpected rain. The piece is simply a rectangle of awning cloth supported by five poles, the center one 12" longer than the others. All have pins in the top to push through the awning and shouldered hardwood plugs at the bottom, as in Fig. 1. Sandbags hold the guy ropes taut.

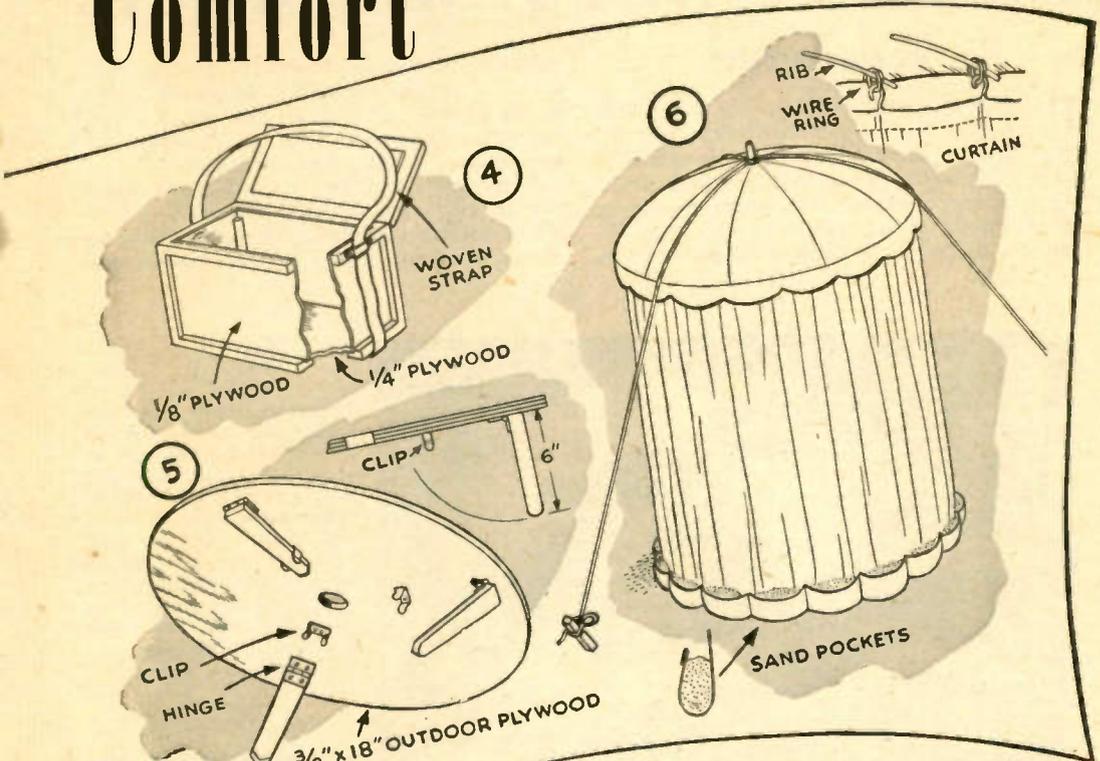
Junior can be kept amused with a wooden

mold (Fig. 2) for making sand clippers, and others in the party may be made comfortable on canvas sheets with folding back supports (Fig. 3). The box shown in Fig. 4 is made of plywood to any suitable dimensions and serves the double purpose of carrying food and acting as a bench to keep the portable radio out of the sand.

A low table (Fig. 5) is convenient for picnicking. The middle awning pole goes through the hole in the center. Three legs will keep it steadier than four.

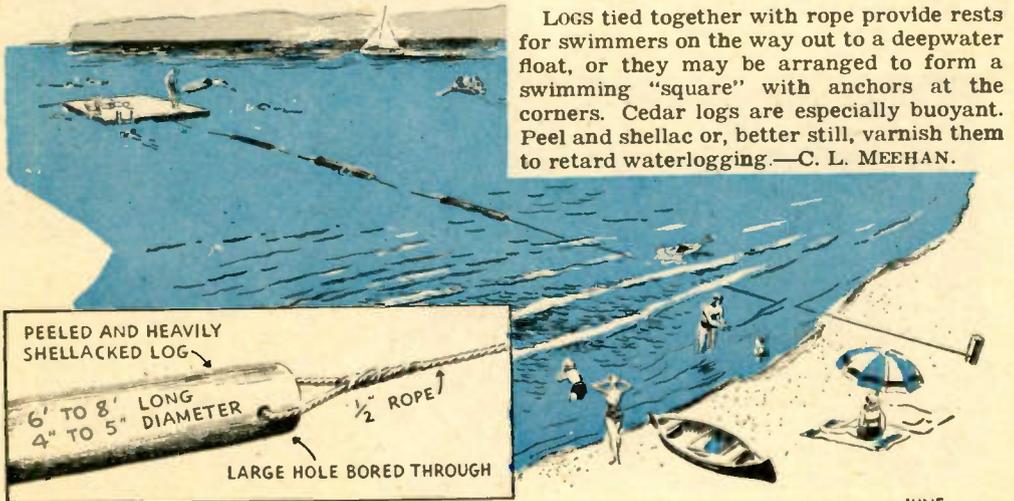
For a dressing tent, hang a curtain around a beach umbrella. Sand pockets in the hem hold the sides down—HI SIBLEY.

Comfort



Accessories like these will help make your next beach outing a success for the entire family. From the shelter awning at the far left to the dressing tent above, they are designed for convenience. You can stow them all on the car.

Chain of Floating Logs Serves as Rests for Tired Swimmers



LOGS tied together with rope provide rests for swimmers on the way out to a deepwater float, or they may be arranged to form a swimming "square" with anchors at the corners. Cedar logs are especially buoyant. Peel and shellac or, better still, varnish them to retard waterlogging.—C. L. MEEHAN.

GLAZING... *the* PROFESSIONAL

By JOSEPH ARONSON

PAINTED effects familiar on fine furniture have little in common with ordinary two- or three-coat semigloss or enamel finishes. The latter can be taken straight from the can, and a smooth, full finish is easy to obtain with good brushing over a well-sanded surface. A painted finish with a

soft, decorated look, however, must be built up by a variety of careful steps, as shown in the photos below of an antique glaze being put on the decorations of a Pennsylvania Dutch chest (PSM, Apr. '46, p. 152).

This craftsmanlike type of paint finish begins with a sealer, such as a coat of shellac or prepared primer, put on over the raw wood. Then all cracks and surface defects



← ①

Turpentine, japon drier, and linseed oil are the vehicles for the colors, which may be bought either in a tube or a can. Raw or burnt sienna or umber, acher, Vandyke brown, and black are chiefly used, with only enough in the oil for a translucent smudge. A soup plate is a good mixing dish. Soft, old brushes and soft rags are needed.

Swab a smudge of the oil mixture an freely. Don't be frightened by the disreputable look that is taken on. Begin smearing in the crevices and don't let the fluid accumulate in the corners.

②



← ③

Using a soft, old brush, draw out the excess fluid from the corners before tackiness can set in and make removal difficult. Some of the oil smudge has been wiped off at the center or high-light part of the panel shown here.

TOUCH on fine craftwork

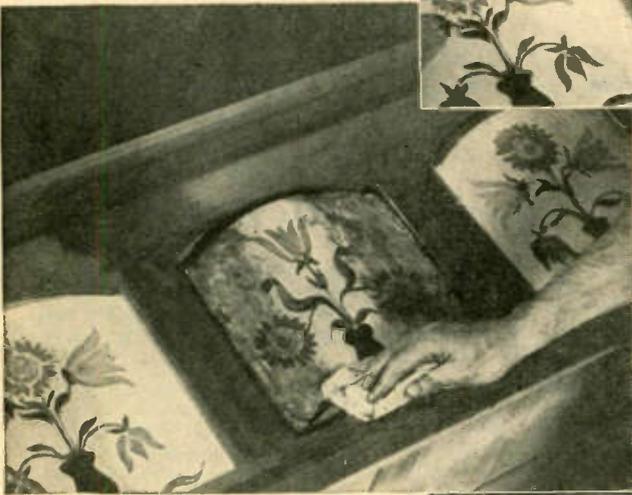
are filled with a filler compound like Swedish putty, the surface is sanded smooth, and two coats of good flat paint are applied, the last being the finish color but somewhat brighter and lighter than the final shade desired.

Decorating is done at this stage, and the antiquing or glazing follows. The decorations must be applied on a well-sanded sur-

face, and good oil colors mixed fairly heavy in japan drier should be used. They may be applied in stripes, ornamental features, stencils, transfer patterns, or any of the familiar decorating methods desired. Antiquing is a process of shading with a thin wash or "glaze" of colored oil that softens the colors and outlines and blends the tones. It is shown step-by-step in the photos.

④ →

Wiping and texturing are done with wadded pads of cheesecloth. Don't scrub the fluid off. Just wipe off enough to leave a thin glaze over the paint and to produce the shade and texture you want. Antiquing of the right-hand panel under the arm in the photo has been completed; that on the panel at the left has not yet been started.

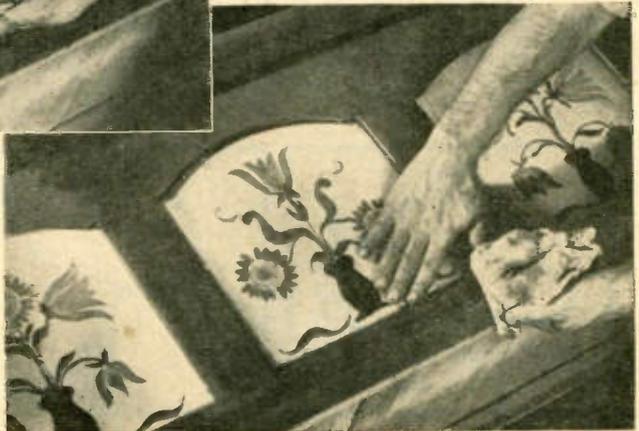


← ⑤

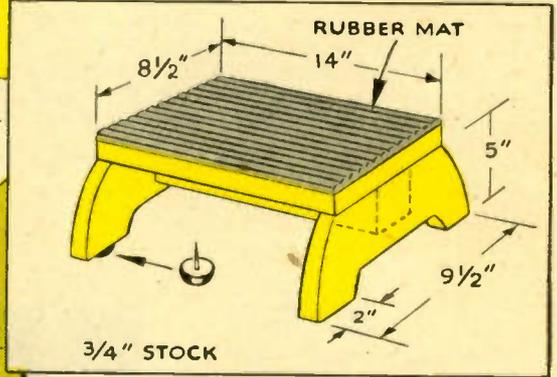
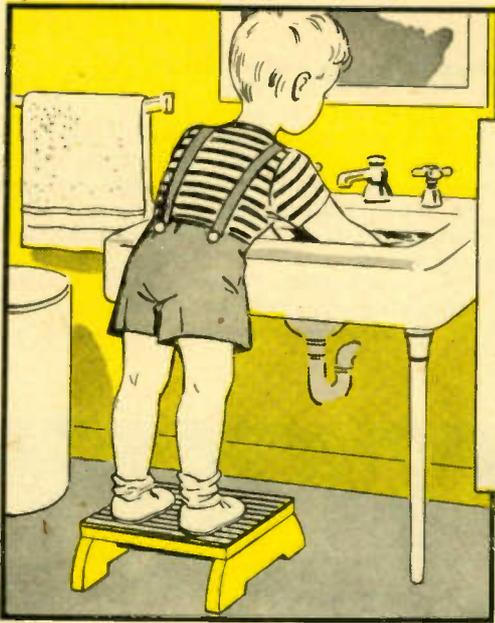
Begin the wiping process at the middle, and then work the smudge out from the corners and back into the cleaned-out middle or high light. This blends the shading to accent both the decoration and the molding that frames it.

⑥ →

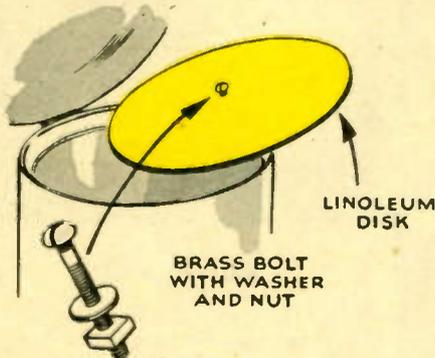
Palm and fingers can do a perfect job of final redistribution if you don't mind dirty hands. Rub with a rotary motion, removing excess fluid from the palm as fast as it starts to smudge. When the glaze is dry, protect it with a coat of white shellac rubbed to a satin finish with pumice and crude oil.



KEEPING



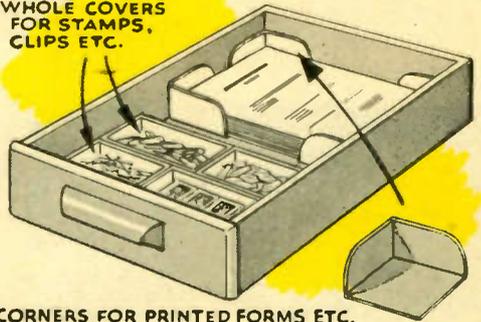
A footstool just for the youngsters speeds up the process of teaching them to wash themselves. Extra wide legs, a rubber mat, and rubber-headed tacks prevent upsets under lively little feet. A piece of two-by-four, shown dotted, reinforces the legs.



BRASS BOLT WITH WASHER AND NUT

LINOLEUM DISK

WHOLE COVERS FOR STAMPS, CLIPS ETC.



CORNERS FOR PRINTED FORMS ETC.

When the bottom of a garbage can rusts through in part, a disk of heavy linoleum cut to fit freely inside will keep the can in service. A loose bolt lets you lift out the disk for occasional cleaning.

Box tops thumbtacked to the floor of a desk drawer will keep pins and other small items in convenient order. Corners of box tops may be arranged to hold any size stationery, and sheets are easy to remove.

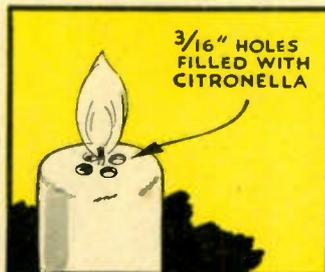
Surplus white shoe cleaner is unsightly on the dark edge of the sole. You'll find it easier to wipe off if you have coated the edge with colorless nail polish.

To shoo flying pests, try this homemade insect repellent. Fill holes 1" deep in a plumber's candle with oil of citronella. Plug with wax to prevent evaporation.

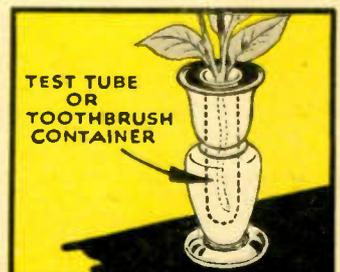
Many small vases aren't practical for holding live blossoms because they are porous. A test tube or plastic toothbrush container is an easily cleaned watertight liner.



APPLY CLEAR NAIL POLISH TO EDGE OF SOLE

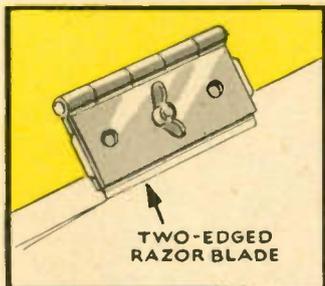


3/16" HOLES FILLED WITH CITRONELLA



TEST TUBE OR TOOTHBRUSH CONTAINER

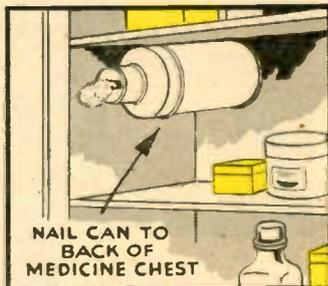
THE HOME SHIPSHAPE



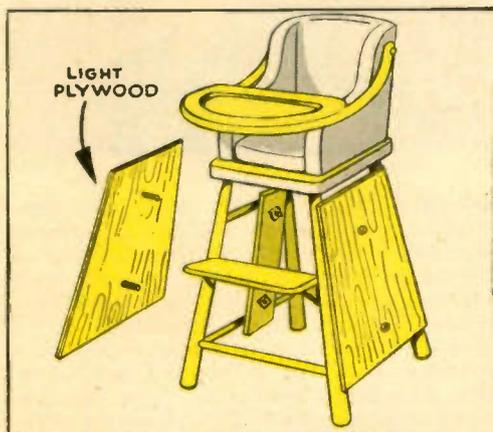
Need a razor-blade holder? Just find a hinge a bit longer than a double-edged blade, put in the latter, and clamp with a small bolt and wing nut as shown above.



You needn't trouble to read the titles to replace records in the right albums. Put a sticker on each record with the key letter of the album that it came from.

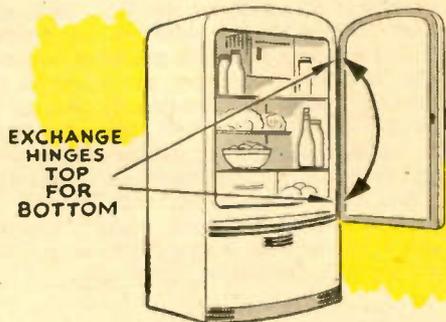
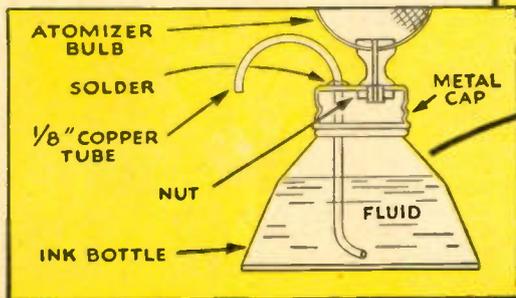


A cotton dispenser is easily made from a talcum-powder can. Punch a slot in the top and pry open at a joint to fill. Mounted as shown above, it takes up no shelf space.



To keep a child from climbing the rungs of a high chair and possibly toppling over with it, attach plywood shields with wood screws or with bolts through a cleat as above. Finish like the chair.

Refuel your cigarette lighter at this handy filling station, which virtually eliminates spilling and evaporation. Old atomizer parts, an ink or mucilage bottle, and copper tubing do the trick.



One reason refrigerator doors eventually fail to latch is that hinge-pin holes wear at the inside of the top and outside of the bottom hinge. Just interchange the hinges to eliminate this trouble.



MODERN LIVING

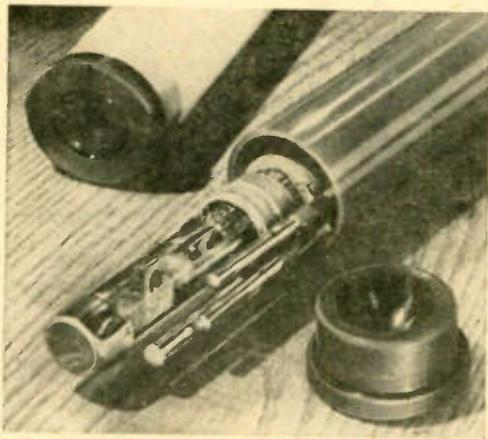


New plastic-cased alarm clocks made by GE for 115-volt, 60-cycle A.C.

TRICK ALARM CLOCKS have been developed by General Electric to awaken both determined and twitchy sleepers. The dark-cased clock at the left above is connected to a radio to wake you with music or commercials; if that doesn't get you up in a few minutes, a buzzer automatically adds to the din. The clock at the right above, for either the hard-of-hearing or persons who don't wish to disturb others, flashes a bright light in the sleeper's face. A third clock, not shown, has a buzzer that is adjustable, GE says, to make sounds ranging from a gnat's whisper to a fearsome racket.



DOUBLE-ENDED LAMP. With an ultra-violet sun lamp in one end and an infrared heat lamp in the other, this ivory-enameled fixture for bedroom or bathroom will equip the householder for all his special-light needs. The Select-o-ray, manufactured by Westinghouse, has a three-position switch, a combined floor and table stand, and a friction mount that permits it to be adjusted to and held at any angle. To produce the ultra-violet and infrared rays, the fixture uses two standard-base, internal-reflector bulbs, the ultraviolet one a self-ballasting type.



FISHING-ROD CONTAINERS of plastic are light, shatter-resistant, and won't dent with hard use. Whether tossed in the back of the car or perched on a crowded closet shelf, treasured fly-casting rods are thus safeguarded from mishap. Extruded of Tenite, the containers are 1½" in diameter and a little over 3' long. The end is closed with a rubber plug that keeps out dirt and damp.

NOTHING ROLLS LIKE A BALL, as is well known to playful kittens and to knitters who must frequently retrieve balls of yarn from beneath the couch. The "Yarn Top," a plastic spindle with a weighted base, keeps balls of yarn or crochet thread from wandering afield. Yarn need not be pulled off in short lengths during use, and it does not twist as the ball rotates, assuring that the knitted article will not have a turned-up edge. The Allied Appliance and Plastic Company of Los Angeles makes the device.



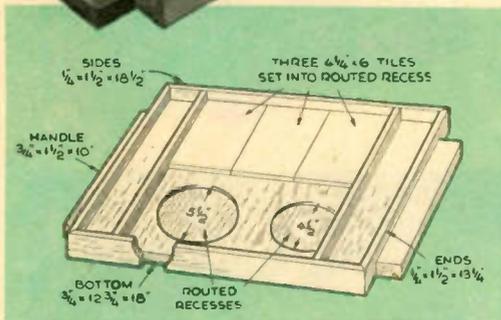


THREE TEA TILES ON CEDAR TRAY

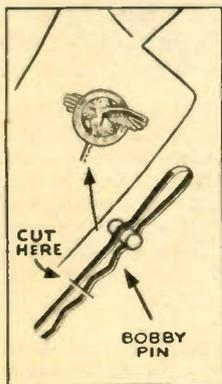
TEA tiles set into a recess in the floor of this tray make it ideal for serving hot drinks and dishes as well as cold and also add a touch of beauty. If tiles of your choice differ in size from those shown, dimensions should, of course, be changed.

Aromatic red cedar of the kind used in chests gives the tray a pleasant odor. The floor is built up of three boards rabbeted on the inner edges for glued joints. A rectangular recess is routed out to take the three tiles and two round recesses for dishes and the like are routed as shown.

Sides and endpieces are mitered for corner joints and, with the strips setting off the end compartments, are glued in place. Handles slightly recessed on the underside are attached with dowels put through the endpieces into the floor. The tray is shown in color on page 120.—ELMA WALTNER.



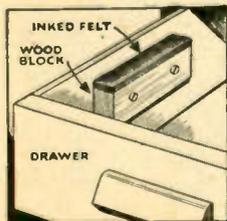
Bobby Pin Holds Lapel Emblem



DISCHARGE buttons are apt to be lost from the lapel of light-weight suits unless some means are taken to anchor them on securely. One way to do this is with a bobby pin put over the shank of the button behind the lapel. The bobby pin may be cut short and shaped if desired, by squeezing with pliers over a small nail.—E. H. GODFREY.

Stamp Pad Inside Desk Drawer

IF YOU frequently use a narrow rubber stamp, such as a date stamp, a pad screwed to the inside of a desk drawer will be handy. Glue a strip of felt to the edge of a block and saturate the felt with mimeograph ink. Inking will hardly be required oftener than once a month, and the block can be unscrewed for the job if preferred. No cover is needed for the pad.—D. H. MATHESON.

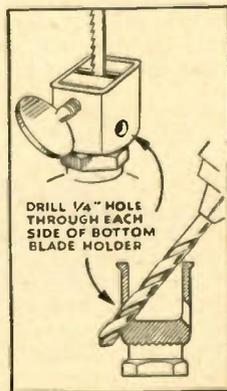


Dentifrices Shine Up Plastics

AS A kink in getting a higher luster on plastic pieces being worked, try polishing them with two kinds of common dentifrice— tooth powder and tooth paste. Rubbed in briskly with a small piece of felt, tooth powder and water will easily remove small marks in the surface; then use the tooth paste to give a high polish to the sanded ends and sides. Don't reuse the same piece of felt.—FRANCIS E. HOLMES.

Cleanout Holes in Blade Holder

SAWDUST won't clog the blade holder at the lower end of the jigsaw if you drill a hole in each of the two sides, as shown in the drawing at right. Much of the sawdust that collects around the bottom end of the saw blade will escape of its own accord through the holes while the saw is in use. What remains can be blown out easily when the blade is removed. Dust left packed in a holder often makes it difficult to obtain a good grip when a new blade is put on.—A. G. OGRIN.



NEW TOOLS

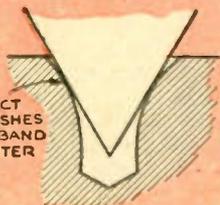
MULTIPLE GAUGE SETUPS are possible with this kit made by the Doall Company of Minneapolis. Used in conjunction with gauge blocks, the kit will permit almost any kind of inspection gauge to be assembled within five minutes. One unusual combination is an angle comparator having two dial indicators; when an angle identical to that set up with a sine bar is tested, the dials read alike. Another is an indicating square gauge; the work is simply pushed against a stop and an indicator tells if its side is precisely 90 deg. Also included is a set of accurately lapped wires of various diameters.



NEW CENTER DRILLS without the usual 60-deg. countersink have been developed for use on work to be mounted between machine centers. The Hy-Co drill produces a center hole having a curved section, which is said to result in a burnished, narrow-band seat that stays true under load. The drill has a relieved tip that may be easily removed if broken in the work.



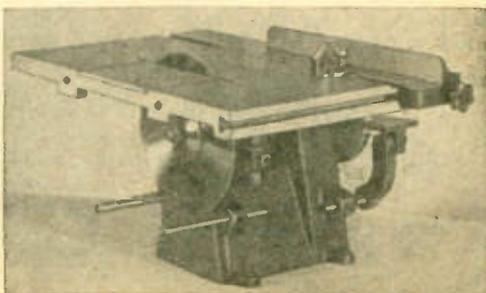
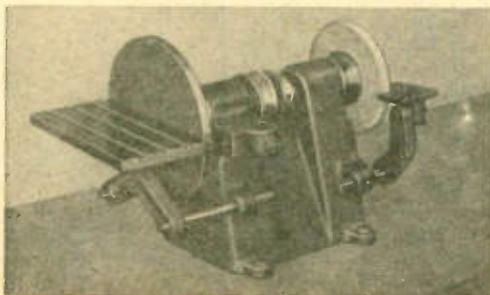
LINE CONTACT BURNISHES HARD BAND IN CENTER HOLE



TINY POWER BRUSHES fit many hard-to-reach spots and are handy for removing rust, burrs, and mold marks as well as for general finishing and polishing. Sold in sets of twelve by the Osborn Manufacturing Co. of Cleveland, the wire brushes may be used in drill presses, electric drills, flexible-shaft tools, lathes, and bench grinders with chucks.

PACKAGED WORKSHOP. Designed for home shops and light manufacturing, this power tool combines a circular saw, grinder, sander, and buffer. Set up as shown at left below, the tool has a grinding wheel at one end of its ball-bearing spindle and an abrasive disk at the other. To convert it to

a saw (right below), the sanding table is removed, an 8" circular saw replaces the sanding disk, and a cast aluminum saw table is attached. The latter tilts to 45 deg. and has a miter gauge, rip fence, and an adjustable plate for the use of a dado head. The Parlec Tool Company, Inglewood, Calif., makes it.



FORMS for CONCRETE SLAB FLOORS

FIRST OF A SERIES ON HOW TO BUILD SMALL STRUCTURES

By EDWIN M. LOVE

SLAB floors of poured concrete are excellent not only for shops and garages but also for store buildings, offices, and residences that do not require a cellar. They are particularly suitable for amateur construction, since they reduce form building to a minimum and eliminate complicated sill arrangements, the labor of placing and leveling floor joists, and the installation of bridging and underpinning. In many instances, such construction also costs less for materials.

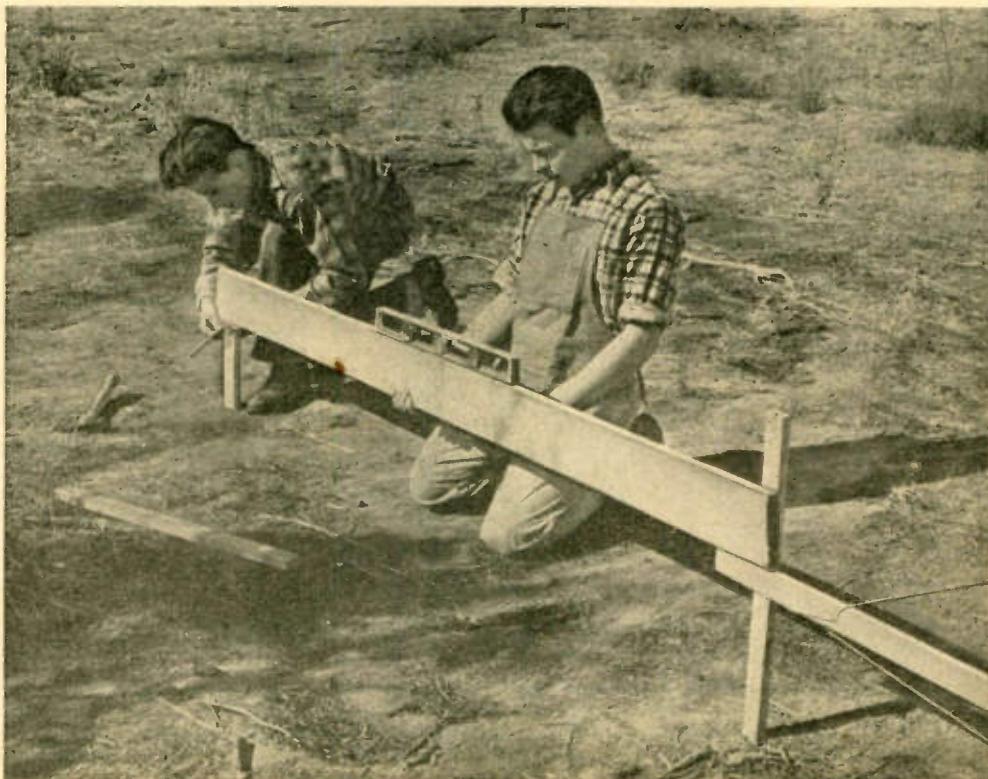
The initial problems in building are locating the structure on the lot and squaring and leveling the foundation form. Usually it is sufficiently accurate to come within 1" or 2" of the planned spot, but closer limits are easy to attain. A base line from which to measure may be the edge of the front sidewalk, a line stretched between

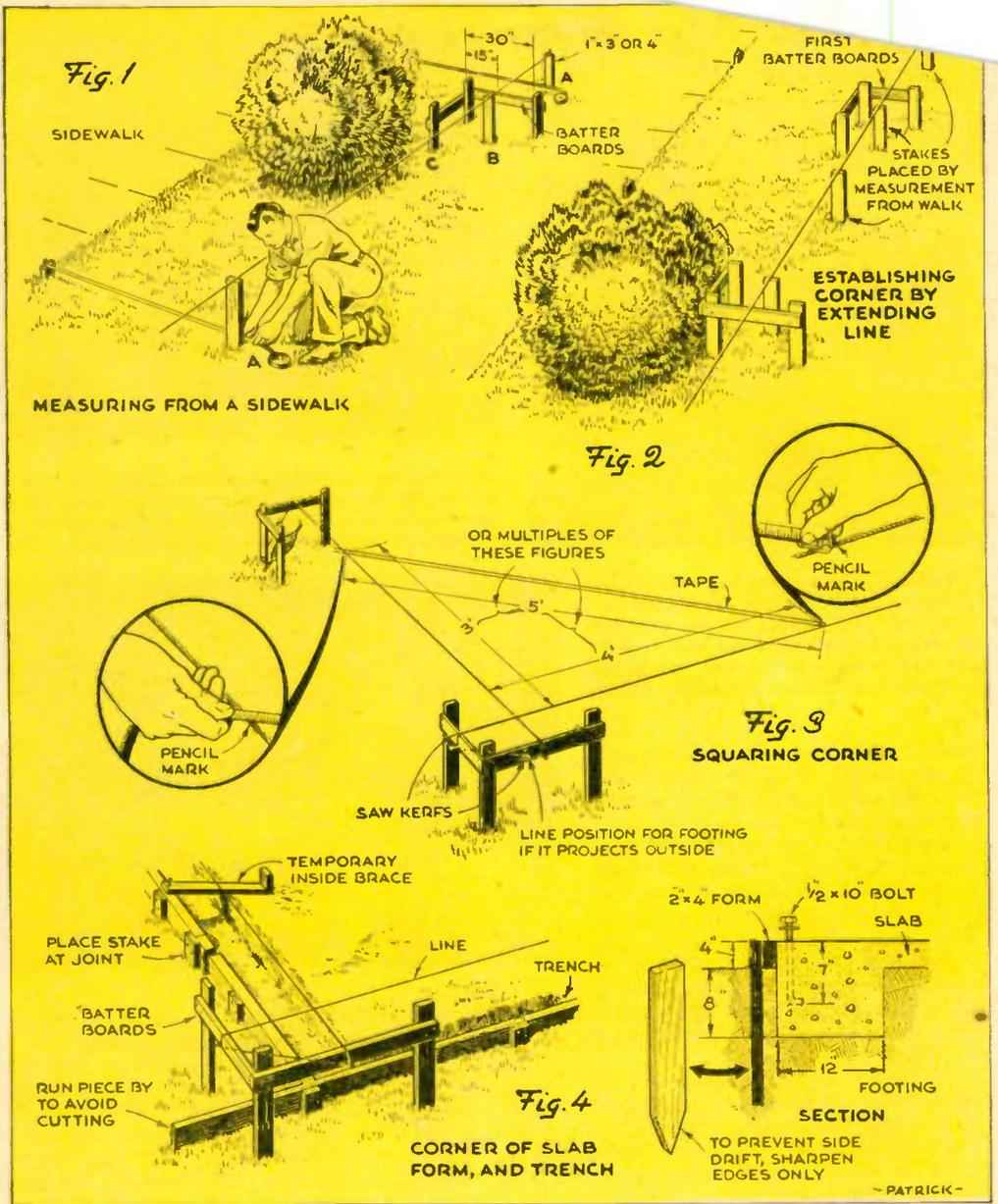
surveyor's corner stakes, or a center line in the street or road if there is no sidewalk. Occasionally a building already on the property will serve the purpose.

A method of laying out the side of the building is shown in Fig. 1. Stakes at two well-separated points at the edge of the sidewalk have nails driven in at the tops to catch the ring on the tape. Measure from these points to locate two stakes A-A, and mark accurately on their sides; then transfer the measurements to the tops by use of a level. Cut a saw kerf in each to receive a mason's line stretched between them.

Next, locate an approximate corner stake B, by measuring from the side of the lot, and then drive three plumb stakes, as at C, forming a corner well outside the temporary stake B. Nail on batter boards leveled a few inches above the floor to be laid so as to allow for grade slope and to keep sagging lines from touching the ground. This corner

Leveling is done between stakes, with each stake marked and a nail driven in to support the straightedge.





is a rigid assembly out of the way of the form and trenches.

Drive a corner stake for the second corner at the established line and erect batter boards. Locate the level height on succeeding stakes with a transit, if possible, or by using a long straightedge and a carpenter's level, as in the photo on the facing page. Rest one end of the straightedge on a batter board and mark the level on a stake driven near the other end. Drive a nail at this mark, rest the straightedge on it, and set a

second stake, repeating until the far batter boards are reached. Turn both the straight-edge and level end for end at each new stake so any error in either will be largely canceled out. It is not unusual to find a discrepancy of $\frac{1}{8}$ " or more at the last stake, but this can be overcome by working in both directions from the first corner and doing a little "dividing up."

With two sets of batter boards placed, mark the position of the line with a plumb bob and saw shallow kerfs to take it. Then



When batter boards are being placed for a second corner and the established line does not reach, extend the line over the second measured stake, as above. Shift the line to align with a saw kerf in the stake and mark it on the batter board.

mark the position of the next side by measuring from the edge of the lot, and mark the third by measuring from the second.

Sometimes the established line measured directly from the sidewalk doesn't extend to the second batter board (Fig. 2). In a case of this kind, do not fasten the line to the nearer stake, but extend it to cross the batter board, shifting until it is aligned with the stake kerf, and then mark it on the batter board, as shown at left above.

To locate a rear corner, lay a framing square on the ground with the blade parallel to the first line, determining the position by sighting, as in the photo at top right. Watch as a helper unreels the line, signaling him to the right or left. Measure the length of the side, and drive the approximate stakes; then place the batter boards. Sight along the blade of the square as the helper tightens the line and ties it. Figure 3 shows how the sides are accurately squared by measuring along the lines and marking them with a pencil. When the lines are square, a measurement between the pencil marks will be in the proportion shown. If adjustment is needed, shift the rear end of the second line.

Place the approximate stake and the batter boards for the fourth corner by measuring from the second and third corners, and



Approximate squaring of a line to locate a far corner is done by sighting on a framing square lying on the ground. Below, a screed cleated to slide on the side of the form reveals uneven spots on the base surface.



make a final check on squareness by measuring diagonally between line crossings.

It is of course desirable to have the floor above the grade line to keep water out during storms. If the slope of the lot is slight, place the 2" by 4" form members directly on the ground at the lowest corner and cut into the higher ground as necessary to level them. Establish the corners by dropping a plumb bob from the lines to the inside faces of the forms, and drive stakes at all joints and at other points so no two stakes will be more than 8' apart. Establish corner levels by measuring down from the lines, and then level from joint to joint with the straightedge and level. Blocks of equal thickness tacked to the ends of the straightedge will prevent it from riding on high spots in the form. Straighten members by sighting along them and over the lines. Saw part-way through any out of line and spring them back into position, holding

them with stakes driven in. Two 6-d. box nails are sufficient in each stake. Temporary shores or braces, to be removed as the slab is poured, will support members that sag inward, as in Fig. 4. The ends need not be cut off if one can overlap.

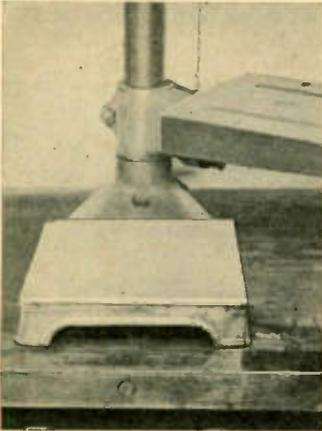
Dimensions of the footing trench will vary according to locality and should be determined by local practice. Those suggested in Fig. 4 should serve in mild climates, but before starting to build, it's wise to obtain minimum requirements from the city or county building office, as penalties are often severe for violations of building laws.

Dig smoothly, since irregularities waste concrete and do not strengthen a founda-

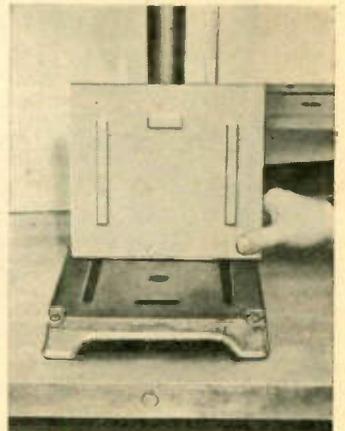
tion or floor. Excavate for the floor by digging out high parts and throwing the dirt into low sections for firm tamping. All tree sprouts and live roots should be dug out. Gauge depth with a leveling strip or screed made from a length of two-by-four with cleated ends to slide on top of the form, as in one of the photos on the facing page.

Mark bolt positions on the form, spacing them 6' apart, or according to building laws, and 2" inside the edge of the slab. Place one about 10" from the outer corner at the end of the side from which studding is to be placed, and then measure from there. If this is not done, some bolts may come in a stud position and make notching necessary.

Plywood "Pan" Keeps Chips from Under Base of Drill Press



SCRAP plywood can be made in a few minutes into a "chip pan" to fit the drill-press base, as shown at left, and prevent litter under the machine. Cut the plywood to the outline of the bottom table, nail cleats to the underside, as at right, for a snug fit in the slots in the base, and then paint it. Chips may be brushed off as necessary during work, or the "pan" may be removed and emptied after each job.—D. J. BACHNER.



MIXING CONCRETE

[HANDY MAN]

Thorough mixing of the cement, sand, and aggregate is necessary for concrete. If the job is large, it is best to borrow or hire a mixing machine, but the mixing can be done, if necessary, on a platform about 8' by 14'. Make the platform of 1½" to 2" stock, preferably tongued and grooved, and nail strips on three sides so no cement will be washed away and lost. The platform should be near the site so the concrete can be shoveled directly into the forms.

An average wheelbarrow will hold about 2 cu. ft. of sand or crushed stone and can be used for measuring. Or the materials may be shoveled into a bottomless box placed on the platform and then lifted away. One 12" high by 24" by 24" inside will hold 4 cu. ft. Lines marked inside at 3", 6", and 9" heights will measure 1, 2, and 3 cu. ft. One bag of cement measures 1 cu. ft.

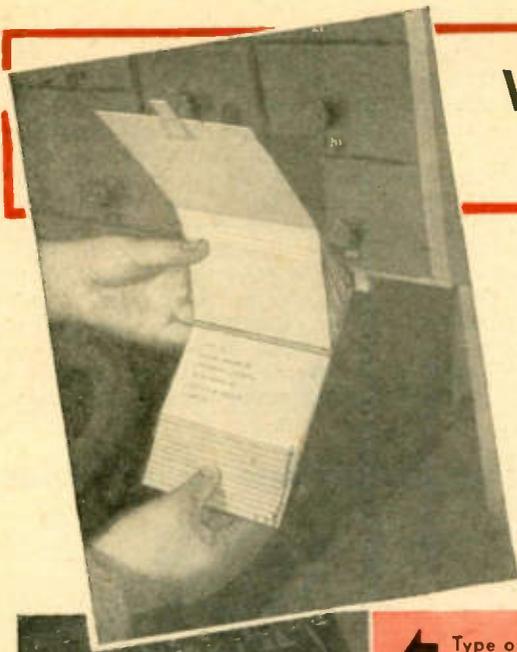
Put the sand on the platform first and spread the cement on it evenly. Mix thoroughly with a shovel, first dry and then wet. Spread out the mortar, put the crushed stone or other aggregate on top, and mix thoroughly, adding more water as required. Light aggregate may also be mixed dry with the cement and sand before water is added.

A minimum of water produces the greatest strength in the finished concrete, but be careful not to use too little, as that would prevent proper mixing. Generally, when the sand and aggregate are dry, a minimum of about 5½ gal. to each bag of cement will be found about right. Less water will be needed, of course, when the materials are wet. The water used must be free of all impurities. To be suitable, it should be fit to drink.

POPULAR SCIENCE MONTHLY SHOP DATA

Workshop Index File

AN AUTOMATIC MEMORY

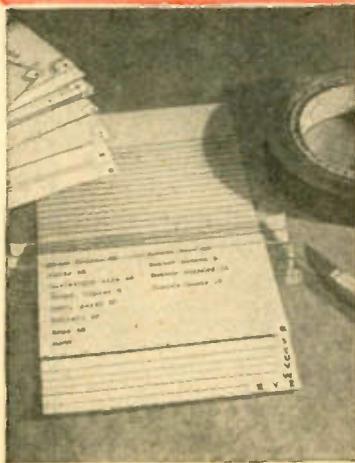
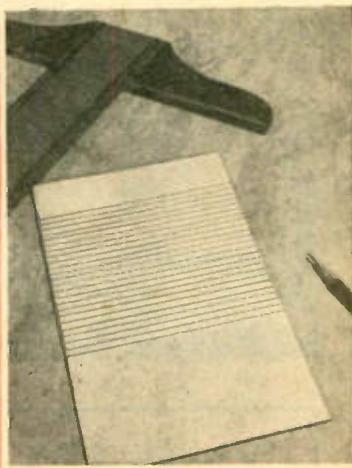


WHEN numerous small parts, specimens, tools, and materials are kept in cabinet drawers, an index file is essential for quick location. This one is made of standard file cards attached to a backing with cellulose-tape hinges. The index letters can be seen at a glance. Wood rails screwed to the bottom of the cabinet, if there is room, provide a place for the unit. Though made of cardboard, the index should last a few years, after which recataloguing may be necessary anyway.—WILL THOMAS.



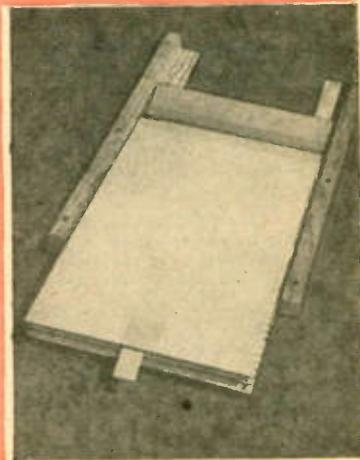
← Type or write contents titles on 3" by 5" file cards, leaving space to add later entries. Ink in index initials in one lower corner or use prepared tabs. Letters cut from a magazine would do if glued on.

Make the back of heavy cardboard 5" wide by 7½" or more long. Begin 3" from the bottom and rule it horizontally every ¼". Have a space for each card used and leave a ½" margin at top. →



← Cards are put on with tape hinges. A single strip holds, but the cards may be folded up and taped on the back also. Start at the bottom. Leave a blank corner when one letter covers two cards.

Trim the tape even at the sides and cut the top margin off. Add a thin cardboard cover with a tab at the bottom. Make up two L-shaped rails, screw them to the cabinet bottom, and slide the file in. →



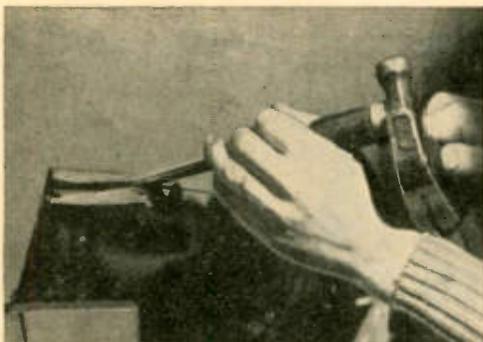
REPAIRING a STOVE-IN HULL

By ELON JESSUP

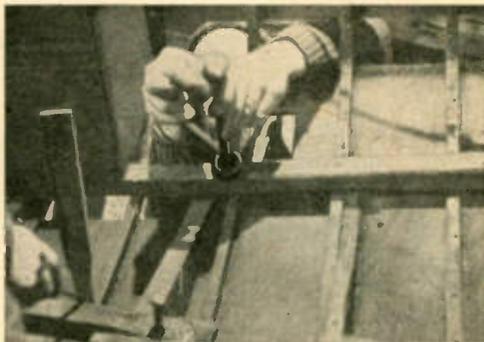


WHEN your ship comes in on the rocks, and you get it on the stocks to find a hole stove in big enough to drop an anchor through, don't be downhearted. Things may not be as tough as they seem—it's often plain sailing to replace wrecked planking with a tight patch. When she's sanded down, brushed off, and then spread with paint or varnish, nobody will ever know your boat had once been ripped open.

Step-by-step repairs on such a hull are illustrated by the photos on this and the following page. Two pieces of planking have been damaged on the 16' cedar boat shown, requiring two new planks for repair.



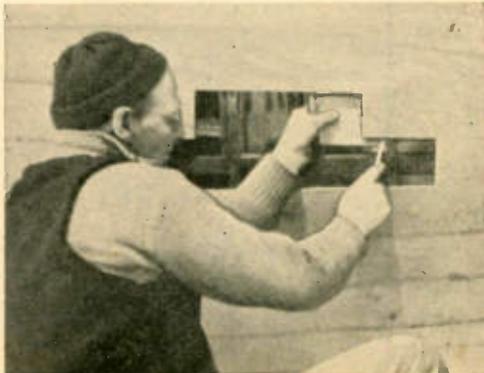
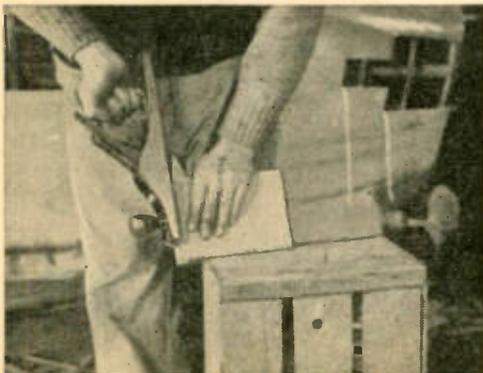
1 Damaged planking is first cut away to solid wood with a keyhole saw and pried out to the seams above and below. Where abutting planks are damaged, replacements must be of unequal lengths.

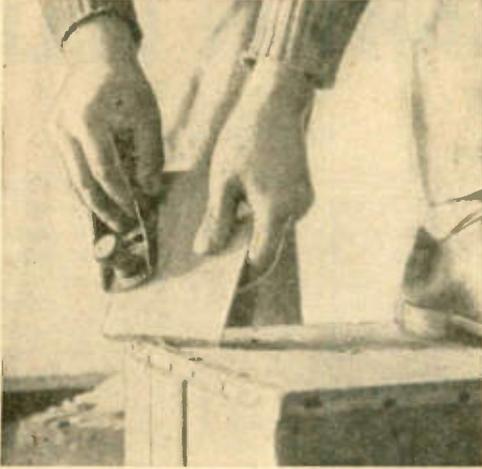


2 Fasteners holding the damaged parts are now useless and should be removed. They can be reached through the hole in the hull and their heads cut off. Then they are pounded through.

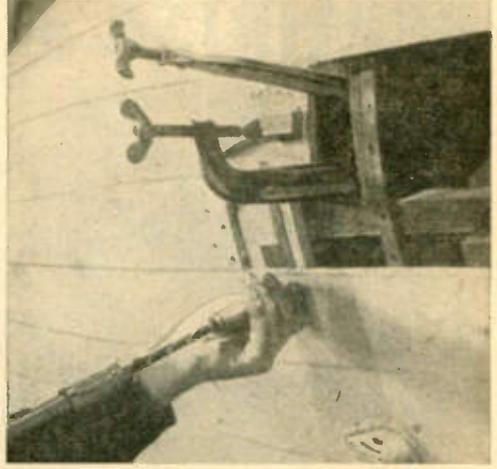
3 This is a key step in the replanking job. An oak butt block of the same thickness as the planking must be cut for backing up the new planks from the inside at each end.

4 Here a butt block is being fitted. Half of it shows, the other half being covered by the hull. The block overlaps the hole by from $\frac{1}{4}$ " to $\frac{1}{2}$ " at both the top and the bottom.

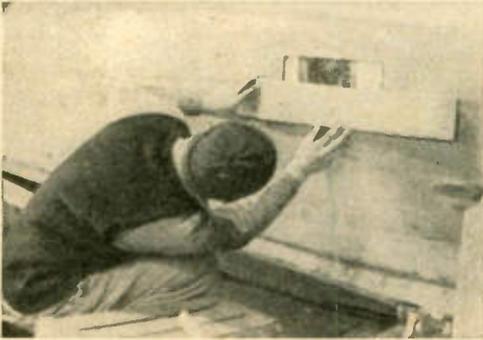




5 Next, the outer face of the butt block must be curved by planing to fit flush against the natural curve of the inside of the planking. The grain runs lengthwise of the boat.



6 Hull, frames, and butt blocks are clamped firmly together and held by screws put into countersunk holes. Here a butt has been screwed on, and a screw is being put into the frame.



7 Then a new section of planking is marked up to fit the lower part of the gap. The stock used should be $\frac{1}{8}$ " thicker than the original on the boat so it can be planed down flush.



8 Take care with the planking to get an exact fit, and then bevel the edge for calking. Holes are bored and countersunk deeply, and the screws are put into the butt blacks and frames.

9 Using a plane, take the planking down flush with the rest of the hull. The screw heads have been countersunk deeply so there will be no danger of striking them and damaging the plane.

10 Finally, the seams, including those at the butts, are calked tight, and all the screw holes are puttied up. The new planking is then sanded, brushed, and painted or varnished.

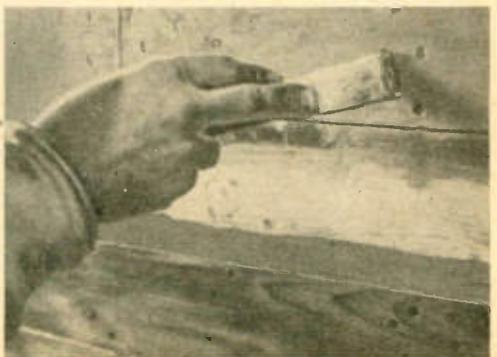
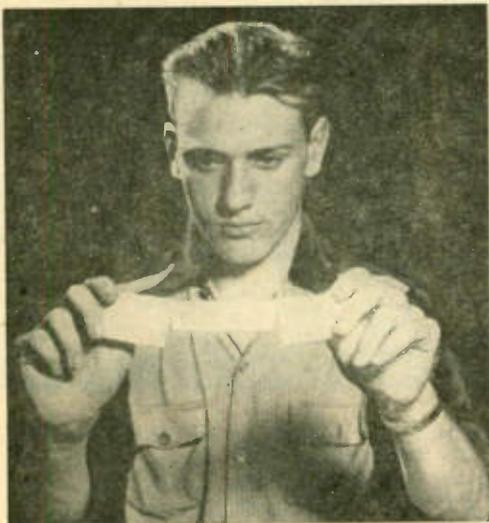
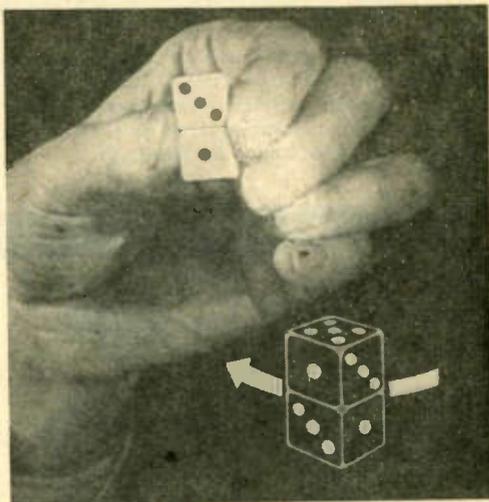


TABLE TRICKS



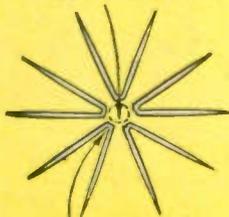
TEARING BOTH ENDS away from the middle of a strip of paper sounds easy. Actually it's difficult. But you can have a lot of fun in a group of friends if you can work up interest in the stunt. Cut almost through the strip at points equidistant from the ends and make the cuts as nearly even as possible. Try then as you will, one link will always give way first.

COINS DISAPPEAR without going up your sleeve. To prove it roll up your right sleeve and have a friend grip your right wrist. Show him how by gripping it yourself, as below, and shake your arm to jingle the coins. Then when your friend takes hold, open your right palm, and the coins will have vanished. They were really in your left hand all the time. If you find it hard to hold the coins when releasing the wrist, try gripping it from beneath instead.



PUTTING MAGIC ON DICE so the *three* shows over the *one* at one moment and the *one* shows over the *three* the next is mystifying but easy. Of course, you must arrange the dice with the adjacent *three* and *one* faces as indicated in the drawing. Conceal the faces on both sides with the thumb and forefinger, stroke the dice with a finger of the other hand, and while that hand conceals then, give them a quick quarter turn. Don't repeat the trick too often.

DROP WATER HERE



BEND TOOTHPICKS
IN MIDDLE

TOOTHPICKS FORM A STAR before your eyes if you bend five of them in the middle and arrange them as shown at left. Then let a drop of water fall in the center, and they will jump to the position shown at right. The trick should be performed on a metal or waxed table, and you may need practice in aiming the drop of water.—S. C. DEAN.

STAR FORMS



CHESSMEN turned to



CHESSESS players who are also workshop enthusiasts will derive double enjoyment from this project. Craftsmen not adept at chess will still find interest in the turning, and the set will make an ideal gift.

Use of 1" maple doweling simplifies the job of turning if the stock is close-grained and free from blemishes. About two lengths will be enough for all 32 pieces with some left over. If you don't have a regular screw center, it will be worth while to turn one of hardwood like that in the drawing below to hold the pieces accurately centered. Drill a $\frac{1}{2}$ " hole for a depth of $\frac{1}{4}$ " and drive through a wood screw, as shown, so that $\frac{3}{8}$ " of the end protrudes. This screw must be accurately centered. Turn the spindle by hand, noting any variation of the revolving point. Bend the point slightly with pliers, if necessary, until it turns true.

Cut the doweling into required lengths, taking care to saw the ends square, and mark centers accurately on both ends. This is best done with a 1" disk cut from heavy cardboard. Push the fixed end of the compass all the way through the cardboard, and use this hole as a center through which to prick a mark on the pieces with a small punch or scriber. Then drill a $\frac{3}{32}$ " hole about $\frac{3}{4}$ " into one end and absolutely perpendicular to the face. Screw this end flush

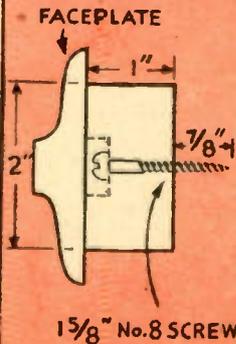
Front • KING • Back



KNIGHT

SCREW CENTER

Front • BISHOP • Back



the QUEEN'S TASTE



on the screw center and bring the dead center in, oiling it to prevent friction.

If you wish to make the pieces the size shown in the drawings, full-size templates can be directly traced. However, the patterns can readily be enlarged or reduced, using either proportional dividers or photostatic methods. Turn the pieces about $1/32''$ over dimensions and finish by sanding. Two chisels, $1/4''$ and $1/2''$ in size, and a small flat or half-round file will be tools enough. Be sure the chisels are sharp, or chipping may result. As a further precaution against chipping, use the file for a finish cut on all sharp edges, such as the hats.

Most of the painting can be done in the lathe as well as the application of a wood filler. Use a good camel's-hair brush and first-quality enamel and run the lathe at a very low speed, if it has one, or turn the spindle by hand. Put on two base coats, black for one set and white for the other. Much of the design can also be put on in the lathe with the tool rest supporting the brush hand. Touches of color, as in the photo on page 120, add interest. If you find

the pieces are not sufficiently stable during play on the board, bases can be weighted by boring them out and filling with molten lead, or by cementing on heavy washers and felt disks.—JAMES S. HARTZELL.

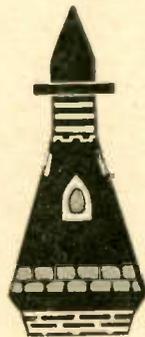
Front • QUEEN • Back

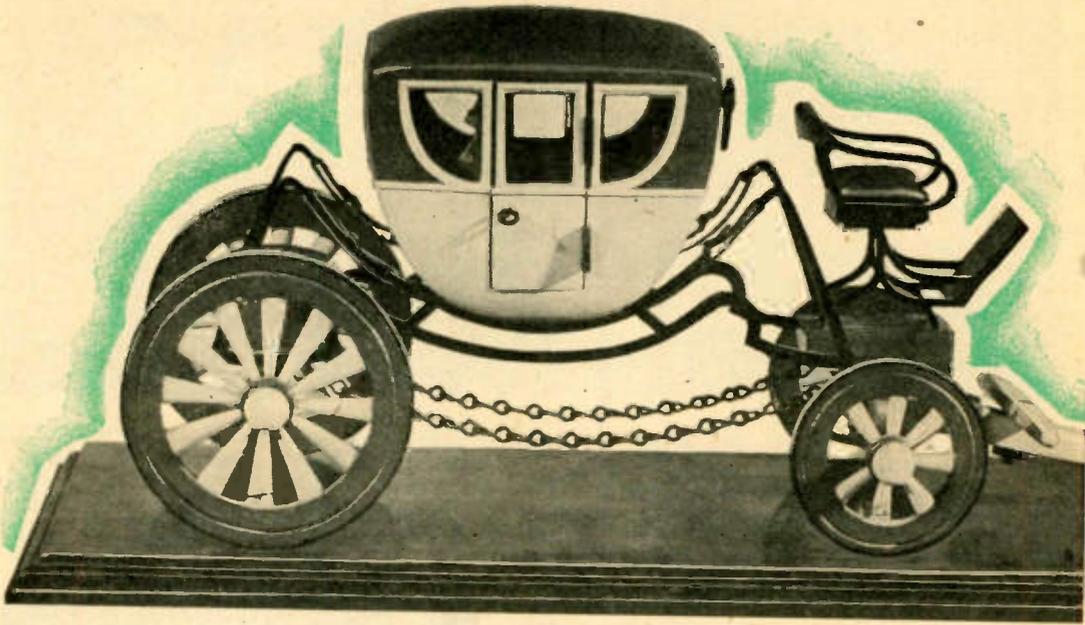


Front • PAWN • Back



Front • CASTLE • Back



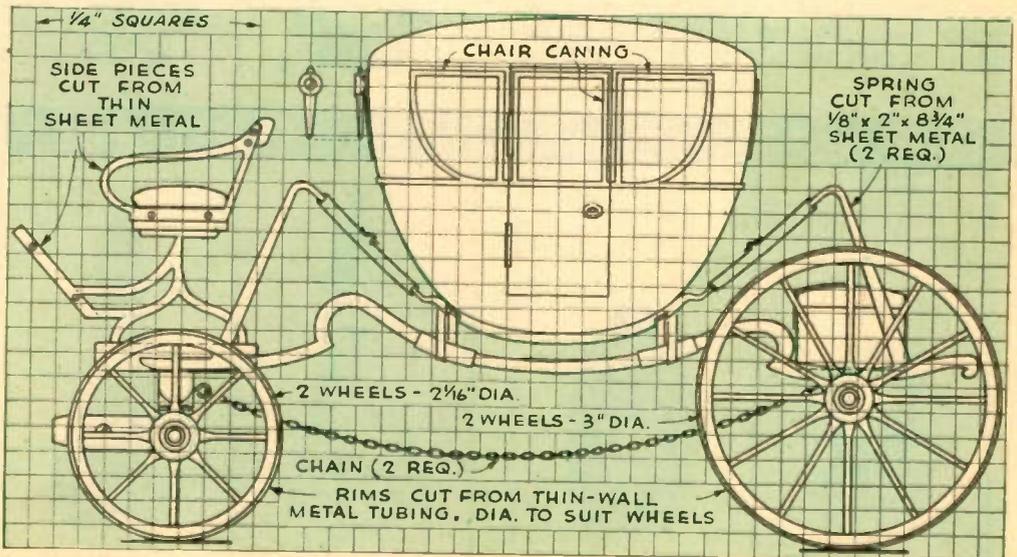


IN THESE streamlined times, George Washington's coach may look like an ornate relic of a distant age. But on close examination even the modern eye will be struck by the simplicity of its lines. Perhaps this simplicity appealed to America's first President; certainly the rude roads of the times demanded a vehicle both light and sturdy.

Compare Washington's conveyance, for example, with the British Royal State Coach, built just a few years earlier. The

latter was elaborately ornamented and encrusted with gold. In contrast, the head of the United States government contented himself with this relatively simple one.

Two virtually identical coaches were imported from France at the same time, and no one can be sure how many other copies of this pattern were turned out by the same coachmaker. The fact that there were at least two such coaches in America has caused some confusion among the experts. It is known that the one the President used

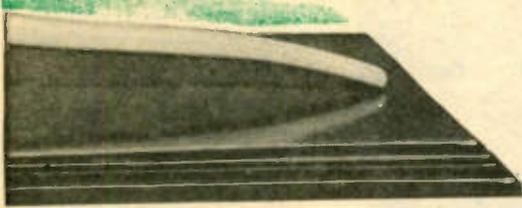


MANTEL MODEL OF

Geo. Washington's Coach

By WILLIAM J. WARD Jr.

This attractive miniature is made of oak and mahogany with brass fittings.



no longer exists, but there is some doubt as to whether the one now at Mt. Vernon, from which this model was copied, is an exact replica.

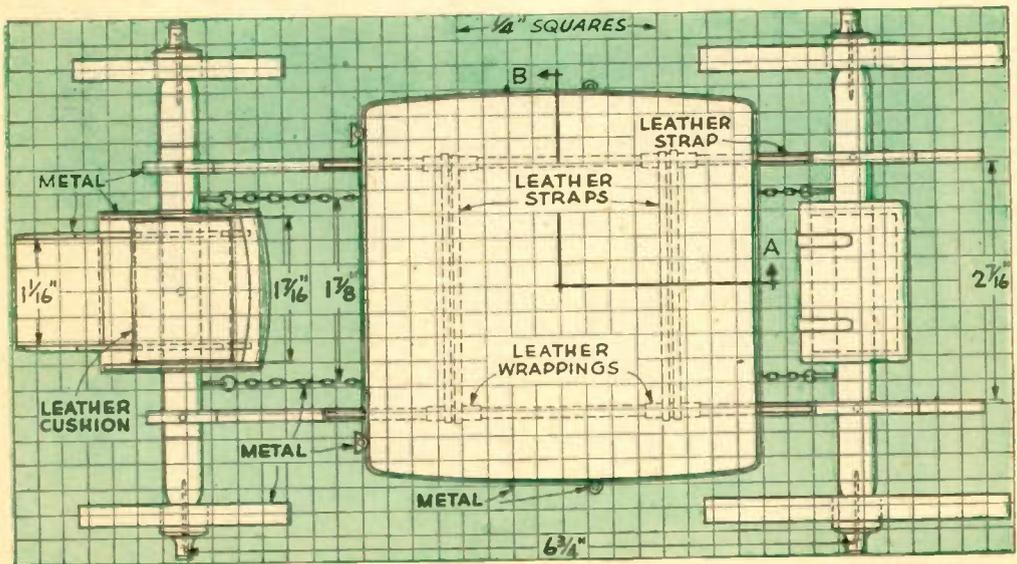
In this hand-carved miniature, the wheels were whittled out of solid oak. More accurate modeling is possible by following the method of the coachmakers of that time. These skilled masters made each spoke individually and then let it into the rim and the hub.

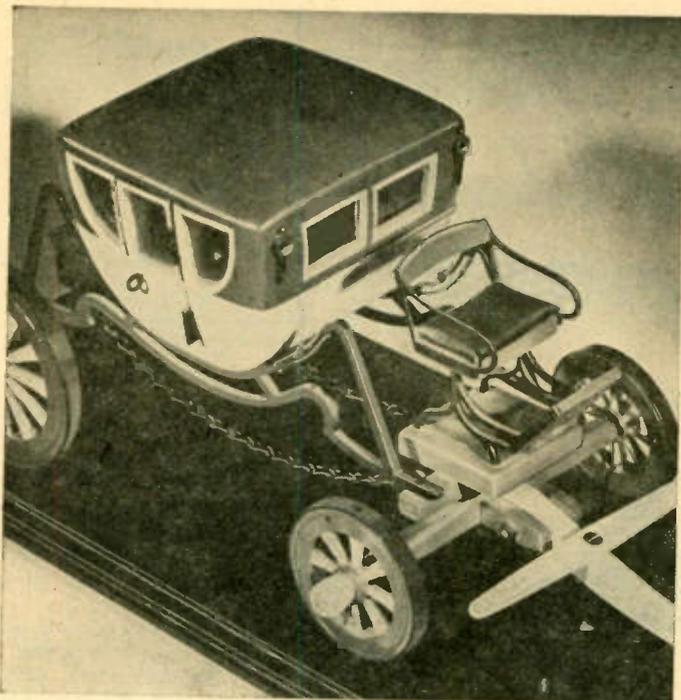
For those who prefer this method, the

drawing suggests proportionately thinner spokes. If you enjoy delicate lathe work, you can turn them; alternatively, $\frac{1}{8}$ " dowel can be sanded or carved to a taper at one end, and to a wedgelike tenon at the hub end. The hubs themselves can be turned or carved of hardwood dowel, or built up of disks of various diameters to afford the contour shown.

The tires for the wheels were made of thin-wall brass tubing, which happened to be available in the right diameters. If you don't have such tubing, cut strips of sheet brass slightly longer than the wheel circumference, screw or brad them to the wood rims, and solder the joints. When the coach is mounted with the joints at the bottom, these will be concealed by the base.

To make the springs and the curved main frame members which join the axles, enlarge the profiles to scale, and trace them onto a sheet of $\frac{1}{8}$ " sheet brass. Saw the metal with a jeweler's saw, and dress smooth





All metal frame members used in this model were cut from sheet stock, but stiff wire will also serve for some parts. Solder joints can be filed to form smooth fillets.

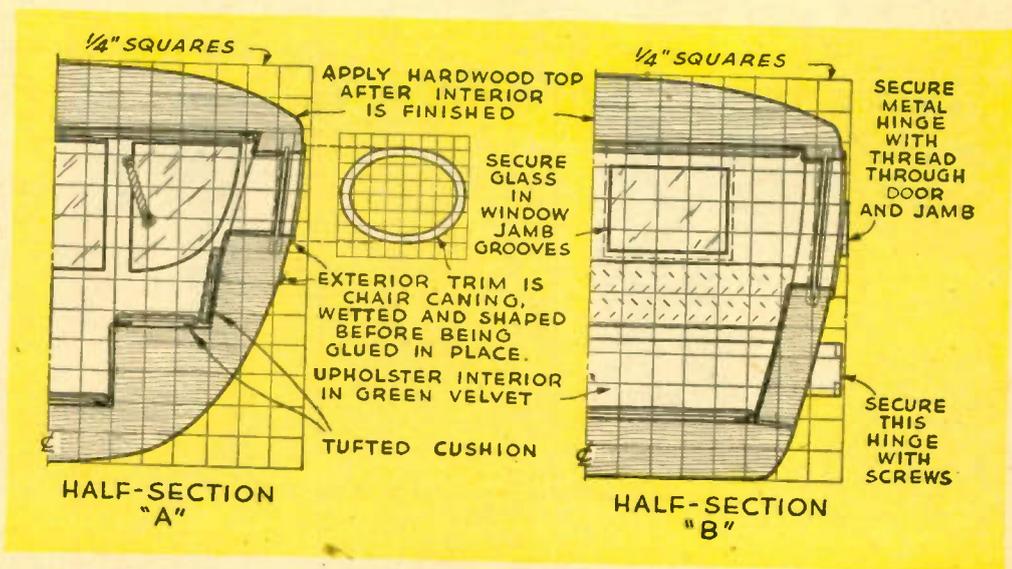
hammered flat where necessary for attaching with escutcheon pins to the seat and footboard. Fillets can be formed of solder. Strap buckles are bent from light wire. The driving lights may be sawed and filed out of $\frac{1}{8}$ " brass, a glass bead being set into a shallow hole to simulate the glass window.

A built-up block of mahogany was used for the body, the several layers or lifts being dimensioned to afford the setbacks shown in profile section "A." If you have a router, you may find it easier to cut these steps from a solid block.

with a file. The curved members directly under the coach body are made of the same stock as the springs, from which they are suspended by leather straps. The coach body is actually cradled on cross straps joining the spring-suspended members.

The coachman's seat and footboard support can be sawed from $\frac{1}{16}$ " sheet stock or alternatively bent from heavy wire,

In this model the windows are actual glass panes, let into grooves in the vertical window members through slots cut in the top crosspieces. A simpler way would be to carve rabbets for the glass from the inside and glue in strips to retain the glass. The strips will later be covered by the green velvet that lines the interior of the coach. Mica, celluloid, or cellophane may be sub-



Side doors swing freely on two hinges. The trunk may be carved as a solid block, but if you like to attend to all details, hollow the box, and hinge the lid on top.

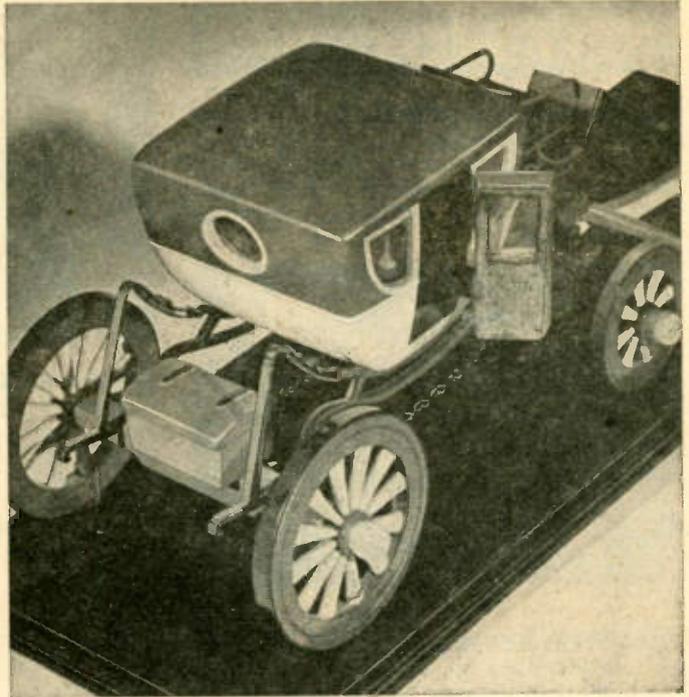
stituted for the glass. The roof is glued on last, and the exterior is shaped and sanded smooth.

Hinges are made of brass; the lower ones are set with screws, and the upper ones secured with silk thread which is pulled through to the window grooves and tied before the glass is installed. Door handles are tiny, bent screw eyes, shaped with a file.

To make the driver's seat, place a pad of cotton on a sheet of cardboard of proper size, and cover it with thin leather. Fold the leather tightly, and glue it under the cardboard.

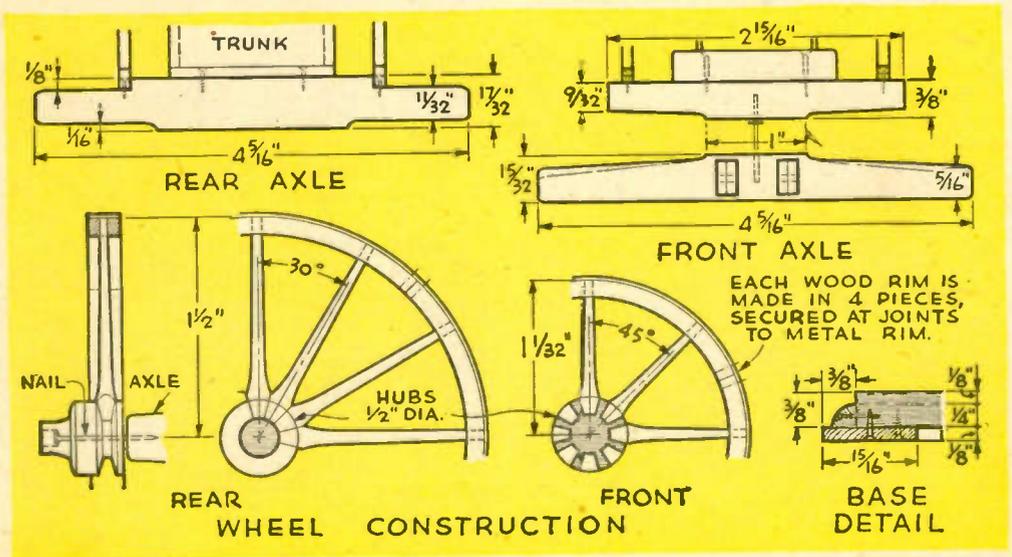
Interior seats are similarly made, except that green velvet is used in place of leather. A tufted effect is obtained by sewing tight loops of green thread through the fabric at short intervals. Tasseled hand pulls are suspended from the jambs of both doors. The outside window trim is chair caning, shaped after wetting, and glued in place.

Finish the coach by sanding all surfaces



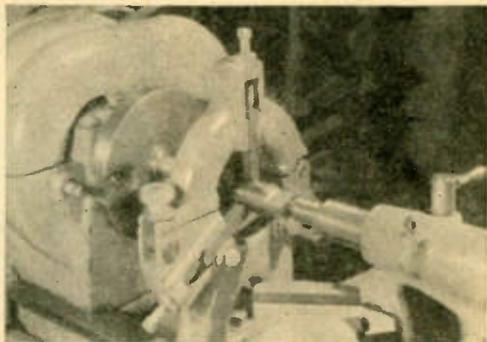
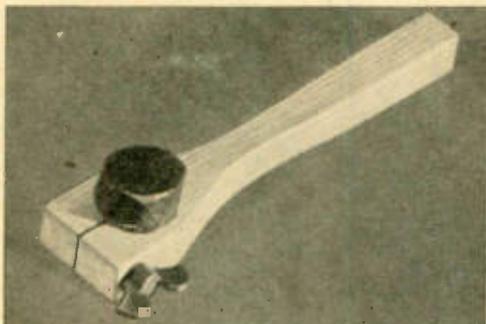
smooth and applying several coats of enamel. The cream-and-green color scheme, shown in the photo on page 120, is taken from illustrations of the original coach.

It is usually a good idea to mount this type of scale model on a permanent display base. Leaving it unmounted may prove too great a temptation to friends who must find out whether the wheels turn.



NEW SHOP IDEAS

BELT DRESSING is applied safely in a holder like that below without danger of injury from a running belt. The wood holder is handsawed to shape, bored with an expansive bit, slotted, and drilled for a clamping bolt.—C. W. W.

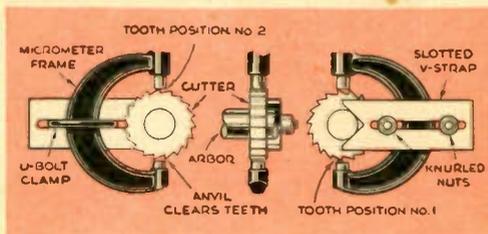


STEADY-REST JAWS can be adjusted with accuracy for precision work in the lathe if you happen to have a mandrel of the exact diameter of the workpiece. Mount the mandrel between centers and carefully adjust the jaws to it. Then when the work replaces the mandrel, the work axis (and any boring or other cuts) will be truly parallel to the lathe bed.—C. W. W.

DIAMETER MEASUREMENTS of odd-tooth cutters and gears can be taken direct with a micrometer if a slotted V-strap is made and clamped to the micrometer frame as shown in the drawing.

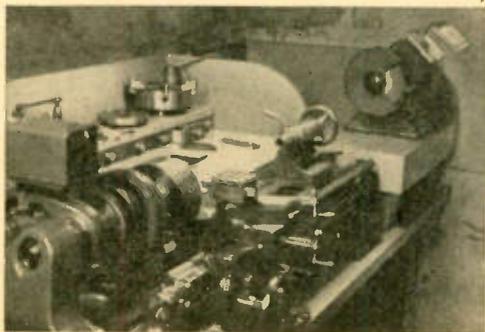
Mount the cutter on an arbor and clamp the V-strap lightly with the V well back. Place the anvil on the point of a tooth, as in position No. 1, turn the spindle down to straddle the opposite two teeth, slide the V forward snugly against the arbor, and clamp the strap tight. Then release the micrometer, bring the spindle in line with a tooth, as in position No. 2, press the V firmly against the arbor with one hand, and adjust

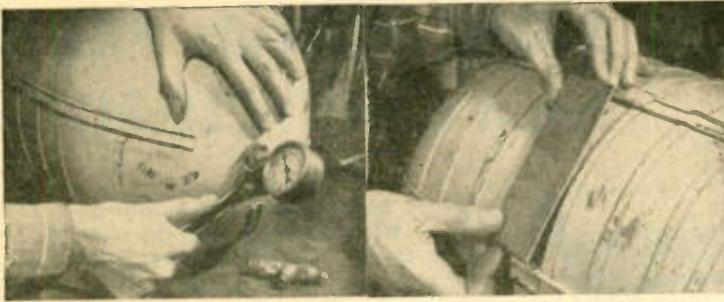
the micrometer with the other. The reading will show actual diameter since, while the anvil does not touch a tooth, the V holds it in relative position.—H. MOORE.



BACK BENCHES BEHIND LATHES are probably the most convenient means for keeping tools, chucks, faceplates, wrenches, and the like within reach. The back bench in the photo at left below extends around the end of the lathe and furnishes a suitable

mounting for a tool grinder and electrical outlets. That at right is inclined at an angle and has holes bored in it to hold chucks and collets. The latter type of bench is also convenient for holding blueprints out of the way yet handy for reference.—J. C. M.





STORED IN A PORTABLE TANK, compressed air can be carried with you to a job. The tank is also useful for such specialized work as operating an artist's air brush. It may be filled from your own compressor or at a service station, garage, or commercial shop. Any tank that is sufficiently strong to be safe and is not too heavy for easy carrying may be used. If you don't know its safe pressure, ask a boiler maker to give it a hydrostatic test to pressures well above those you will employ. The tank shown is a stainless-steel breathing-oxygen tank of the type used in military planes. It weighs about 18 lb. and has a volume of 2,200 cu. in.

The tank was obtained with a fitting that had both an inlet and outlet valve. A hand-operated petcock was substituted for the outlet valve and a plate attached to the side to keep the tank from rolling. The inlet valve should be the kind used in auto tubes. Install a reliable pressure gauge as a safety measure.—W. E. B.

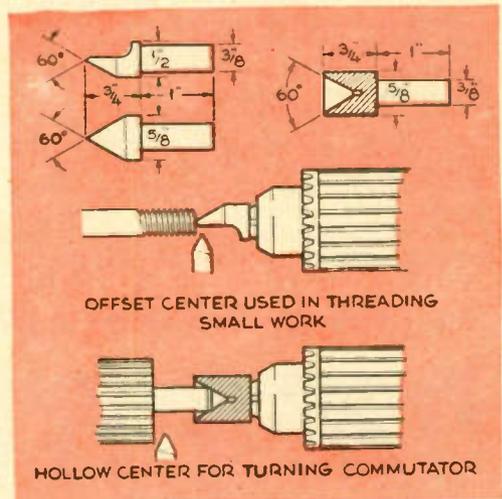
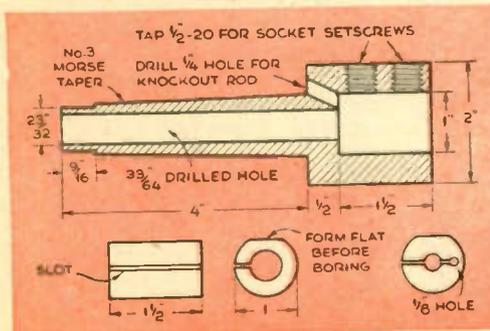


Daubled picture wire in old rubber air hose is a good carrying handle.

INEXPENSIVE COLLETS and a hollow taper-shank holder can be made on your own lathe, will hold round stock accurately, and will allow you to feed stock in through the spindle. Turn and fit the taper on unhardened tool, machine, or cold-rolled steel, insert in the spindle, and drill and bore for a push fit for 1" steel collets as below.

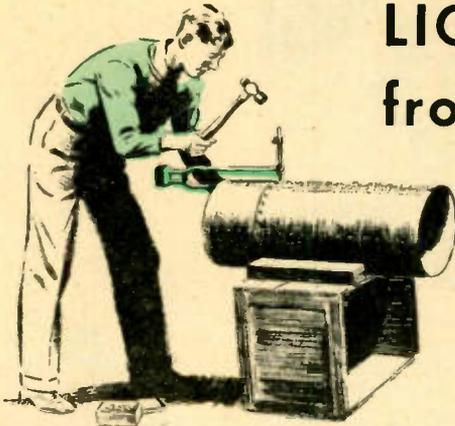
Square the collet stock to 1½" lengths in the three-jaw chuck. Then file 5/16" clamping flats on each. Clamp in the holder with the setscrews, and drill, bore, and ream the holes that are to hold the work.

Slit one side of each with a hacksaw and mark the outboard end. For the smaller sizes, make a supplementary hole and slit. When a collet wears, put a strip of soft steel in the slit to prevent compression and rebore larger.—JOHN A. BLAKER.



OFFSET AND HOLLOW CENTERS held in a drill chuck in the tailstock of the lathe will save time in turning special small jobs. They can be machined from tool-steel bar stock in one chucking, hardened, and then ground if that is desired. An offset center like the one shown above provides more working room and clearance for threading small work or facing between centers. A hollow center is useful for supporting small shafts or pins, as when truing up a small commutator.—R. M. DYKE.

LIGHT PUNCH PRESS from a BICYCLE FORK



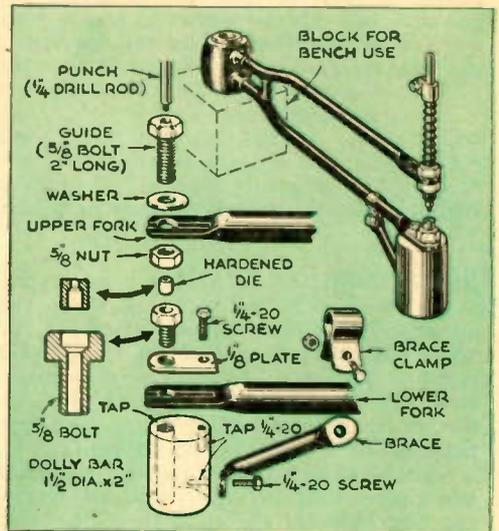
THIS little punch press, made from a rear fork of a bicycle, can be used on the bench or held by hand as the work may require. It can easily put $\frac{1}{8}$ " holes in mild steel or brass up to $\frac{3}{32}$ " thick. When it is used on the bench, a block is slipped under the crank-housing end, and a block may likewise be put under the dolly bar for additional support on large-diameter work.

A light spring automatically retrieves the punch from each hole. It is held against a discarded auto throttle-rod clamp that is clamped on the punch over a split brass bushing. Be sure not to use a stiff spring, for it may bend the forked frame.

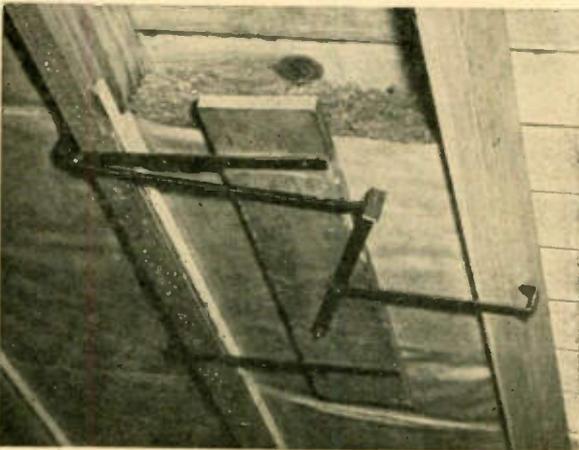
Punches up to $\frac{1}{4}$ " in diameter can be made up of $\frac{1}{4}$ " drill rod for use on light stock, and a hardened die insert may be made for each size. The inserts can be dispensed with, if desired, and the die formed in the bolt head if it is tool steel or can be casehardened. When three or more dies are

needed, however, the inserts will save time.

Cut the horizontal fork from an old bicycle frame and file notches near the end of the axle slots for the $\frac{5}{8}$ " bolts. Drill through the guide bolt, making a sliding fit for the drill-rod punch, and assemble on the upper prong, as shown. Then drill the dolly bar and plate, as indicated, and assemble on the lower prong with a brace and clamp. Bend the prongs to align them.—R. S. MACNEILL.



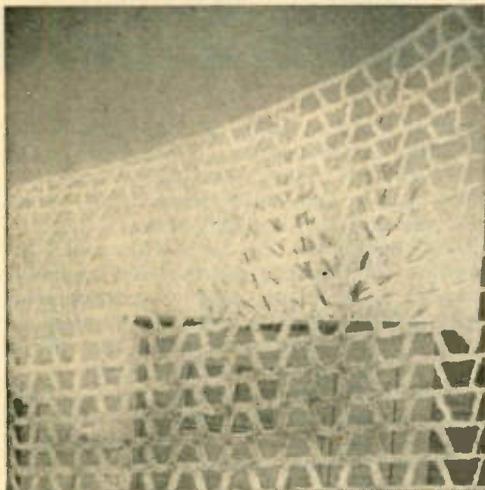
Jig Holds Up Insulation Bats for Installation Between Studs



NO HELPER will be needed to hold rock-wool or other insulation bats in place while you nail them to the studs in an attic wall or roof if you use a jig like that shown at left. Grind the ends of three pieces of strap iron to a point and bend each 90 deg. in two places so the point can be pulled into the outer sides of the studs. Nail or screw two of the straps near the ends of a length of board and pivot the third on a fourth strap-iron piece which in turn is pivoted on the board. A heavy spring between the free end of this fourth piece and one of the fixed arms provides the required tension.—LYELL J. MOORE.

CAN YOU BEAT THESE PICTURES?

We will pay \$5 for any photo used on this page. Write your name and address on each print. Enclose a stamped, self-addressed envelope and the negative, if it is available, and send your contribution to the Curious Photos Editor.



CROCHETING BY NATURE. This view of a fence enclosing a chicken yard was taken after a moist snow when every particle clung to the entwined wire. Nature in a domestic mood was caught by Mrs. Marie Lisec, of Omaha, Neb., when she brought her camera into play in her back yard.

AND NATURE'S MARBLE CAKE. Would you be able to tell what this curious pattern really is? It is foam on water flowing in and out of an inlet at the edge of a river. J. Q. Womble, of El Dorado, Ark., recognized the possibilities and snapped the interesting pattern from above.



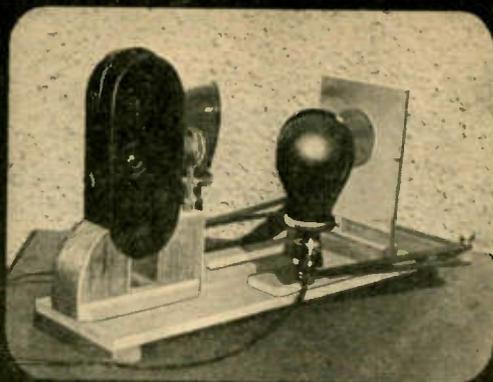
TIRED, BUT IT HOLDS ITS HEAD UP. Many trucks have skidded on slippery streets, but this one at Cedar Rapids, Iowa, turned over on its side and pushed its tractor and cab straight up into the air. Luck must have skidded along with it, for the driver was able to climb out from behind the wheel after the accident, dust himself off, and walk to a phone to call a wrecker.

GOOD ADVICE FROM THE CHINESE. The sign shown in the photo below hangs outside a tea shop in Tientsin, China. Its recitation of the effects of drinking tea will be a revelation, no doubt, to a good many constant users. N. Mihailoff, who lives in Tientsin, was so intrigued by the sign that he photographed it. In submitting the picture he failed to say whether he himself was a patron of the shop.



Trick Titrler

adds Phillip to Home Movies



If a picture is worth taking, it's worth titling. With a compact little titler like this, the task of dressing up film footage is greatly simplified.

By SIDNEY POTT

IT'S generally recognized that showing untitled home movies is a sure way of giving your friends that drowsy feeling. Interminable scenes of little Wilbur's first steps, mingled with equally tedious footage of Aunt Beulah smelling the dahlias, represent a parlor ordeal that few friends will take twice. With this compact wooden titler, however, it's easy to turn out a batch of your own individualized titles in short order.

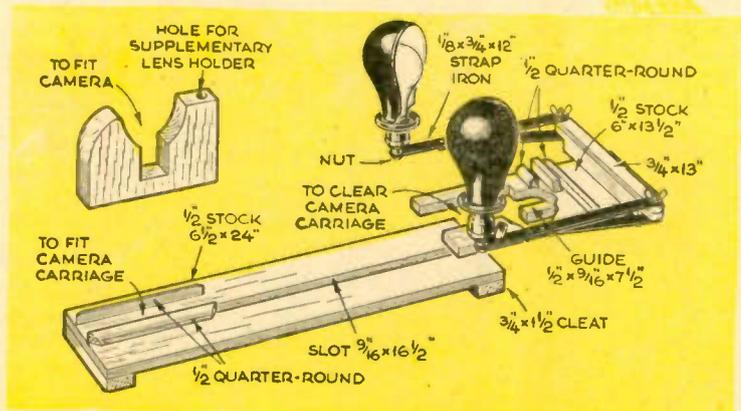
Suited to any ordinary home-movie camera, the device permits you to standardize on lighting and hence on exposure—thus eliminating one variable likely to cause trouble. Interchangeable boards afford title effects that range from the straightforward to the tricky. You will need only the simplest wood-working facilities to build the device.

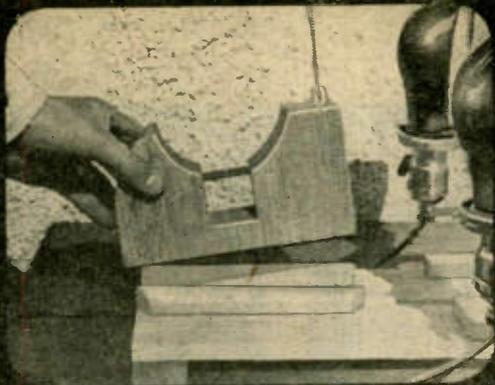
The first step is to provide a means for taking sharply focused pictures at close range. One way is to obtain a supplementary lens that will fit over the regular one. On some cameras, the same result can be secured by extending the regular lens outward

a short distance, using an extra lens mount or tube. A third method, which was used by the writer, is to buy some inexpensive spectacle lenses and determine by experiment the lens and distance that give the requisite effect. Sharpness of focus can be checked by using a magnifying glass to study the image formed on a small piece of ground glass placed in the camera gate. I mounted my supplementary lens on a dowel that fits in a hole in the wooden camera support.

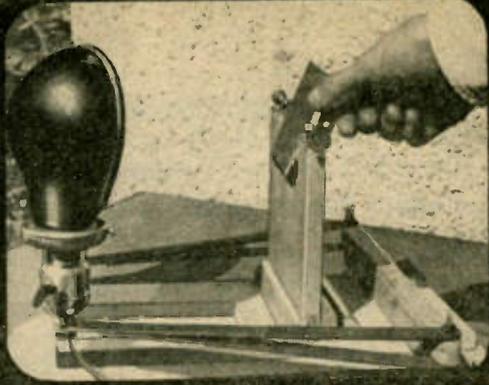
A base, a camera carriage, and a title-board carrier are required, the latter two sliding on the base. Strap-iron brackets support the two metal-shaded lamps. The camera carriage is a block of wood jigsawed to the outline of the camera to be used. If the lens of the camera is not on its vertical centerline, the two quarter-round guides for the carriage should be offset to center the lens on the titler base.

Title boards either $\frac{1}{4}$ " or $\frac{1}{2}$ " thick may be accommodated in the slots formed by two other lengths of quarter-round with an intervening spacer strip. The flip-over board, useful for introductory or long titles, is made



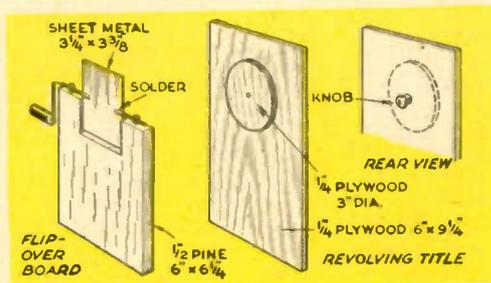


The wooden block that serves as a camera carriage can be modified to receive any home-movie camera. Two pieces of quarter-round act as guides for it.

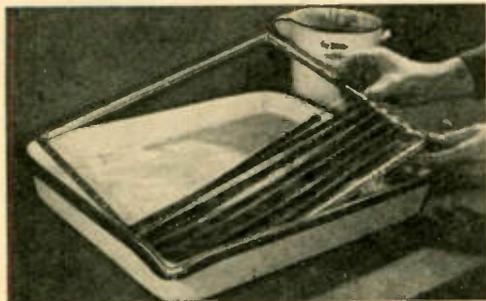


The flip-over board is controlled by a crank. Note that the light-to-board distance does not change, whatever the distance between the board and lens.

with a pivoted sheet-metal rectangle the size of the area covered by the lens. A drum-type variation may also be devised. The revolving title board is used in this way: Paste a title on the disk, turn it upside down, photograph it for normal reading time, and then spin the disk from the back. Splice in the finished film with the whirling section first. The effect on the screen will be a jumbled, circular blur that stops to spell out the desired title.



Rectangle of Tubing Is Rack for Processing Home-Movie Titles



DIMENSIONED so that it will lie in a standard developing tray, a rectangular frame with a row of pins across each end makes a handy rack for developing titles and other short lengths of movie film. While the frame may be made of wood waterproofed with lacquer, nonrusting metal (other than aluminum) is preferable. The one shown uses $\frac{5}{8}$ " o.d. brass tubing; it fits an 11" by 14" tray and holds about 38' of 16-mm. film.

Bevel the ends of the tubing at 45 deg. and solder the frame together, making tight joints so that solutions won't get inside. Silver solder makes a better job, though soft solder will do. The spacers are brass escutcheon pins, driven into drilled holes a bit smaller than the pins, with a little solder run around each. The heads are cut off and the ends well rounded after driving. The pins may extend straight out, but winding is easier if they project at an angle of 45 deg. If the frame does not rest on the sloping sides of the tray but instead goes to the bottom, four more pins can be located underneath to elevate it slightly.

If you wish to run an axle through the rack so it can be rotated for winding film, drill a hole through each side and solder in short tubular pieces. The axle may be a length of $\frac{1}{8}$ " rod.—W. E. B.

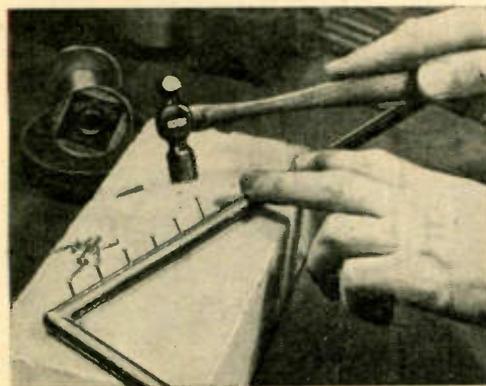
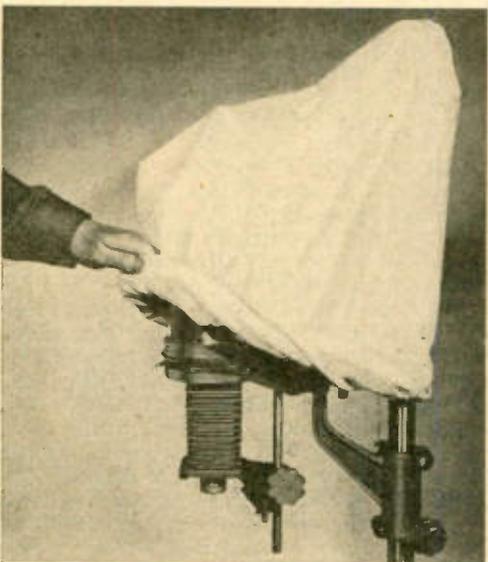
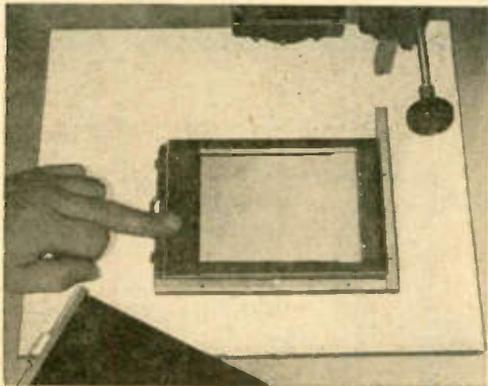
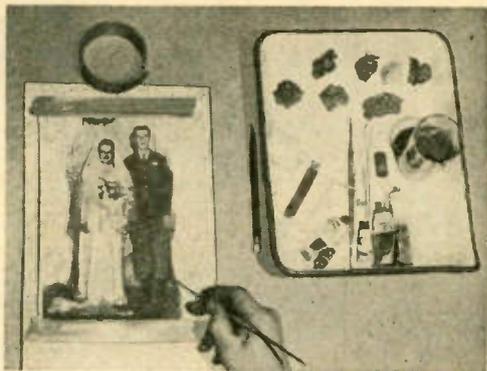


PHOTO IDEAS

MAKING TRANSPARENCIES in the dark-room, for black-and-whites from Kodachromes or other purposes, is facilitated with the system below. Fasten two cleats to a board, and load a cut-film holder with white paper on one side and film on the other. Move the board to position the image and focus on the paper. Then invert the holder, draw the slide, and expose.—I. G.

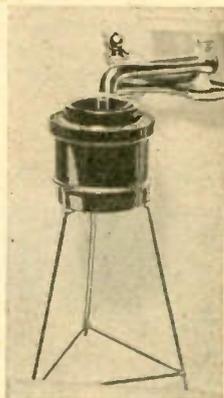


DUST IS THE ENEMY of good enlargements, as any photographer who has spent hours spotting prints will testify. A good way to minimize the problem is to shroud the enlarger in a linen bag, uncovering it only for use. A laundered, lintfree sugar or flour bag is also satisfactory.—H. LEEPER.

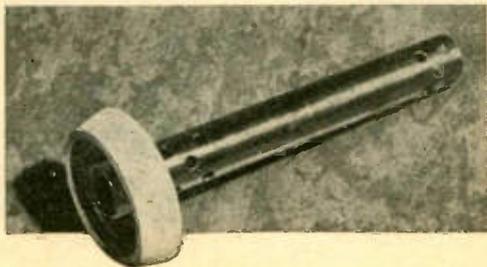


A HANDY PALETTE for tinting enthusiasts and retouchers is a standard 8" by 10" tray. The enamel finish is smooth and easily cleaned; tubes and brushes or swabs can be conveniently accommodated; and an accidental upset of a wash-water glass will not mess up the table.—IVAN GROSVENOR.

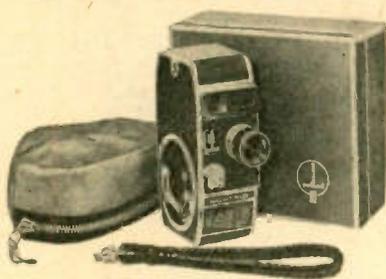
SPLASHING wash water onto the floor got me into domestic difficulties whenever I developed films in the kitchen. To hold my tank up near the faucet, I made a supporting bracket out of 3/16" brazing rod, soldering the joints. A secondary advantage, I find, is that the tank thermometer is easier to read at this height.—ROBERT BUTTS.



SINK WASHING of prints is a pleasure with the drain plug below. A 6" length of 3/4" brass tube has eight or ten 1/8" holes drilled around its top and about twice as many near the bottom. A hole is cut through the center of the rubber plug to take the tube snugly. The lower holes let out the heavier, hypo-laden water at a rate determined by how far in the plug the tube is.—W. T.

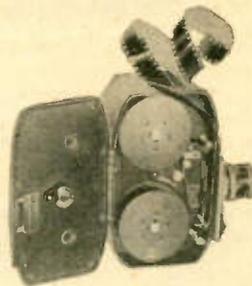


NEW PHOTO EQUIPMENT



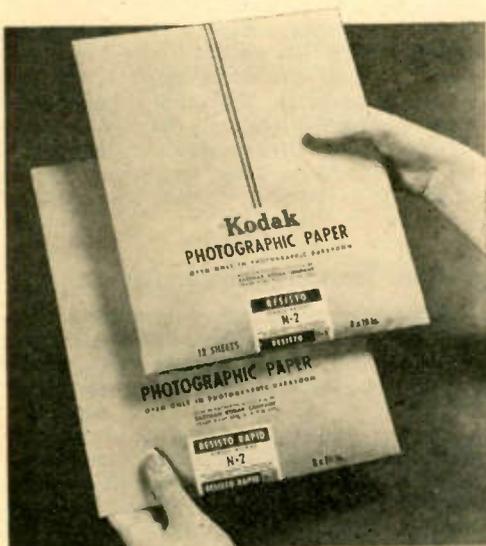
With a sharp-cutting $\frac{1}{2}$ " f/2.8 lens, the Bolex L-8 goes in for simplicity. There are no trick gadgets to confuse the amateur.

In loading, one end of the film is put on the take-up spool, and both spools are then inserted. No looping is necessary.



CONSTANT SPRING TENSION in the new American Bolex L-8 home-movie camera puts the last frame of film through the lens aperture at the same speed as the first and excludes lags and speed-ups. Complete passage of 25' of film takes just four windings.

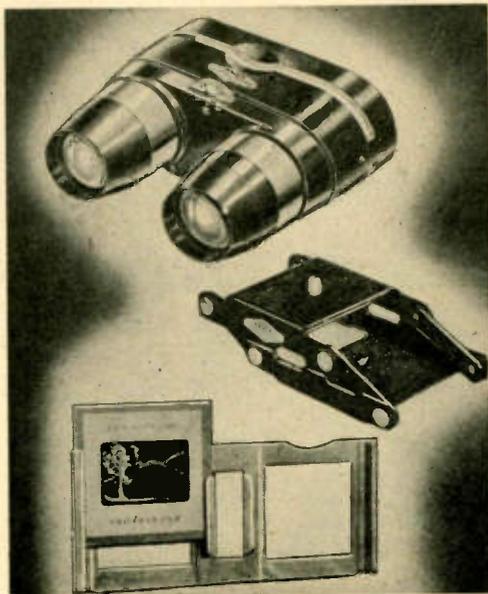
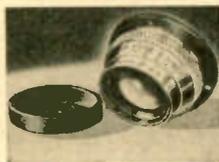
A telescopic view finder gives a bright image of the scene, and an indicator appears in the finder when the end of the spool nears so the user won't keep shooting after the film runs out. The film aperture can be removed for cleaning.

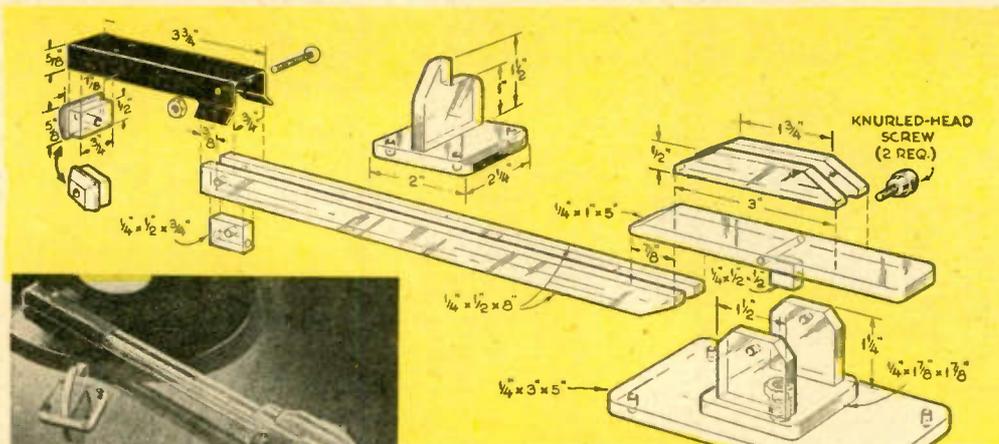


TWO NEW PAPERS that dry thoroughly in an extremely short time are announced by the Eastman Kodak Company. They have an almost waterproof, acetate-impregnated base that sheds water. Shrinkage and swelling during processing and drying have been reduced to a low percentage.

TWIN TRANSPARENCIES for stereoscopic viewing come easier with the aid of the new Radex parallel (center at right) mounted between the camera and tripod to permit shifting between shootings. The Radex Stereo Company, of Los Angeles, also is making a new binocular-shaped aluminum viewer and an aluminum slide holder.

COLOR CORRECTION even at full aperture is a feature of a new enlarging lens, the Apos Colorstigmat. Especially adapted for color work, the lens is made by the American Precision Optical Systems, of Newark, N. J., in 90 mm., f/4.5, with a 127-mm., f/5.6 lens soon to be ready. Its resolving power is 2,000 lines per inch for black and white and 1,000 lines for color work.





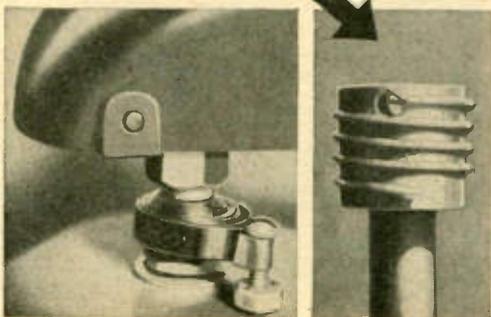
Phonograph Pickup Arm of Plastic Is Handsome and Light in Weight

HIGH-QUALITY reproduction and modern design are combined in this pickup made from a light-pressure crystal replacement cartridge and a few pieces of $\frac{1}{4}$ " clear plastic, which may be scraps.

The pieces were cut as shown, the edges sanded to a smooth, frosty finish, and joined with plastic cement. Thin aluminum was

shaped as shown for the cartridge housing, and a shielded wire run back along the channel of the arm through a length of $\frac{1}{4}$ " pipe nipple at the base. The nipple is a tight fit in the base and a free fit in the swivel bracket, while the knurled screws are a snug fit in the bracket and a free one in the arm for easy action.—ROBERT WOOLFOLK.

Recording-Disk Grooving Rig Uses Electric-Clock Motor



WITH pregrooved recording disks hard to find, many home-recording enthusiasts have been forced to use expensive cutting heads in order to make impressions on ungrooved blanks.

Having assembled all the equipment except the cutter, however, I found that the rig shown at the left gave excellent service as a pregroover. The only unusual piece of equipment involved is a 1-r.p.m. electric-clock motor. Mounting the motor inside the cabinet, I fitted the vertically projecting shaft with a small section of $\frac{1}{2}$ " bolt. The bolt acts as a winding drum for a length of No. 30 wire fastened to the recording arm about two thirds of the way from the pivot. As the clock motor turns, the needle is pulled across the record. A light coil spring placed around the pivot, as shown at the lower left, provides the slight tension needed to keep the wire tight between pickup and drum.

For proper operation, the drum must rotate at a constant speed and be completely free of wobble. Spacing of the grooves can be varied to some extent by shifting the connecting wire closer to, or further from, the recording-arm pivot. Using this setup, I get about 75 lines per inch. The smaller the drum, the more lines.—STEFFEN H. SORENSEN.

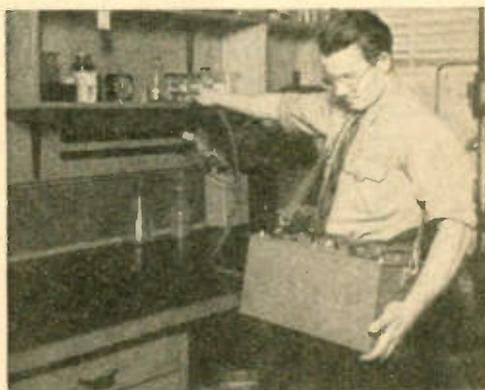
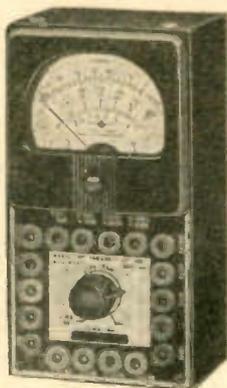
NEWS in ELECTRONICS



JUKE-BOX JANGLES may become a thing of the past if this new electronic phonograph takes over the music-making job at taverns and restaurants. A product of the Aireon Mfg. Corp., of Kansas City, Kan., this coin-operated phonograph automatically adjusts its output to the noise of the room in which it is playing. Its volume is controlled by a microphone which "listens" to the audience, and acts to keep the music at just a pleasantly audible level. At left, Jo Stafford, popular singer, smiles her approval of the new device.

DIRECT MEASUREMENT of the output of electronic equipment is made possible by six newly developed power-measurement lamps. Manufactured by Sylvania Electric Products, Inc., of Emporium, Pa., the lamps are said to measure outputs of .05 to 25 watts at frequencies up to 900 mc.

POCKET-SIZE testers are always popular, especially with servicemen who carry their equipment to the job. This instrument, made by Radio City Products Co., New York, weighs only 1½ lb. complete, and features six multi-range testers for A. C., D. C., and output volts, milliamperes, ohms, and decibels. The case measures 2" x 3" x 6".



ELECTRONIC "SMELLERS," are now used to detect the presence of harmful mercury vapor. Sensitive enough to detect one part of mercury vapor in 100 million parts of air, this equipment, designed by General Electric, helps keep the concentration of the vapor from rising above the safety level. Its operation is based on the fact that ultraviolet light is scattered when it passes through atmosphere containing the toxic fumes.

VOICES GO HITCHHIKING over rural power lines in an experimental system installed near Jonesboro, Ark., by Bell Telephone Laboratories and the Rural Electrification Administration. The test may result in bringing phone service to out-of-the-way rural areas.

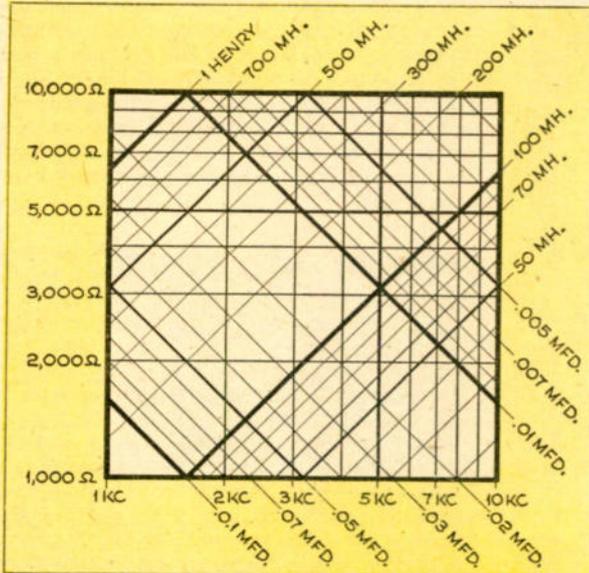


Mrs. Carl Robbins puts through one of the first calls to go over the new power-line phones, while William Hickox, left, completes an installation. The equipment in the box produces a high-frequency carrier current.



Filters...radio's most

How ingenious combinations of
censors in your receiver to



A reactance-frequency graph, of which this is a section, gives direct values in ohms for any frequency up to 1,000 kilocycles.

By GEORGE O. SMITH

FILTERS are electronic circuits that have frequency selectivity. At the will of the designer, they can be made to pass or block frequencies below, above, between, or around certain specified limits. The names of the four major types are self-explanatory; they are low-pass, high-pass, band-pass, and band-elimination filters. Taken together they make possible two important things: the first is radio reception; the second is good radio reception.

The ability of filters to discriminate against certain frequencies is due to the fact that the resistance of capacitors and inductors to alternating-current changes with frequency. Alternating-current resistance is called *reactance*, and is symbolized by the letter *X*. Like direct-current (or pure) resistance, it is measured in ohms.

In the case of a choke coil labeled, say, 30 henries, 200 ohms, the 200 ohms stands for the resistance of the wire that is wound on the coil. This is a constant minimum, regardless of frequency; it would still measure 200 ohms if a D. C. potential were ap-

plied, or if the wire were stretched out straight. Reactance is another matter. It increases as frequency increases. In addition to the resistance of the wire, a 30-henry choke has a reactance of about 11,300 ohms at 60 cycles. At 600 cycles, the reactance has grown to 113,000 ohms. The way in which the reactance of a coil varies with frequency is expressed by the formula: $XL = 2\pi fL$, where XL stands for inductive reactance, 2π is the constant 6.28, f equals frequency in cycles per second, and L represents inductance in henries.

A good capacitor, on the other hand, has infinite resistance to direct current, but will pass alternating current more or less readily, depending on frequency. Unlike the choke coil, the reactance of a capacitor goes down as the frequency goes up. In mathematical terms, $XC = \frac{1}{2\pi fC}$. Here, XC stands for capacitive reactance, and C is a measure of capacity in farads. A .01-microfarad capacitor

would have a reactance of about 265,000 ohms at 60 cycles, but only 26,500 ohms at 600 cycles. The total opposition that inductive reactance, capacitive reactance, and resistance offer to the flow of an electric current is called *impedance*.

Between them, capacitors and inductors can hold any alternating current at their mercy. Used in various combinations—series, parallel, and series-parallel—coils and condensers serve varied functions in radio transmission and reception. They polish off rectified A. C. so as to provide a smooth D. C. power supply; in the form of tuning circuits they enable you to select a station at the twist of a condenser.

This article makes no attempt to deal with all filtering actions. While filters are integral in the basic radio circuit, they may also be added to existing amplifiers as tone-corrective devices. One of the simplest types is that shown at the right. This is a form of high-pass filter, and it operates in precisely the same way as a voltage divider, except that the resistance of one leg automatically varies with frequency. Let us say that the components of the circuit are

important networks

resistors and condensers can be made to act as electronic screen out unwanted frequencies or boost fading ones.

a 50,000-ohm resistor, and a .01-mfd. capacitor. Then at 320 cycles, X_C equals 50,000 ohms, and the output voltage at the tap between the two elements is one half the input across the divider. This is just what you'd get if both R and X_C were 50,000-ohm resistors. But at 640 cycles, X_C has fallen to 25,000 ohms, which gives a voltage division of one-to-two. The output is then two thirds of the input.

Now, if both 320 and 640-cycle signals are put into the circuit simultaneously at equal voltages, two thirds of the 640-cycle signal will come through, but only half of the 320-cycle note. Conversely, if the 320-cycle input were, say, 12 volts, and the 640-cycle signal were 9 volts, both signals would come out as 6 volts A. C.

The first effect is useful in boosting high frequencies, while the second helps to level off the response of an amplifier that favors the lows. Carrying the calculation higher and lower than the figures given will demonstrate the high-pass effect of the filter. The graph at the bottom of this page shows the output response of a typical high-pass, tone-corrective filter. At 100 cycles the output may be about one fourth of the input, while at 10,000 cycles almost the entire voltage drop is across the resistor.

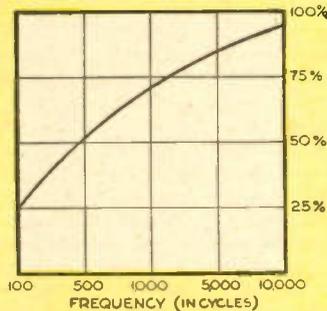
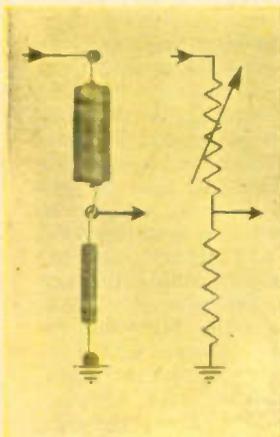
In order to design a resistor-condenser filter to suit your own needs, you will have to determine the reactance of any given

condenser within the limiting frequencies. These values may be obtained either by calculation, or through the use of a reactance-frequency graph which can be purchased at any drafting-supply house. The figure on page 190 is one small segment of such a graph, twice enlarged. To find the reactance of any condenser, locate the condenser's capacity along the right-hand edge of the chart. (In the section reproduced, capacities are carried around to the bottom of the sheet.) Follow the sloping line up until it intersects the vertical line that represents, say, the lowest frequency you are interested in filtering. Where these two lines cross, read straight over to the left-hand margin where capacitive reactance is indicated directly in ohms.

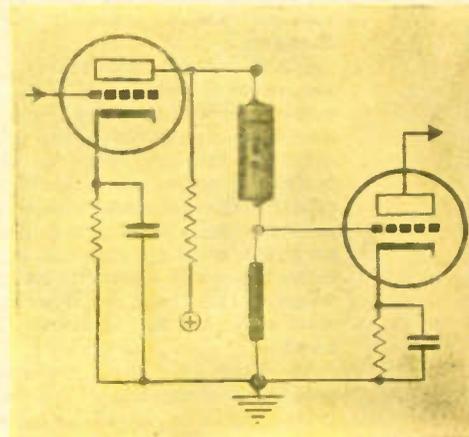
From this chart, get the reactance of the condenser for a number of frequencies in the passband of your filter. Assuming a standard load resistance, you can then figure how the voltage will divide for each frequency, and draw a graph representing the output of this particular filter. Percentage of output is obtained by dividing the sum of reactance and resistance into the resistance. If the resulting curve doesn't suit your needs, try another capacity.

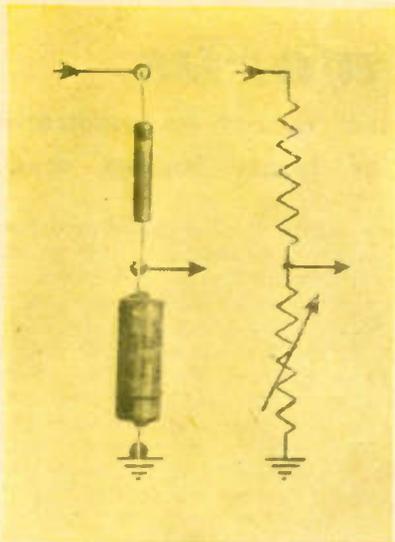
In constructing a filter, remember that a large capacitor and a large resistor give quite different results than a small capacitor and a small resistor. For example, a .2-mfd.

If your receiver tends to cut off or distort the high notes, this tone-corrective filter may be just what it needs. It acts like a voltage divider in which the ratio of output to input rises with frequency.

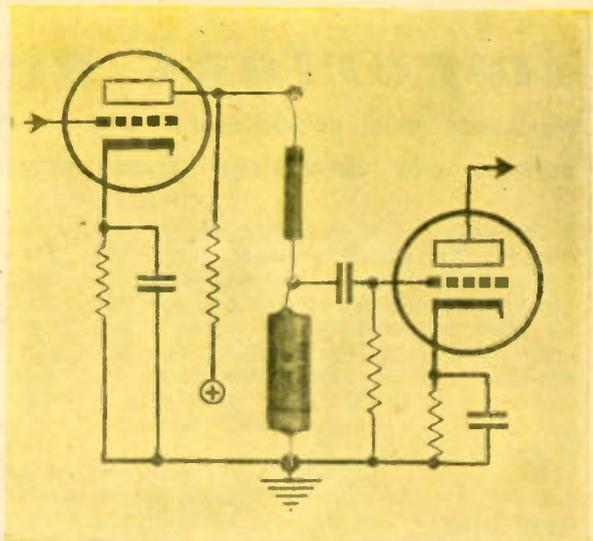


Signal-attenuation curve of a typical resistance-capacity high-pass filter.





Tapping the output voltage off the capacitor will tend to favor the low notes.



Used between amplifier stages, this type of filter requires an extra condenser-resistor arrangement in the coupling circuit.

condenser and a 2-megohm resistor show less than 1 percent response difference between 80 and 8,000 cycles, while .001 mfd. and 20,000 ohms will cause about 40 percent difference in the same range.

This type of filter may be connected between the audio stages of an average amplifier as shown in the hookup schematic on page 191. While calculated values give you a good starting point, the final test of any filter is in its effect on the entire amplifier. Because of distributed effects, calculated values are at best approximate, and it may be necessary to juggle values a little until you get a result that is pleasing to the ear. A voltmeter placed across the amplifier output will help you to check the real effect of a filter. Used in conjunction with an audio-frequency generator, or a frequency-test record, the voltmeter will show how output voltage varies as the input frequency is changed.

While resistor-condenser combinations are often favored for tone correction in audio circuits, there are times when a more level response is desirable. Let us say, for example, that you want to give equal emphasis to all notes between 10 and 1,000 cycles. The response curve shown on the previous page would then not be satisfactory. At 1,000 cycles, this filter has almost three times the output it has at 100 cycles, whereas the graph we now want should be level between the two extremes of our pass-band.

To obtain this effect it is necessary to replace the resistor with a choke coil, thus giving your voltage divider two variable

arms instead of one. When the reactance of one arm increases, that of the other decreases correspondingly.

The use of inductance-capacity filters, however, involves a number of other critical considerations which are outside the scope of this article. Getting back to our first circuit, let's see what happens when we make a few changes.

Reversing the positions of the filter components produces, reasonably enough, an opposite effect. The illustrations above show how this is done to produce a low-pass filter that will attenuate the higher frequencies. In this case the output voltage is tapped off the variable leg of the divider. As frequency goes up, the reactance of the capacitor decreases, giving a lower voltage drop for the higher frequencies.

Using a filter of this type between amplifier stages requires certain precautions that are not needed with the high-pass unit. By themselves, the filter components would put part of the high plate voltage on the grid, and the condenser would block the grid return to ground. The schematic diagram above shows the additional circuit elements that must be used when this kind of low-pass filter is inserted between stages. In this hookup, the filtering is done between the plate connection and ground, and the grid is coupled to the filter terminal through a condenser-resistor arrangement. This, however, constitutes another high-pass filter; if the components of both sets were alike, they would merely nullify each other.

To offset this possibility, the coupling components are made large, thus reducing

their frequency selectivity, and allowing the desired filter to do most of the frequency selection. The coupling condenser for this circuit should be about .1 mfd., and the grid resistor about 2 megohms.

Among the "built-in" defects of many existing amplifiers is an auditory effect known as "loss of bass." Most often this is noted when the volume control is turned to a low position. A tone-corrective filter that often succeeds in eliminating this fault consists of a tapped volume control with a condenser connected between the tap and ground. When the volume control is turned down near the tap or below, the condenser causes it to act as a type of low-pass filter. As volume decreases, the low notes are increasingly favored, thus compensating for the loss of bass.

To prevent overemphasis of the bass, a limiting resistor should be used in series with the condenser from tap to ground, as shown at the left, below. At high frequencies the capacitive reactance may drop to just a few ohms, yet the series resistor maintains the total shunting effect above the level of its own resistance. At low frequencies, the higher capacitive reactance adds its ohmage to that of the resistor, raising the shunting effect.

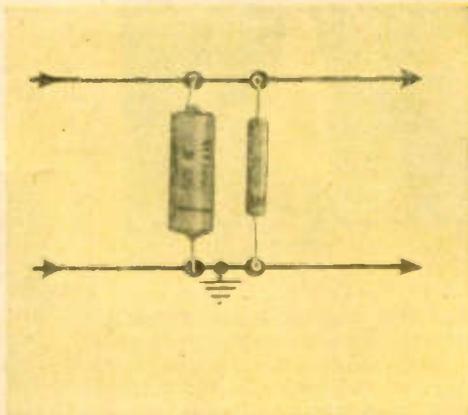
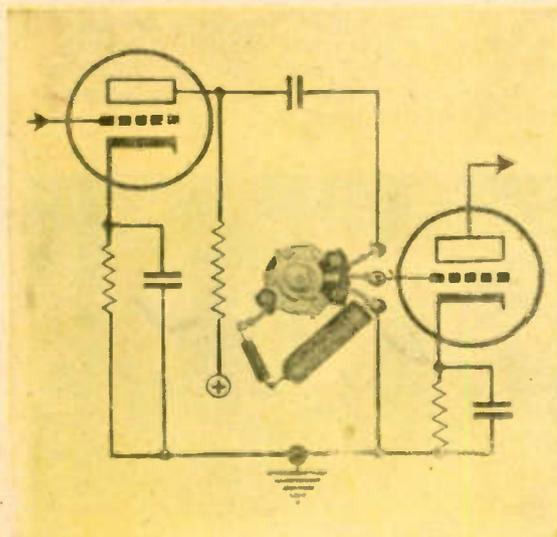
In order to reverse this effect, the limiting resistor should be connected in parallel with the condenser, as shown at the lower right. Below the so-called "cross-over frequency"—that frequency where the capacitive reactance equals the pure resistance—the incoming signal sees mainly the pure resistance shunting the line. Above this frequency, the line is shunted by the resistor and the lowered reactance in parallel.

Connected in series, the impedance of this filter tends to level off to the limiting resistance above the cross-over frequency, while in the parallel hookup the total impedance is level for frequencies below the cross-over level, and the impedance drops as the frequency rises above the critical value.

As before, the final test of these filters is in the listening. Using a .01-mfd. condenser and a 30,000-ohm resistor as a starter, this tone compensator can be adjusted to suit your taste. Set the volume-control arm to the point that gives the lowest ohmmeter reading between tap and arm, and leave it at that value while making changes.

Some increase in high-frequency response can be obtained with this filter by connecting a small condenser—say 50 mmf. to 250 mmf.—between the top of the control and the tap. The over-all response will then be low in the middle-frequency ranges, and have broad peaks at both the low and the high ends. This type of response curve is generally considered to be the most pleasing.

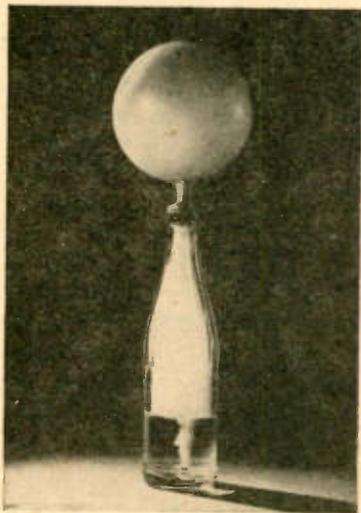
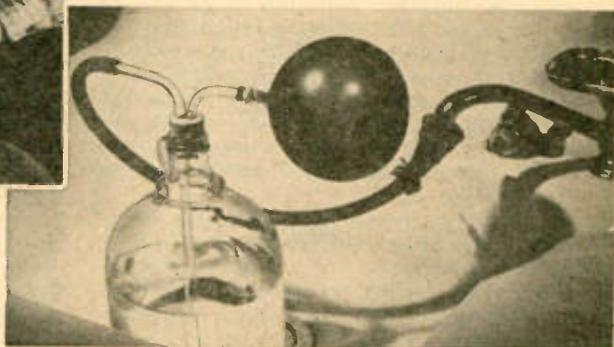
The thing to remember about resistance-capacity filters is that the use of a frequency-selective element (the capacitor), in conjunction with a nonselective element will produce all manner of curves in the audio response of an amplifier. Whether high or low frequencies will be passed or blocked depends upon the position of the components, while the range of any filter is governed by the size of the parts. Doubling or adding filter after filter will steepen the response curve. In one combination or another, filters will permit you to do just about anything you want with just about any alternating-current signal.



If turning the volume control low produces a "loss of bass" in your receiver, inserting a condenser between volume-control tap and ground may give the failing low notes a boost.

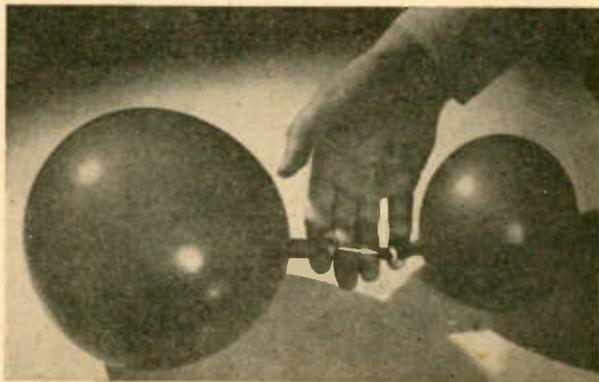


ILLUMINATING GAS may be forced into a balloon in order to give it buoyancy. *But keep such balloons away from fire, for this gas is highly explosive.* Fill a 1-gal. bottle with water, insert through the stopper two glass tubes (one long enough to reach the bottom), and run rubber tubing from the gas supply to the short tube and from the outlet to a pan below. When the gas is turned on, pressure starts water flowing in a siphon action. After the bottle is partly filled with gas, attach the outlet tube to a faucet, as below, and quickly tie a balloon on the short glass tube. Turn on the water and the resulting pressure in the bottle drives the gas into the balloon.



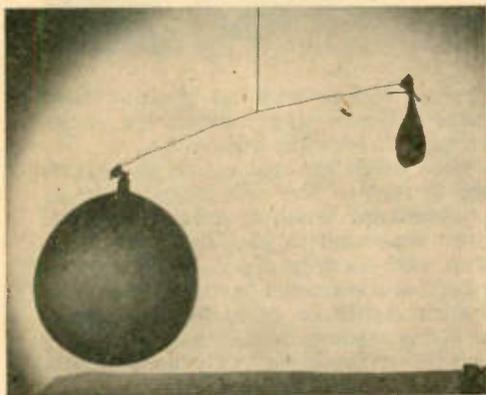
DRY ICE, which is solid carbon dioxide, creates tremendous pressure when it changes into a gas. This may be used to expand a balloon. Fold a chunk in a cloth (*never touch dry ice with the hands*), break it into small pieces, drop several with a spoon into a bottle partly filled with water, and tie the balloon on the neck.

BALLOONS OF DIFFERENT SIZE react in an unexpected way when connected by a tube as below. You might think the larger would blow up the smaller until both were of equal size. But the reverse happens. Air rushes from the smaller to the larger balloon, inflating it still more. Why? Because the pressure per square inch exerted by the rubber is greater in the smaller balloon, there being less surface for this force to press on.

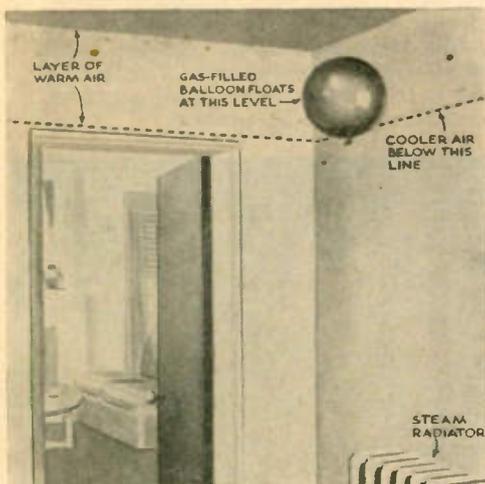


TRICKS with TOY BALLOONS

AIR UNDER PRESSURE increases in weight. You can demonstrate this by inflating two balloons to equal size, tying them to the ends of a stiff wire about a foot long, and balancing the wire carefully at the center. Let the air out of one and the other will sink. Being under extra pressure, the air in the inflated balloon is denser—and hence heavier—than the air of the free atmosphere.



SOUND WAVES that are passed through a lens-shaped area of a gas that is heavier than air will come to a focus much the same as light waves passing through a glass lens. You can demonstrate this with the balloon that was filled with carbon dioxide gas in an accompanying experiment. Hold the balloon between your ear and a ticking watch. By maneuvering the balloon you will find a spot in which the ticks sound considerably louder than they do when the balloon is removed.



IN A HEATED ROOM a gas-filled balloon that has been weighted with just enough paper clips or cardboard so that it barely rises will give the performance illustrated above. It will rise to just about the height of the doorways and remain suspended there in midair. This is because the layer of heated air near the ceiling, being lighter, is less buoyant than the cooler air below.

PLACE A BALLOON in the airstream of a fan tilted as below. Instead of straight down, the balloon falls diagonally—into the breeze that is trying to blow it away. This is explained by Bernoulli's principle. Air flowing rapidly around the balloon is at a lower pressure than the still air at each side of the stream. When the balloon tries to fall out of the stream, the greater pressure outside forces it back.

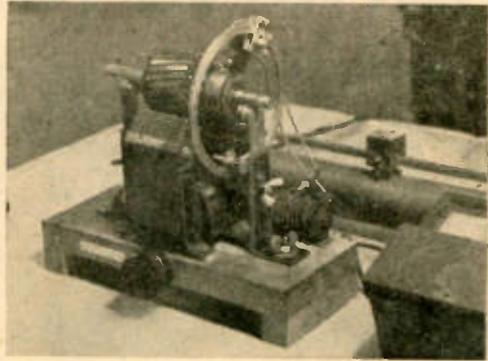


Growler Accessories Help to Check Armatures

ARMATURES are usually tested for faults in devices called growlers, most of which are designed for the armature to rest on the poles. Test prods on the commutator segments and a phone receiver or low-reading voltmeter take bar-to-bar values, and it is not always easy to get these readings in a really accurate manner. But with the armature rotated on ball bearings (Fig. 1) with a small air gap between the poles, a steel ring (Fig. 2) attached to the upper section of the opposite sliding-shaft support, and an adjustable contact block (Fig. 3) arranged on the ring to stay fixed on any desired point of the commutator, the true condition of the windings can be quickly ascertained.

Make the hardwood base with a $\frac{1}{2}$ " wide slot so the bracket supports will fit various lengths of armature shaft. Other parts are steel. Dimensions may be changed to suit the growler used. The contact block is made of plastic or hard fiber, and it has two phosphor-bronze contact points fitted at the lower end. By means of a clamp and wing nut, this block can be placed and locked anywhere on the ring. The slot in the center permits raising or lowering of the contacts to meet commutators of different diameters.

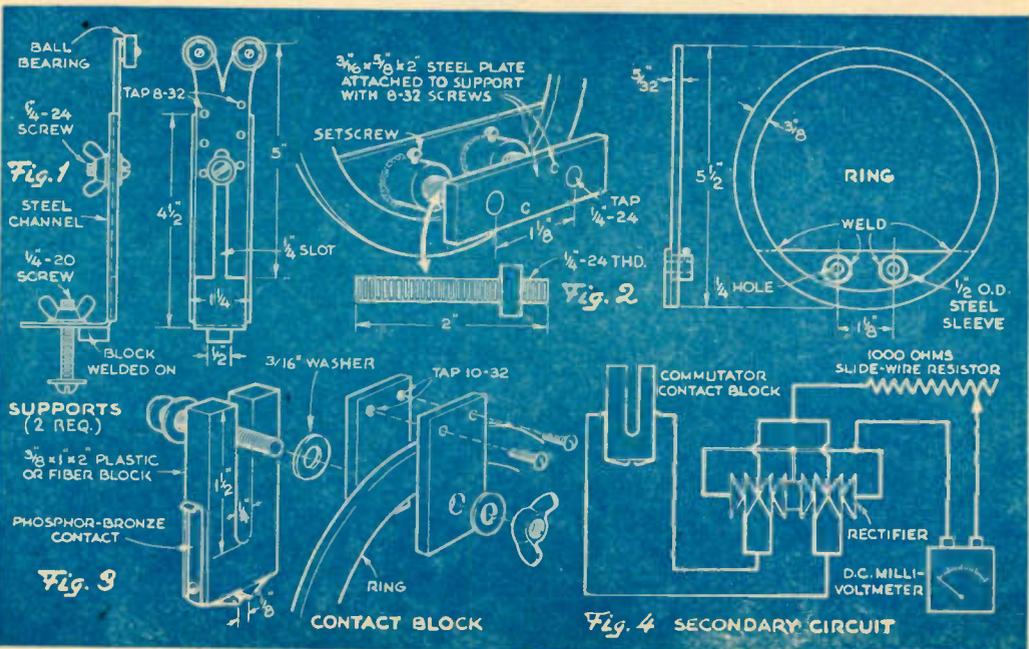
For the first test for 'shorts, the armature is placed in position between poles and the shaft supports are adjusted so the core clears the growler points with a small air gap between—the smaller the gap, the higher the readings because of the greater magnetic flux. The contact block is not used. Bar-to-



bar testing is done with the block adjusted to make a firm contact between the points and a pair of adjacent segments.

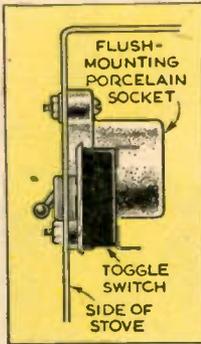
A good setup for making these tests is shown in Fig. 4. The A.C. picked up from the commutator is fed to a small dry-disk rectifier connected to give full-wave rectification, and readings are made on a sensitive D.C. millivoltmeter having a 1,000-ohm slide-wire resistance in series for adjustment of the readings so they will come near the center of the scale. This equipment is also shown in the photo above.

Most of the usual armature troubles, except reverse winding which should, of course, be checked with a wattmeter, can be found with this instrument. Readings should be taken all around the commutator, and they should be consistent or of equal sequence all around.—HAROLD P. STRAND.



Lamp Brightens Dark Stove Top

IF YOU don't feel at home on the range because there isn't light enough to show what's cooking, it's easy to brighten your outlook. You'll need to drill four holes in the side panel of the stove back—two for mounting a socket, one for a 110-volt toggle switch, and the fourth, fitted with a bakelite bushing, for the cord. This should be asbestos covered, as it's exposed to considerable heat. Flip the switch and you can see that the carrots *are* about to burn, and the steak is done to a T.—H. D. SMITH.



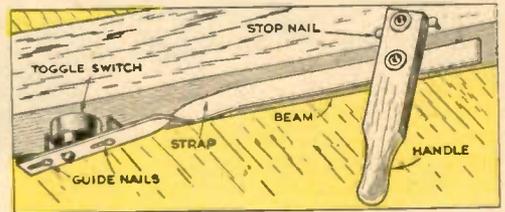
Levers Reduce Shock Hazard

COMMON toggle switches shouldn't be used in damp locations, as in the cellar or laundry, especially where wet hands may result in dangerous shocks. If you must use such a switch, rig it as at the right. A dowel, notched for the toggle and guided in screw eyes, can be used instead of the metal strap.



Pipestem Light Frees the Hands

WISHING you were an octopus when you need both hands to work with and a third one for a flashlight won't help, but this homemade rig may. Solder a radio pilot-light socket, or one from a Christmas-tree lamp set, into the cover of a shoe-polish can. Then solder a nail to the bulb terminal and attach two leads. Push the nail into a pipestem, cementing it in if necessary. For current, solder series jumpers to the requisite number of flashlight cells and tape them together for carrying in a pocket. Small paper or alligator clips, or dress snap fasteners on all leads, facilitate connection.—AL SCOTT.



LAMP RESISTANCE VALUES

[ELECTRICAL]

Common lamp bulbs may serve as resistors in electrical experiments. The table below, supplied by the General Electric Company, lists resistance values of 120-volt lamps when cold, and when 25, 50, 75, and 100 percent of rated voltage is applied. Filaments have much lower resistance cold than hot, and common watt ratings are based on their resistance when white hot. In normal use filaments reach incandescence quickly, and there is only a brief surge of heavier current. Remember this, however, if delicate apparatus that may be damaged by such a surge is used.

In choosing a lamp, calculate the voltage drop across it and find its resistance at that potential in the table. Example: It is desired to connect a low-resistance coil to draw no more than .83 amp. on a 120-volt line. Disregarding coil resistance as negligible, the entire drop will occur across the lamp, which will thus receive 100 percent potential. By Ohm's law, we find that at 120 volts 144 ohms will pass .83 amp. In the last column, 144 ohms is the hot resistance of a 100-watt bulb.

Example: A device rated at 20 volts and .5 amp., and therefore having a resistance of 40 ohms, is to be connected to 120 volts. By calculation a total resist-

ance of 240 ohms is required of which the lamp must represent 200. The drop across the lamp must be 100 volts, which will therefore receive about 83 percent of full voltage. The nearest column is that for 75 percent, and here we find a resistance of 201 ohms for a 60-watt bulb.

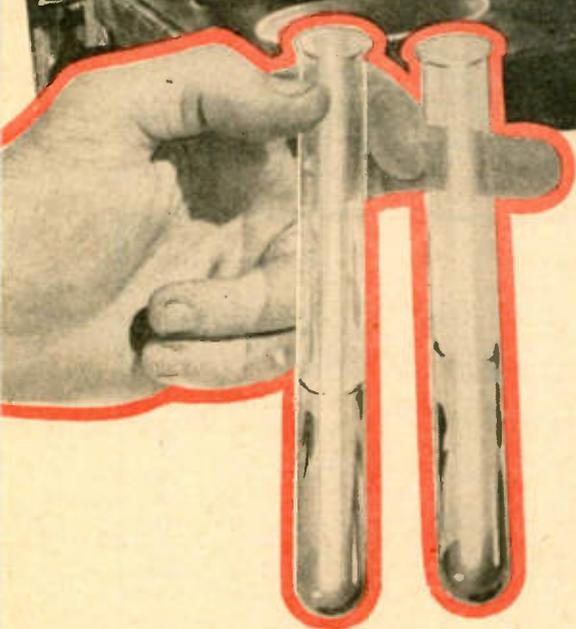
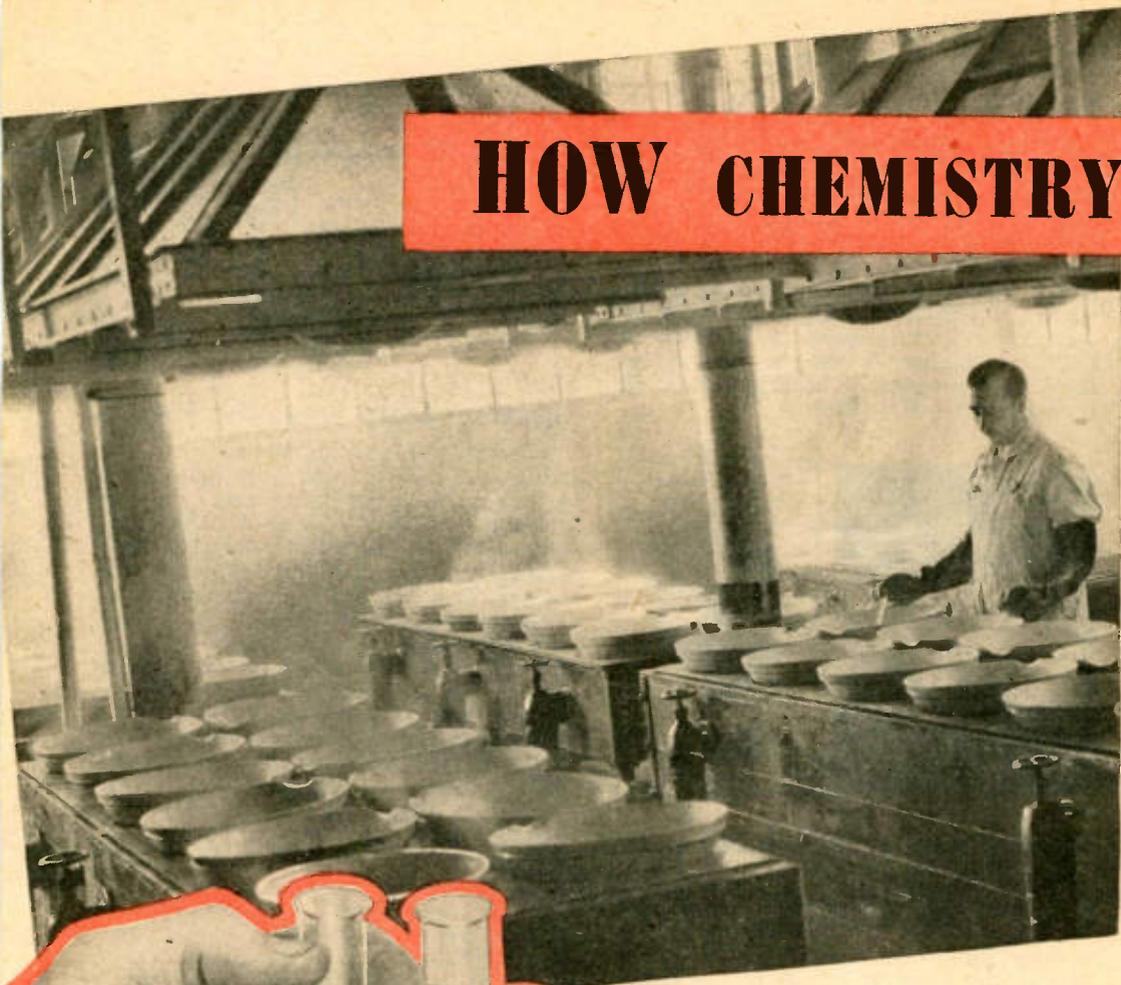
Watts	Approximate resistance in ohms				
	Cold	25%	50%	75%	100%
6	193	1390	1837	2127	2400
10	113	822	1094	1293	1440
15	73	540	722	856	960
25	42	318	427	509	576
40	24½	173	253	299	360
50*	21	141	206	241	288
60*	17	117	171	201	240
75	12	98	136	154	192
100*	10	77	104	116	144
150	6	48	69	84	96
200	4½	36	51	62	72

* Colled-coil filaments.

Percentages = % of 120 volts

POPULAR SCIENCE MONTHLY SHOP DATA

HOW CHEMISTRY



What goes on in the emulsion that coats film is shown by simple test-tube experiments.

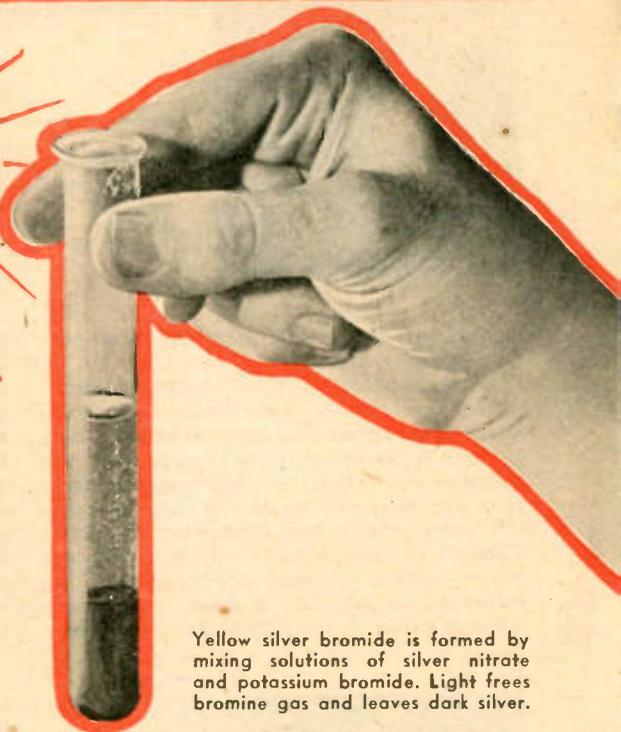
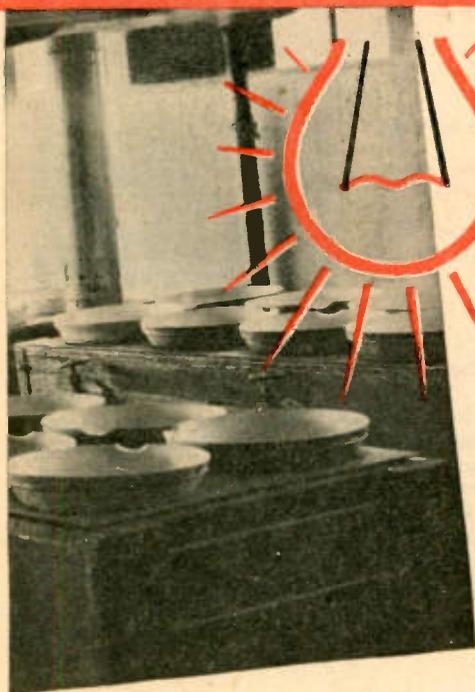
By TRACY DIERS

THE film in your camera is thinly coated with one of the most unstable chemicals known to man. Silver bromide is its name, and from the moment of its birth it is kept in a cradle of darkness until in your camera a swift shaft of light seeks it out. The intricate and far-reaching changes brought to silver bromide by that flash of light are in part still secrets of nature. Much of what happens in your camera and in the dark-room is known, however, and can be shown at home with a few chemicals in a test tube.

Dissolve a crystal of silver nitrate in a test tube half full of water, and dissolve a crystal of potassium bromide in another. If you place both test tubes in direct sunlight, nothing will happen. Mix the two together, and immediately a yellow precipi-

Silver nitrate and potassium bromide are the key chemicals in the emulsion on film and photo-print paper. In crystal form or in separate solutions, they are unaffected by light. At top, purifying silver nitrate in a big Eastman evaporating room.

CREATES A PHOTOGRAPH



Yellow silver bromide is formed by mixing solutions of silver nitrate and potassium bromide. Light frees bromine gas and leaves dark silver.

tate of silver bromide falls to the bottom of the tube. Expose this to strong sunlight or to a photo-flood bulb, and it will immediately turn purple. This purplish-colored material is chemically pure silver, freed from the bromine it was formerly attached to. You might say that the reaction was this: Silver bromide plus light equals silver plus bromine. The latter goes off as a gas.

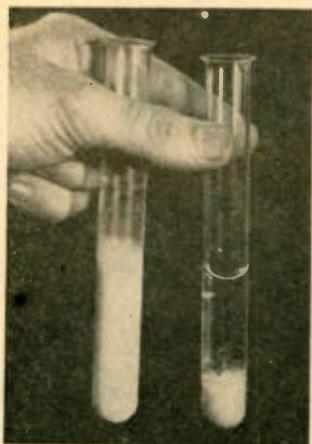
Since it isn't practicable to coat films or paper with a lumpy precipitate, we had to invent some method of spreading the chemical evenly and thinly over the surface we wished to sensitize. The answer was to suspend the silver bromide in an emulsion. Dissolve, with gentle heating, 20 grains of household gelatin in a test tube half full of water. Add a pinch of potassium bromide and then pour in a dilute silver nitrate solution. Silver bromide is again formed, but this time it remains evenly suspended.

In photography the action of the silver bromide is speeded and intensified by the use of a developer. Stock developing solutions consist of a developing agent such as pyro or hydroquinone, an alkali such as so-

dium carbonate or borax, a little potassium bromide as a restrainer, and some sodium sulphite as a preservative. To show how a developer works, put several drops of any stock developer solution in a flask of silver bromide emulsion that has been exposed only briefly, and not sufficiently to turn dark. The emulsion now turns black in a few seconds—much faster than when light does all the work of separating the silver.

On exposed film, you would now see an image consisting of dark areas of metallic silver and light areas of unexposed silver bromide that the developer has not affected. A fixing bath is next needed to keep these light areas from darkening upon subsequent exposure to light, for if they did the entire negative would turn black and the image would be lost. The fixing bath is sodium thiosulphate, the hypo familiar to every photographer.

You can see how it works by dissolving a few small crystals of sodium thiosulphate in water in a test tube and pouring the solution into half a test tube of *unexposed* silver bromide emulsion. Immediately the yellow



← Silver bromide alone would not coat film evenly. An emulsion is made by adding gelatin. In it the particles are suspended as in the tube at the far left.

→ Developing makes more intense the emulsion changes caused by light. A few drops of stock developer in an exposed flask quickly turn the silver black.



suspension disappears, and the tube contains a clear, transparent liquid.

What happens is this. Sodium thiosulphate reacts with silver bromide to form silver thiosulphate, a clear solution; then, if there is plenty of fresh hypo present, the reaction continues, forming complex salts that are dissolved by the remaining hypo.

A simple taste test illustrates the point. Fresh hypo has a salty, bitter taste, and silver sodium thiosulphate is almost as sweet as sugar. Dip a sheet of ordinary writing paper in a solution of 1 oz. of hypo

and 4 oz. of water, rinse it in water for a moment, and taste the salty hypo remaining. Then dip a small piece of enlarging paper in the hypo for a few seconds, rinse it quickly, and taste the sweet emulsion side. Return the enlarging paper to the hypo for a few minutes longer, remove and rinse it, and you taste the salty hypo again. Expert photographers avoid stale hypo so that the reaction, or fixing, will be complete and no silver sodium thiosulphate will remain.

Every photographer has taken negatives that were too light or too dense to afford

Fully developed black emulsion in the tube (left) becomes a clear solution when a reducer is added. That's how reducers act on overexposed negatives.

Tasting reveals that too short a bath in hypo, or weak hypo, leaves a sweet salt that in time will stain emulsion. Fresh hypo gets rid of the salt.



good prints. Too light an image may be due to underexposure in the camera, or underdevelopment in the darkroom. A negative of this kind can sometimes be salvaged by *intensification*. Too dark a negative can be improved by *reduction*.

To show the action of a common reducer, first prepare half a test tube of silver bromide emulsion, expose it, develop with a few drops of stock developer, and add four or five drops of glacial acetic acid (the photographer's short stop) to halt development. Then add 6 cc. of hypo solution. To the dark emulsion you now have, slowly add a reducing solution consisting of 25 grains of potassium ferricyanide in 1 oz. of water. Watch the dark silver particles lighten as they are changed into silver ferrocyanide and in that form are dissolved by the hypo. This is the well-known Farmer's reducer.

A common method of intensification is to combine the silver deposits of the negative with some denser metal such as chromium or mercury. To show how a typical intensifier works, first make up the usual emulsion, expose, and develop it as before. Add a few drops of glacial acetic acid short stop. Oddly enough, the first step in intensification is bleaching. Add 20 grains of mercuric chloride to 1 oz. of water and pour in enough of this solution to bleach out completely the black metallic silver, which in the process is converted into white silver chloride.

On a negative, the image seems lost at this step. It is brought back by redevelopment. To your bleached test-tube emulsion, add a little ordinary ammonia water. The emulsion becomes even blacker than it was before; it has been intensified. The new blacker chemical is a very complex salt, silver mercury ammonium chloride.

The process of toning photographs, in which the black areas are converted to sepia or some other color, also may involve bleaching and redevelopment. Prepare the usual small quantity of emulsion and develop it after exposure. Add the acetic acid short stop. Then prepare a small flask of bleaching solution consisting of 110 grains of potassium ferricyanide, 110 grains of potassium bromide, and 2 oz. of water. Also dissolve separately in a test tube 50 grains of sodium sulphide in 2 oz. of water. This is the redeveloper.

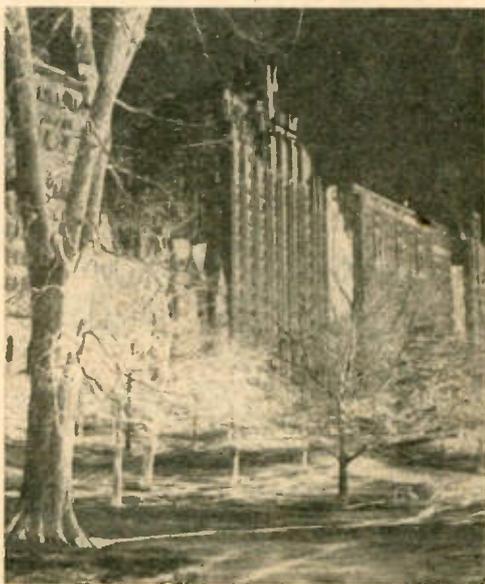
Pour some bleaching solution into the developed emulsion. The black silver particles are quickly bleached out into a yellowish substance. The silver first becomes silver ferrocyanide and then silver bromide.

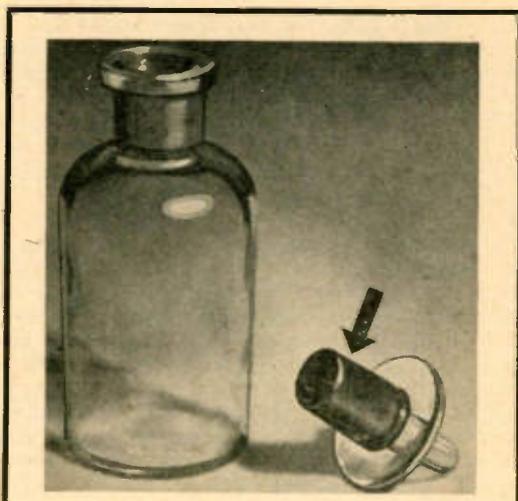
Now pour in some of the redeveloper and at once the emulsion turns brown—in a photo, sepia toning would have resulted. The sodium sulphide in the redeveloper has changed the silver bromide to silver sulphide, the compound that appears as tarnish on silverware, and this is the sepia tone.

This is the same negative of two stages. Below, it has been underexposed or underdeveloped, and is too thin readily to afford a good, contrasty print.



Here the negative has been put through a process of intensification that makes the image denser by causing the silver deposits to form new compounds.

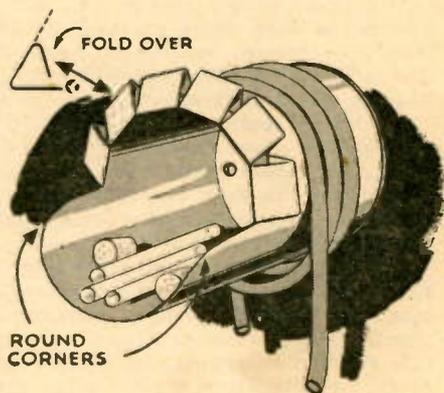




CAUSTIC SOLUTIONS of some strength are likely to make trouble if kept in glass-stoppered bottles; the ground glass joint will "freeze" tightly, rendering it difficult to open the bottle. A rubber stopper is naturally the answer—but if you don't have one handy, cut the finger from a discarded rubber glove, pulling it over the regular stopper.—A. S. LANDRY.

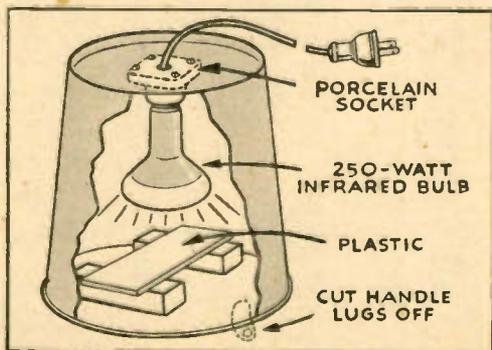
Tin Can on Lab Wall Holds Rubber Tubing Safely

HELD by two screws into the wall over the bench, a tin can makes a good rack for soft rubber laboratory tubing. Cut a series of tabs on the edge of the can and bend them back to form a retaining lip. The inside of the can affords a convenient place to store pinchcocks, stoppers, and short lengths of glass tubing. Use emery cloth to round off the sharp edges formed when the can is cut.—BOB FLEMING.

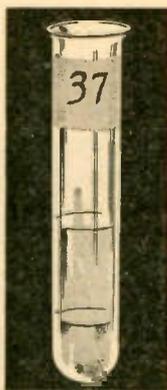


Pail Makes Oven for Plastic

WITH an old 10-qt. pail you can make an electric oven for heating plastic that will take this operation out of the kitchen and into the shop. Cut off the lugs that hold the bail, attach a flush-mounting porcelain socket inside the bottom, and screw in a reflector-type 250-watt heating lamp. You'll find that the average piece of lucite or plexiglas will become limp and ready for shaping in three to five minutes. Watch the time closely, because too much heat will blister the work.—T. GLENN HETRICK.



Frosted Area Allows Test-Tube Notes

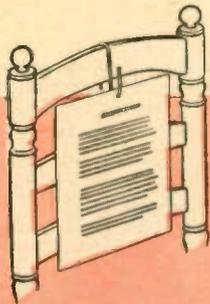


GUMMED labels on test tubes are always coming off, burning, or becoming stained. Because I find it desirable to make notes on test tubes, I frost an area near the top of each tube, using emery cloth or pumice stone. Writing is done with an ordinary pencil, and it can be wiped off with a damp cloth when you wish to make changes.—EUGENE A. REESE.

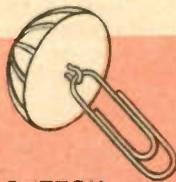
Old Waxed Cartons Are Useful

CARDBOARD milk containers and cylindrical ice-cream cartons are usually thrown away when they have served their original purpose. However, if they are rinsed in luke-warm water and dried, they will be found to have numerous uses in the home shop, on the chemical bench, and in the darkroom. Being cheap and disposable, they're especially suited for such jobs as blending paints, mixing plastic glues, and the like.—N. G.

paper clips GADGETS

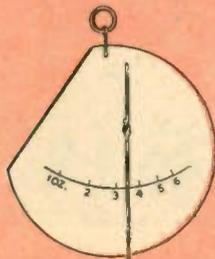


COPY HOLDER



BUTTON RING

MANY are the uses of the lowly paper clip. Besides the ten ideas shown, you can also make a clip into a hook for working knots, a reamer for clogged mechanical pencils, an axle for a cardboard toy, a "memory ring" to remind the forgetful, a marker to identify keys, and a holder for a test-tube bud vase.—L. LOTHROP.



POSTAL SCALE



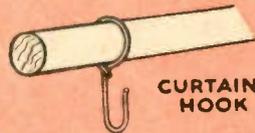
POISON WARNING



PIN DRILL

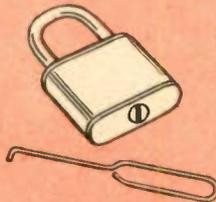


NONROLLING PENCIL



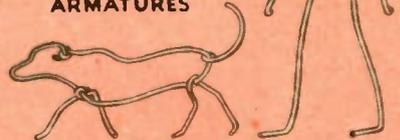
CURTAIN HOOK

DRIPPER

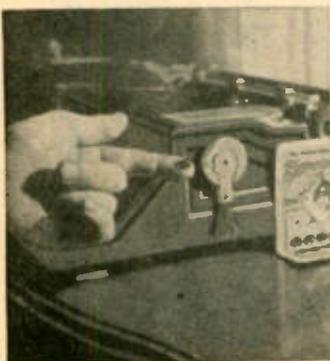


LOCK PICK

FIGURES AND MODELING ARMATURES

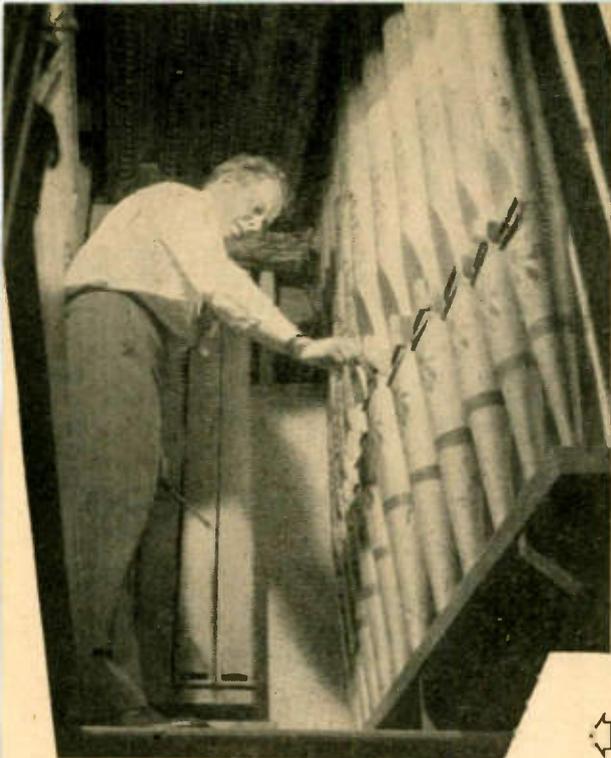


Snap Fastener Keeps Typewriter Eraser Where You Want It



TYPEWRITER erasers, if free to roam, are as elusive as a handful of quicksilver. Chaining them to the table with rubber bands or string will break them of the runaway habit, but the string involves its own complications. I solved the problem by obtaining a large snap fastener at the dime store, and soldering one part of the fastener to the typewriter and the other to the metallic eraser disk. Now I know where to reach for it.—ANDREW VENA.





When Charles or Wellden Neill sits at the console of their homemade organ in West Orange, N.J., the neighbors never know what to expect. With stops all out, the organ can be heard for blocks.



The two Neill brothers have their attic lined with 1,000 pipes. Charles, shown in these photos, is examining some of the big 10' bass pipes located along the stairway leading to the attic.

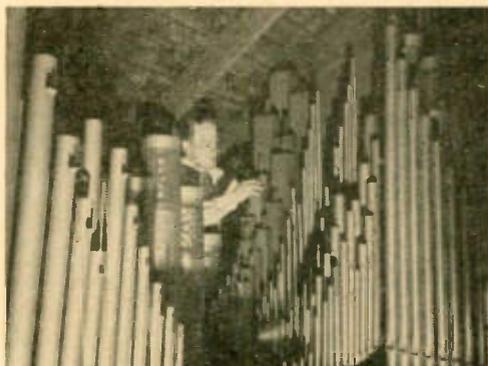
House of a THOUSAND PIPES

TWO hobbies have given Charles and Wellden Neill the unusual organ for which they have installed 1,000 pipes in the attic of their West Orange, N. J., home. Charles is an electrical engineer and, besides helping to build his own organ, likes to install and rebuild organs in churches. Usually he can pick up a few leftover pipes on

such a job, and his goal is to add 500 more of them to his and Wellden's collection.

Wellden, recently out of the armed service, is a student at Upsala College in adjacent East Orange. He and Charles play anything from swing to Bach. The neighbors? They're used to it, the brothers say, and besides, they like music.

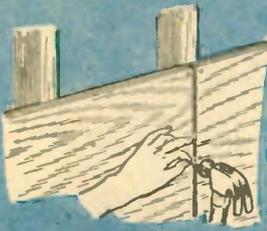
Pipes for the organ are made of wood and zinc and are both decorated and plain. They were obtained from five churches. Some date back to 1870.



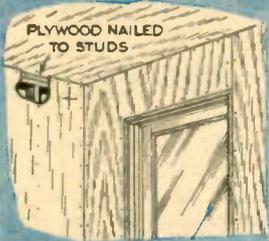
From the big basses, the pipes range down to the size of a lead pencil. The organ can be played from downstairs or from an attic keyboard.



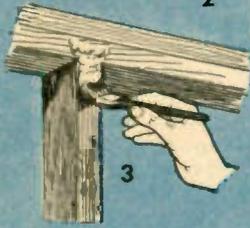
What's Wrong?



1
NAILING PLYWOOD WALLBOARD DIRECTLY ON STUDS



2
JOINTS NAILED FLUSH IN CORNERS AND AT WINDOW FRAME



3
GLUING PLYWOOD TO STUDS

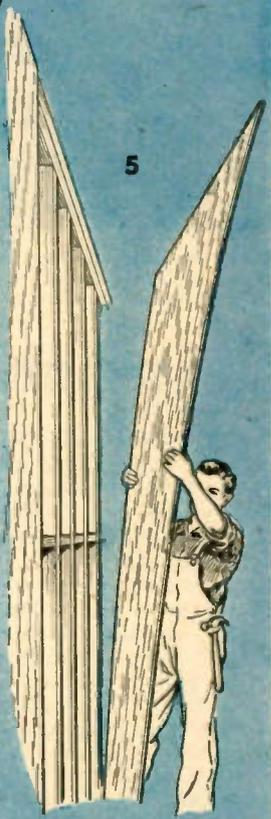
How many of these mistakes would you be apt to make in finishing a room with plywood wallboard? There are six shown by the artist, two in the first drawing. After you have decided what's wrong, turn the page upside down for the correct answers given below.

1. Start nailing at the center of the edge. Stretchers are needed between studs for backing on which corner and door and window-frame joints must be open to allow for movement of the frame. Don't glue to studs. Nail furring strips on before gluing. 4. Use plywood strips with the face grain running crosswise. 5. Two coats of asphalt paint are required on the side of the panel next to the studs to minimize condensation inside the wall.

ANSWERS



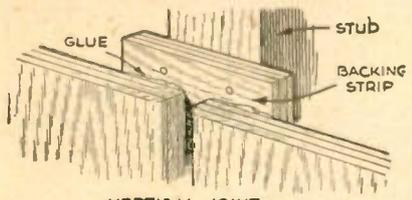
4
USE OF FURRING STRIPS



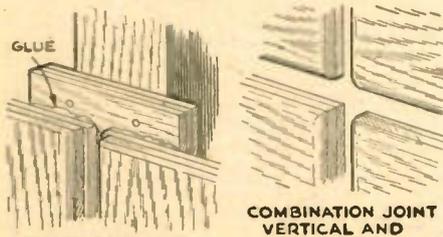
5
PUTTING PLYWOOD WALLBOARD ON THE INTERIOR OF OUTSIDE WALLS

OPEN-JOINT PLYWOOD WALLS

[WOODWORKING]



VERTICAL JOINT



EDGES RABBETED

COMBINATION JOINT VERTICAL AND HORIZONTAL

Open-joint installations of interior plywood wallboard are economical and decorative, emphasizing rather than hiding the joints. Usually sheets running from floor to ceiling are used, with vertical joints spaced 4' apart.

For best results make careful layouts of the walls to determine the best location of the joints.

Nail plywood backing or furring strips to the studs, with the grain crosswise of the panels, and glue the edges of the sheets to these strips. Use a damp cloth to clean off squeezed-out glue before it sets.

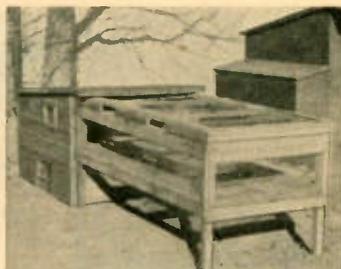
Open joints permit considerable variation in design, for the edges may be square, "broken," quarter round, beveled, or coved. Any such treatment may be combined with rabbeted edges.

For horizontal joints nail stretchers between the studs to carry horizontal backing strips. Combinations of vertical and horizontal joints are effective. They permit cutting sheets into smaller units to exploit various joint effects more fully.

POPULAR SCIENCE MONTHLY SHOP DATA



One of the lamp brooders first developed by the Extension Service of Louisiana State University. About 20,000 are now in use in Louisiana, and the type is popular throughout the South.



Ideal for the back-yard poultryman is this homemade version. Heated by electricity, it needs no attention.

Lamp-Bulb Brooder Cares for 100 Chicks

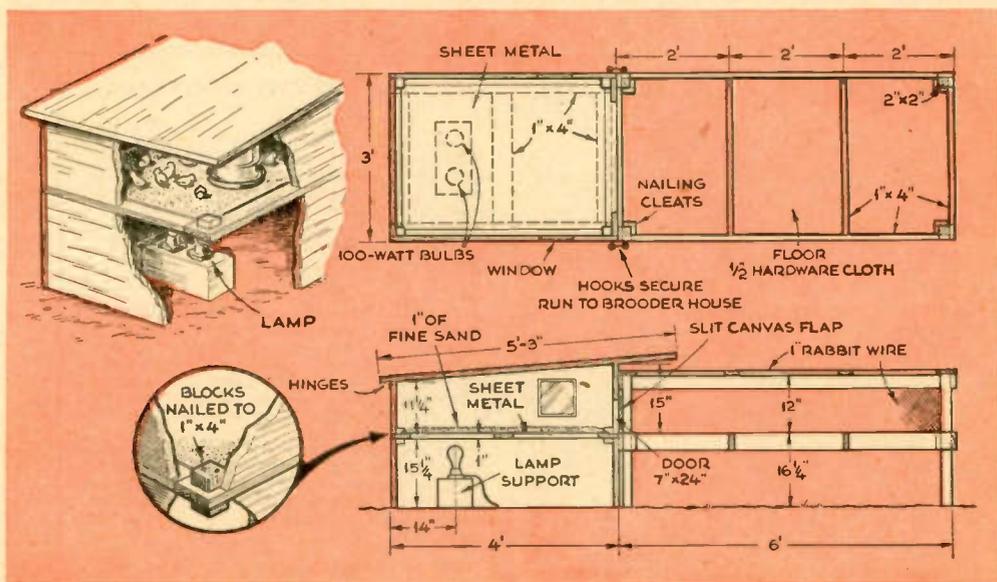
RAISING my own chickens became practical when I built a brooder of the type devised by the University of Louisiana. Occupying only 3' by 10' of back-yard space, it accommodates 100 baby chicks to the age of six weeks, or 60 to 1½ lb., which is broiler weight. Heat is transmitted through a sand-covered floor, and no thermostat is necessary, as the chicks settle down in the sand to obtain the most comfortable temperature.

Two 3' by 4' sections or open boxes, the upper one with two glazed windows and a 7" by 24" door opening on the run, constitute the brooder. The floor, a framework of 1" by 4" stock covered with galvanized iron, is positioned atop the lower section by small blocks at the corners, as shown below. The upper section rests on the floor frame over

similar blocks. The sheet iron is nailed on top of the framework for electric heating, but if an oil lamp is to be used, nail it to the underside instead, and provide several vent holes around the top of the lower section. Cover the metal with 1" of fine sand.

I used two 100-watt lamps placed 1" below the floor, and covered the sides of the brooder with scrap roofing to help retain heat. For cold weather the brooder door is fitted with a canvas flap, slitted at intervals to allow the chicks passage.

The run floor is hardware cloth, carried around the legs on nailing cleats. Hooks and eyes hold the run to the brooder and also secure the roof of the run, a screen-covered frame, to the sides. The brooder roof is hinged for cleaning.—ORVILLE J. GRISIER.



Tricky Tool Removes Plugs of Sod for Subsoil Fertilizing

EMPLOYEES of the city of Tucson, Ariz., have developed a novel method of nourishing trees and shrubs without unsightly surface application of fertilizer. P. J. Martin, Jr. and C. B. Maguire, at right below, devised a tool for removing divots of turf. Fertilizer is then poured into the resulting holes from a hopper. When the plugs of sod are replaced, no scars remain.

Somewhat like a small post auger, the tool has two sharp teeth that cut cleanly into the

turf as deeply as 12". A plunger inside the barrel forces the plug out.

From the base of a tree, applications are usually made 15" to 18" apart out to the diameter of the branches. It has been found that this spotting of fertilizer reaches most of the root system. The photo at the left below, taken in one of Tucson's parks, shows the device in use in the foreground and, at the far left, how fertilizer is poured from a sheet-metal hopper.

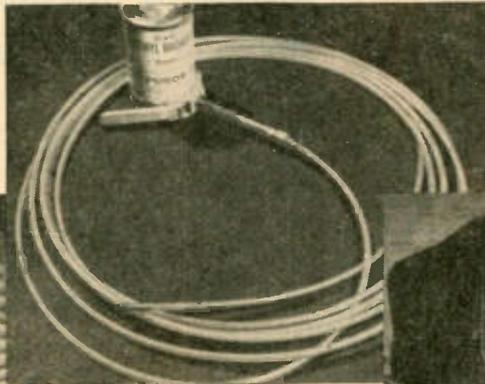


Plastic Envelope and Fumigating Gas Kill Insects in Foods

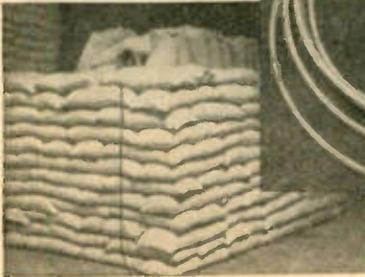
STORED foods, grain, and seeds, if threatened by insects, can be protected by an on-the-spot gas impregnation method when regular fumigating facilities are lacking. It is not necessary to move or even restack the containers. The active gas, methyl bromide, is available in cans and cylinders. It works

in a few hours to kill insect life in all stages, and is so volatile that it vanishes completely upon subsequent airing. The method can be applied with equal success to loaded boxcars, trucks, and ships' holds. A photo below shows how a plastic tarpaulin is used for fumigation of small lots.

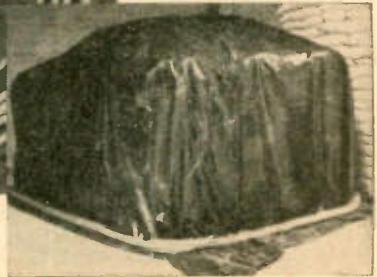
Here insect-infested rice is ready for fumigation, with a plastic tube leading out from the stack for connection to a container of methyl bromide.



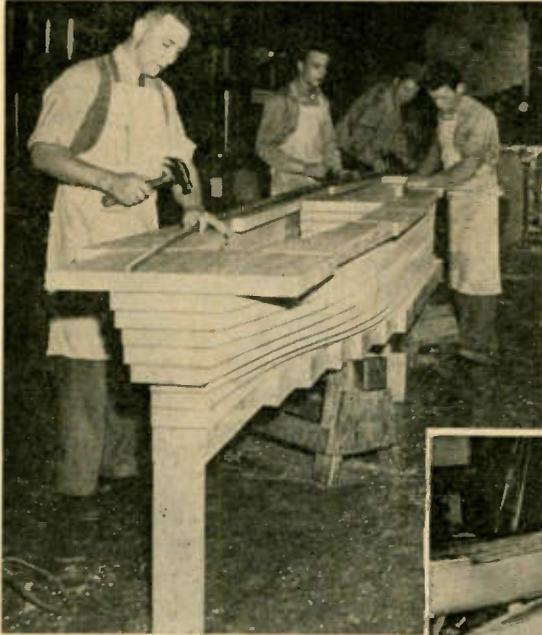
A gas-proof tarpaulin thrown over the bags is weighted down with sand-filled canvas "snakes". The gas, a poison, should be used by trained men.



Above, how plastic tubing is clamped to a can of the concentrated gas.

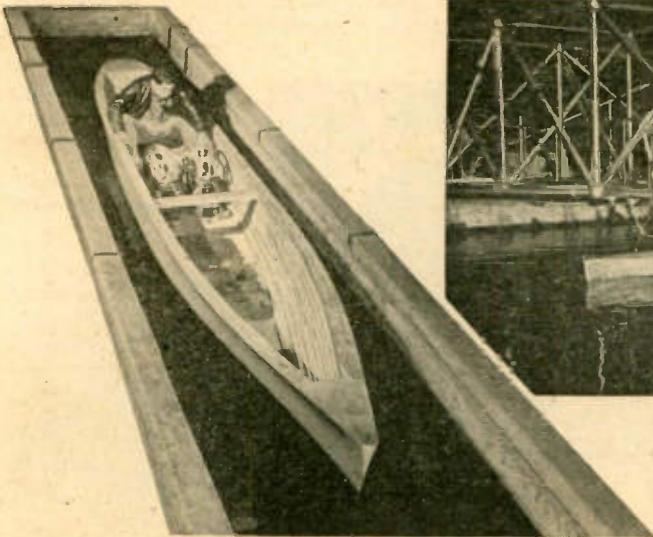


Supermodels for Our Indoor Navy



Navy model craftsmen assemble wood lifts for newly designed hulls, glue them in a huge glue press, and then carve the shape with spokeshaves, planes, and the like.

Twin dynamometers are installed in a 20' hull and checked in a channel leading to the large model-testing basin.

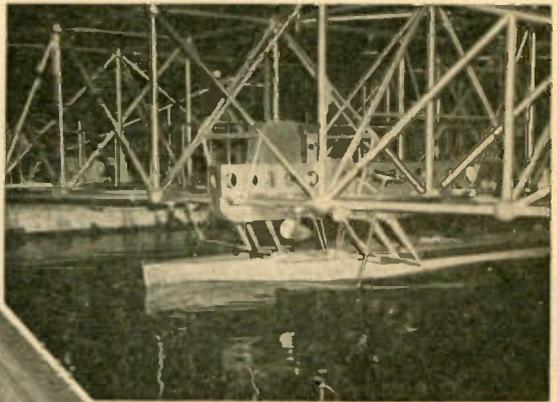


FINE craftsmanship and methods familiar to modelmakers are employed by the Navy in building test models of new hull designs. In the photo at left and in that just below will be recognized the lift, sometimes called bread-and-butter, method of construction often used in building model ships. Wooden lifts are glued together in a huge glue press, and the steps are then carefully carved down to conform to hull templates.

The hulls are built and tested at the David Taylor model basin, which is operating at Carderock, Md., on the Potomac River.



How the lifts look on the inside can be seen here and at left below. The outsides of the hulls are finished smooth.



This 42-ton carriage, equipped with sensitive instruments, tows a hull on its basin trip to test power and design under sea conditions.



KODAK ORTHO-X (sheets)—top-speed ortho film. Gives ruddy skin effects, hence popular for pictures of men.



KODAK PANATOMIC-X (sheets, miniature rolls)—extremely fine grain, first choice for big enlargements.



KODAK PORTRAIT PANCHROMATIC (sheets)—a favorite multi-purpose film, especially valuable for portraits.

First step to a finer picture ...the right Kodak Film



... And it won't be long before these seven favorites, and the rest of the Kodak Film family, will be back on Kodak dealers' shelves. The supply is steadily improving.



KODAK PLUS-X (rolls, packs)—all-around "pan" film; combines high speed, fine grain.



KODAK SUPER-XX (rolls, packs)—favorite high-speed film for both outdoors and indoors.

At your Kodak dealer's...
Eastman Kodak Company,
Rochester 4, N. Y.

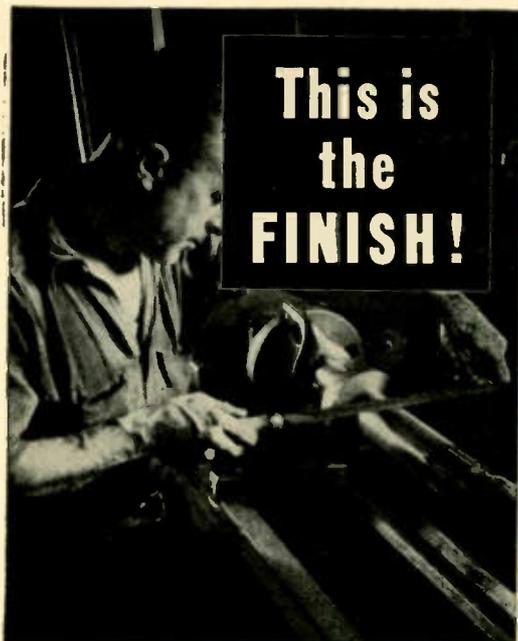


KODAK SUPER PANCHRO-PRESS, TYPE B (sheets)—high speed, good highlight separation. Outstanding for portraits.



KODAK VERICHROME (rolls, packs)—fast, orthochromatic. America's favorite snapshot film by a wide margin.

Kodak



**This is
the
FINISH!**



It's the kind of perfect-fit finish that usually results when human skill and *The right file for the job* get together. A Nicholson Long Angle Lathe File is shown removing the last few thousandths inch from a shaft. The same file will do the final smooth-finishing.

Because of the 45° angle of its teeth, it will, under light pressure, remove metal faster than a regular Mill file used as a "lathe" file. This long angle overcomes filling up—keeps file cutting and avoids scratching the surface of the work. Chips slide down the gullets and are forced out by the motion of the work—making file self-clearing, clean-shearing, non-chattering. Excellent for lathe-using hobbyists, as well as for industrial mechanics. Purchasable through mill-supply houses. Your hardware store also can get this special-purpose file for you.

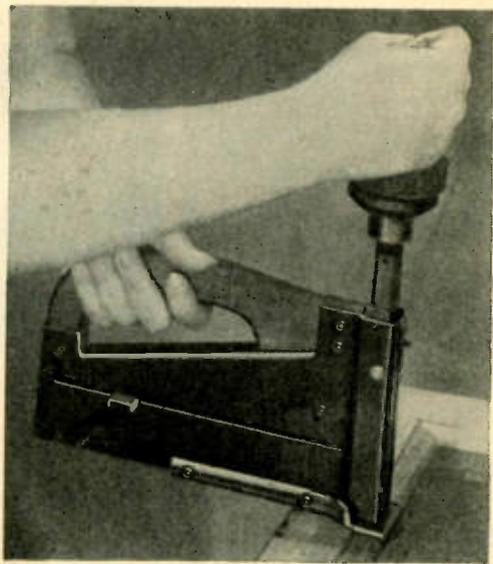
FREE BOOK, "FILE PHILOSOPHY," on kinds, use and care of files—48 interesting illustrated pages.



NICHOLSON FILE CO.
19 Acorn St., Providence 1, R. I.
(In Canada, Port Hope, Ont.)



**NICHOLSON
FILES** FOR EVERY PURPOSE



Light Hand-Nailer Saves Time

LOADED and operated much like a stapler, a 3½-pound, portable hand-nailing machine made by Spotnails, Inc., of Chicago, drives nails ½, ⅝, ¾, and 7⁄8 inches long in soft wood and plywood. The galvanized, hook-headed nails come in cohered strips. Guide plates place the work and spot the nails.

Fiery Liquid Turned to Soap

NAPALM, potent incendiary agent used in flame throwers during the war, has been converted cheaply to a satisfactory liquid soap by the Oahu (Hawaii) Chemical Warfare Service command. Machinery that once mixed Napalm to burn Japs out of caves will turn current stocks into 50,000 gallons of soap within a few months and help to ease the current shortage of that product.

**Model Builders
Attention!**

	V	V-2	V-3
Hex	1/2"	3/8"	5/16"
Thread	3/8"-24	1/4"-32	1/4"-32
Thread Length	7/32	7/32	5/32
Weight, Grams	0	3 1/2	2 1/2

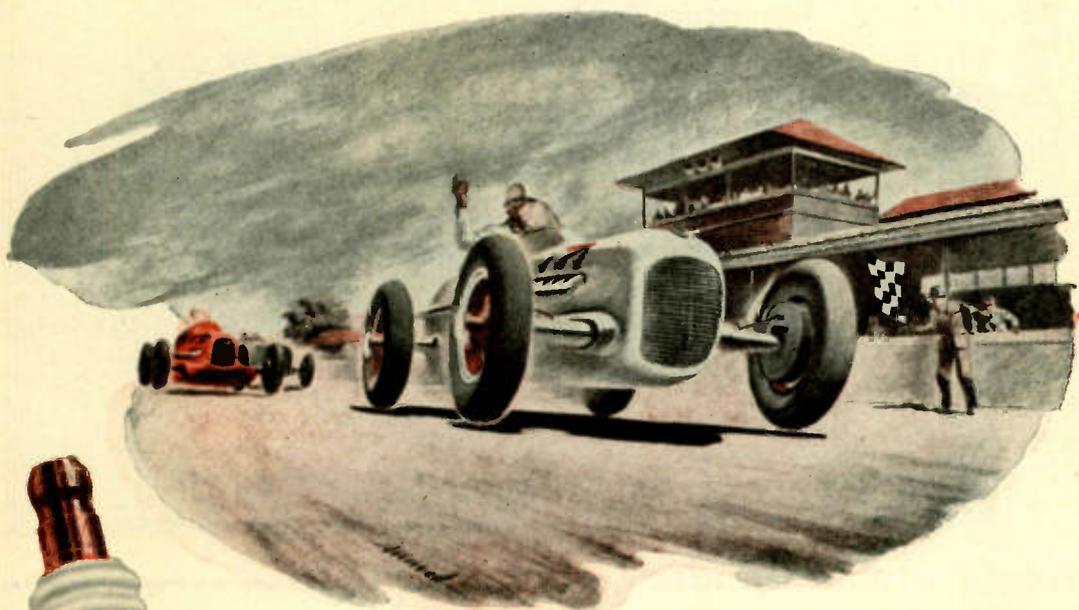
Actual Size V-Plug

Champion spark plugs for model gas engines give the same dependable performance as regular Champions. Sillment sealed. Sillimanite insulator. Alloy needlepoint electrodes for easy starting. One piece construction.

CHAMPION

SPARK PLUG COMPANY • TOLEDO 1, OHIO

Here's why most Race Drivers specify Champion Spark Plugs



THEY'RE DEPENDABLE!

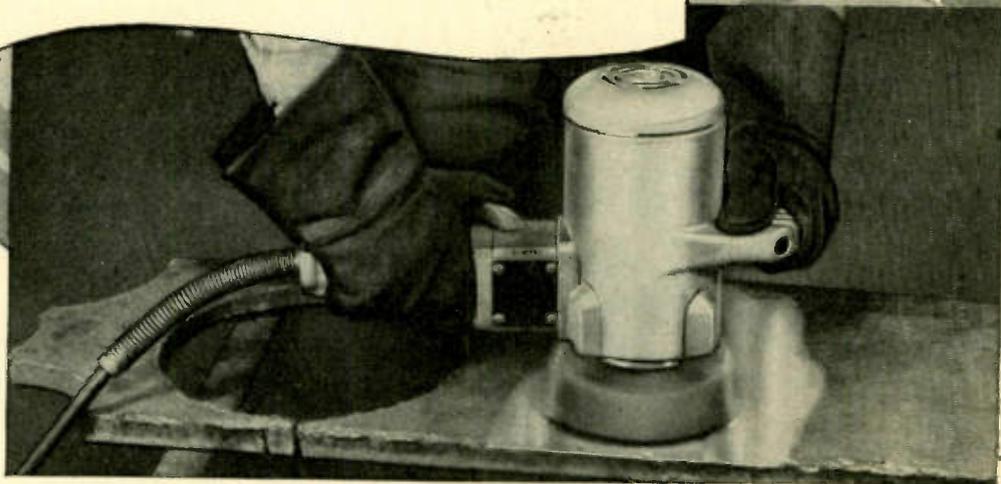
The vast majority of racing drivers use Champion Spark Plugs because they can depend upon them to give championship performance. There are many reasons why this is so, but the end results are contained in the record books on racing—on land, water and in the air. They show that Champions are true champions, in fact as well as in name—a fact worth remembering when you need spark plugs for your car. Champion Spark Plug Company, Toledo 1, Ohio.

FOLLOW THE EXPERTS . . . DEMAND DEPENDABLE CHAMPIONS

JUNE
1946 211

Ingenious New Technical Methods

To Help You with Your
Reconversion Problems



New Portable Grinder Lasts Longer ... Increases Production

The **Portable Gaston Grinder** is designed for the grinding and sanding of metal—also, with wire brushes, for paint and rust removal. Because it is powered by a 3-phase motor, without brushes, commutators or gears, the Gaston will give long service.

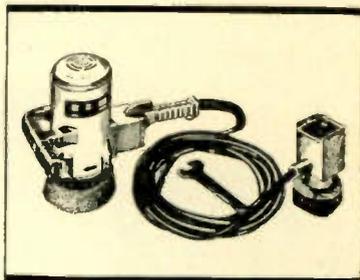
The Gaston Grinder starts at full speed. Its speed remains constant regardless of extra pressure by the operator. This controlled speed under heavy load, eliminates glazing of the grinding wheel; produces a better ground surface.

Three sizes of dust-tight Gaston Grinders are available. Furnished in either "cup-wheel" or "edge-wheel" type, as desired.

In a dusty work atmosphere, that causes throat irritation and dryness, chewing Wrigley's Spearmint Gum helps keep workers' mouths moist and fresh—thereby reducing work interruptions—and "time out" to the drinking fountain.

Workers can stay at their machine, while chewing Wrigley's Spearmint—even when their hands are busy. There is no lost time. And the pleasant chewing helps keep them alert and wide-awake. One Connecticut manufacturer with a dust problem reports group production up about 3% over normal, when workers were given chewing gum. Other plants and factories everywhere, claim stepped-up efficiency when chewing gum is made available to all.

*You can get complete information from William H. Howland,
2533 East 73rd Street, Chicago 49, Illinois*



The Portable Gaston Grinder



AA-72



**Piston rings
wear out, too**

Billions of miles of good engine life go up in smoke every year—the smoke that pours out of automobile exhausts. Plain as day this smoke says: "Your piston rings are worn out. Replace them immediately!"

Smoke is only one symptom of worn-out rings. Others are: oil-pumping . . . slow get-away . . . loss of power. At the first sign of any of these symptoms, take your car to a motor specialist for a complete check-up.

If new rings are needed, it will pay to get Hastings piston rings. They *stop* oil-pumping, *check* cylinder wear, *restore* performance.

HASTINGS MANUFACTURING COMPANY • HASTINGS, MICHIGAN
Hastings Ltd., Toronto



HASTINGS STEEL-VENT PISTON RINGS

TOUGH ON OIL-PUMPING

GENTLE ON CYLINDER WALLS



Only Forecaster Superb Pipes have this

New FILTER

**Cleans, cools, filters smoke •
Traps nicotine • Prevents drip**

Enjoy a clean, cool, dry smoke always from a Forecaster • The exclusive aluminum winder can be removed in a jiffy—change cleaner as often as you like. • Choice, rich-grained briar, in a variety of popular shapes. • Ask to see the Forecaster Pipe display at your favorite dealer.

\$1.50

Six Sheldon Pipes, \$2.50



Pat.
App'd
For

NATIONAL
Forecaster
SUPERB

NATIONAL BRIAR PIPE CO • JERSEY CITY, N. J.

214 POPULAR SCIENCE



Wind-Tunnel Tests for Cars

Quarter-size car models are undergoing wind-tunnel tests at the University of Michigan as part of a new technique in the development of automobile designs. Though the model above, one of several built by the Studebaker Corp., appears to rest on the platform it is actually suspended by wires at four points. Paul McKee, research assistant, here tightens one of them.

Americans Are Urged to Give Canned Foods to Needy Abroad

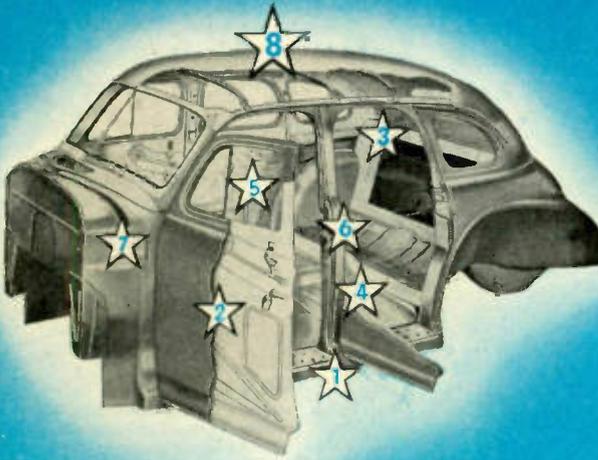
A quarter of the world's population is facing death from starvation and diseases caused by malnutrition. Even though the United States and other countries have been sending shipments of food to the needy in all parts of the world, the demand for supplies far exceeds what has already been sent.

You may help feed the hungry in war-devastated areas by taking any extra canned food you have to the Emergency Food Collection depot nearest your home.

Emergency Food Collection, working with UNRRA, is endeavoring to supplement the minimum subsistence diet planned in the relief program for warding off famine abroad.

Food in tins and money to buy more food are being collected. The kinds of food most needed are: milk (condensed, evaporated, or dried), meat, fish, and peanut butter.

BETTER BY FAR IN SAFETY



THE solid security of the new Body by Fisher is doubly assured by special engineering at such points as these in the structural drawing shown above.

Inside and out, you'll find numerous evidences of the extra care Fisher Body craftsmen take to make safety certain in the bodies they build. And when it comes to beauty and comfort, you can actually see and feel the difference their special "know-how" makes.

Small wonder, then, that seven out of ten motorists say they prefer a car with Body by Fisher. Be sure your new car has one, by looking for the Body by Fisher emblem. It is your assurance of the skilled work that more than 37 years of coachcraft provide.

- 1 Heavier metal at vital points.
- 2 Outer and inner door panels welded into one solid unit.
- 3 Box-type rear-end braces give added protection against weaving and twisting.
- 4 Solid steel floor especially ribbed for extra strength.
- 5 Genuine safety plate glass is used in side windows and ventipanes as well as the windshield.
- 6 Three U-shaped steel channels welded together to form center pillar.
- 7 Ruggedly braced steel cowl and dash.
- 8 One-piece solid steel Turret Top completes the all-round safety that is yours in the Unisteel Body by Fisher.

Body by Fisher



BETTER BY FAR

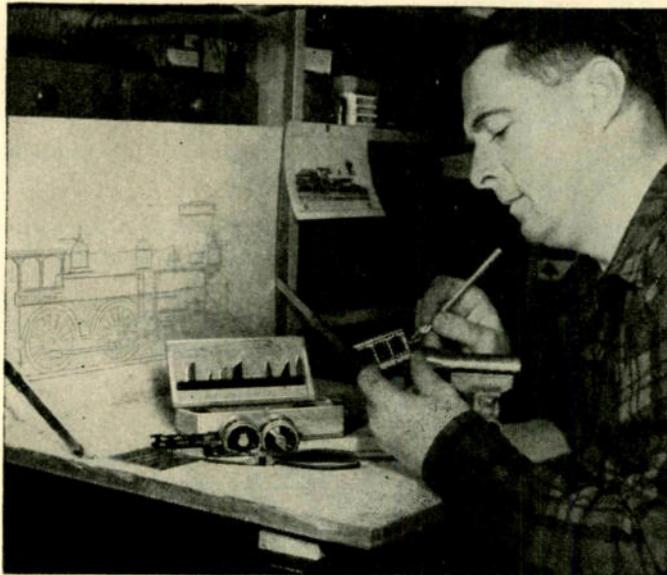
Thousands of dollars in university scholarships and cash awards for best model Napoleonic coaches or miniature cars submitted by boys of 12-19 years inclusive. For information, write: Fisher Body Craftsman's Guild, General Motors Bldg., Detroit 2, Michigan.

You get Body by Fisher
only
on General Motors cars

CHEVROLET • PONTIAC
OLDSMOBILE • BUICK
CADILLAC



The New 1946 Chevrolet
Fleetmaster Sport Sedan



BURBANK DOES IT!...SO CAN YOU!

How Expert Model Builder Gets Topnotch Results

James W. Burbank, of Narrowsburg, N. Y., builds scale models of famous old locomotives. He's a perfectionist. When he finishes a model, it looks real enough to chug off under its own steam.

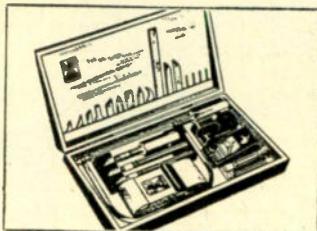
Here you see him finishing the in-laid walnut cab for his model of the Erie's old George C. Bernard, speed demon of the 1870's. You see, too, three good reasons why he turns out such beautiful work, i.e., the picture of the original engine; his own accurate scale design; and his *indispensable* X-acto Knife Set.

"X-acto Knives are tops," says hobbycrafter Burbank. "They're so versatile. I can find a blade-handle combination for the toughest or most delicate jobs . . . And those little pin vises . . . their heads fit my hands

perfectly. I recommend X-acto to every model builder!"

Be Expert At Your Hobby!

X-acto adds skill to your wrist. Smooth-cutting, easy to use as a pencil, X-acto is the indispensable tool for whittlers, wood carvers, artists, photographers.



No. 85 X-acto Tool Chest - 3 all-metal knives; full assortment of blades; saw; sander; stripper; planer; 2 drill holders; 10 drills; 6" steel ruler; Complete in wooden chest, \$12.50. Also #84 Set, \$7.50.

Buy where you see this sign. At better hardware, hobby and gift shops - or if not available write direct to X-acto Crescent Products Co., Inc., 440 Fourth Avenue, New York 16, N. Y.

*Reg. U. S. Pat. Off.



X-acto

KNIVES & TOOLS

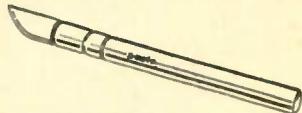
X-acto Knives & Knife Chests From 50c to \$5.00

V is for Versatile

... as in
X-ACTO!



X-acto's 3 handle styles and 13 blade shapes fit every type of cutting job. But if you're a one-knife man, we recommend for all-round work . . .



X-ACTO No. 2 KNIFE, with solid duraluminum handle, made with new improved chuck collet. Knife alone, 50c. With 5 assorted blades, in #52 Set, \$1.



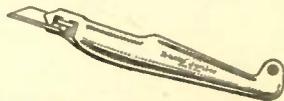
WHITTLE A LITTLE? Send 10c for a copy of "Whittling Is Easy with X-acto!" You'll be an expert in no time.



YOU'LL BE VERSATILE, TOO. Send for these helpful booklets, 10c each. (1) Building Your First Flying Model. (2) The Knife As a Drawing Instrument. (3) Commercial Artists Handbook. (4) How To Build Scale Model Planes.



SAVES CUT FINGERS - X-acto is designed for firm grip and sure control. Blades lock in, can't fold under. So much handier and safer than razor blades.



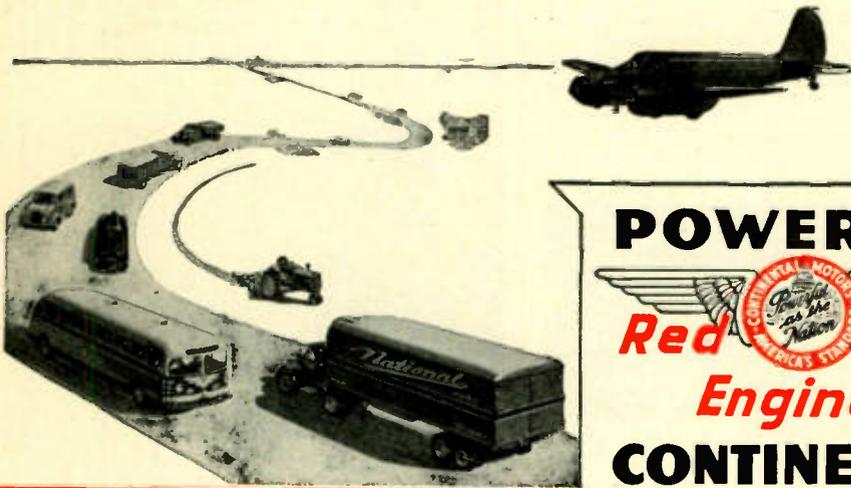
OK, JUNIOR! Here's your X-acto Junior Knife, shaped like a Spitfire fuselage, with a two-edged blade. All-metal. Only 25c.

POWER

BY CONTINENTAL

From the half-horse Tiny Tim to heavy duty Diesels, the Continental Red Seal identifies engines world famous for their stamina, economy, and all-round reliability.

The Continental line is *complete*. It includes a wide range of engines, each expressly designed to meet a specialized need in aviation, transportation, industry or on the farm. There are Red Seal engines for use with gasoline, natural gas, and distillate. And production has now started on Continental Diesels with "Cushioned Power" Combustion Chamber for greatest fuel economy, still further broadening the applications of *Continental Power*. Continental Red Seal Engines are *on the job wherever there's work to do*.



POWER BY



CONTINENTAL

CONTINENTAL MOTORS

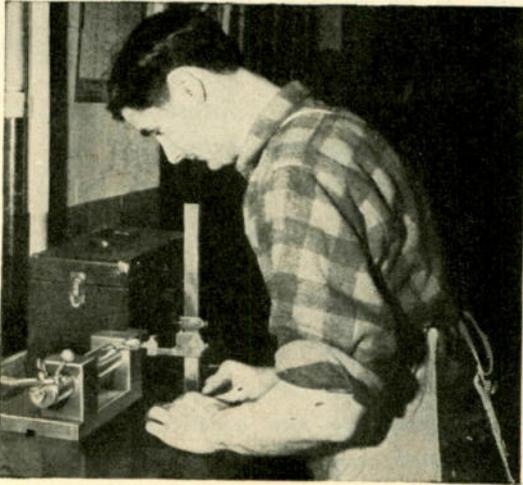
CORPORATION — MUSKEGON, MICHIGAN

44 YEARS' EXPERIENCE BUILDING ENGINES FOR INDUSTRY, TRANSPORTATION, AVIATION, AND THE FARM

JUNE
1946 217

The making of *Marlin* GUNS

Marlin brings to sportsmen, through this series of advertisements, interesting facts on gun-making... to enhance appreciation of fine sporting firearms and to encourage their thoughtful handling and care.



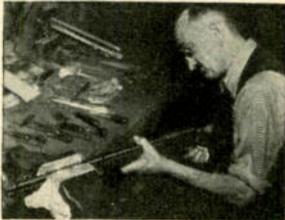
Tool-Making is Handwork of Infinite Precision

TOOL-MAKING • In the modern Marlin plant, jigs, dies and gauges make possible the manufacture of parts so precise and uniform as to be completely interchangeable. These basic tools control cutting operations of automatic machines, check uniformity of parts.

HAND PLUS MIND • Tool-design requires skilled engineering. Tools are made by hand...by talented, experienced craftsmen.

Tooling is starting-point and heart of modern line production...a system which produces fine rifles and shotguns in volume, at prices within the reach of all.

REPRINTS of advertisements on the Making of Marlin Guns will be sent FREE to sportsmen on request.



GUN REPAIR Also Requires Know-How and High Skill



New Rifle Kicks Downward

TWO NEW-TYPE guns have recently been designed by Chief Gunner's Mate James E. Sieg, of the U. S. Coast Guard. First is the Sieg Automatic Rifle, which goes present types one or two better. Owing to a compensator that balances recoil shock, the kick is negligible, and the muzzle, on firing, depresses unless the front is supported. The gun is .30'06 cal., weighs 10½ pounds, and is 36 inches long. Magazine holds 20 rounds, and the rate of fire is from 650 to 700 rounds per minute. The double trigger is pivoted for semi- or full-automatic fire.

Sieg's other invention is a line-throwing gun that establishes new standards in range and accuracy, developed for use by the U. S. Merchant Marine. It is .50 cal., and uses a four-pound projectile with a 150-pound-test nylon line. One type of projectile has mechanism for firing a carbon dioxide cartridge that inflates a "doughnut" float when it hits the water. The gun has a range of 400 yards, and can be fired without setting it into a stationary mount.



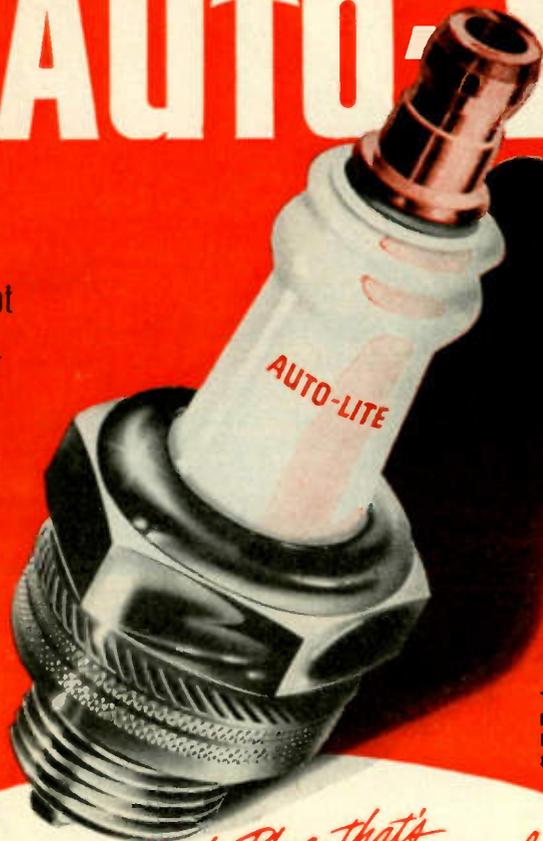
THE *Marlin* FIREARMS COMPANY

NEW HAVEN, CONN., U. S. A. • FOUNDED IN 1870

BE SURE TO SEE MARLIN 1946 MODELS ON DISPLAY AT YOUR DEALER'S

Switch to - AUTO-LITE

Money cannot
buy a better
spark plug



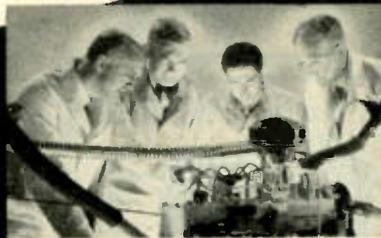
*The Spark Plug that's
Ignition Engineered*

TUNE IN THE AUTO-LITE
RADIO SHOW STARRING
DICK HAYMES—SATURDAYS
8:00 P.M.—E.S.T. ON CBS



Auto-Lite spark plugs are designed by the same engineers who design complete electrical systems for leading cars and trucks. This specialized engineering experience is one reason why money cannot buy a better spark plug. A complete set of ignition engineered Auto-Lite spark plugs in your car, helps give you quick starts, and full mileage from every gallon of gas. So switch to Auto-Lite when faulty spark plugs need replacing. See your Auto-Lite Spark Plug Dealer today.

THE ELECTRIC AUTO-LITE COMPANY
Toronto 1, Ontario Toledo 1, Ohio



Continuing tests and scientific research, plus 35 years' experience designing complete ignition systems, enable Auto-Lite ignition engineers to maintain one high standard of quality.

AUTO-LITE SPARK PLUGS



VanRoy

with the
Ajustomatic
STEM

THE ONE AND ONLY PIPE OF ITS KIND



FREE-TURNING—SELF-ALIGNING



VanRoy Ajustomatic Bard \$5

VanRoy Ajustomatic holds a man's affection; it is the only screw stem pipe that maintains perfect alignment of stem and bowl throughout its long, happy life! The exclusive VanRoy patent, "float-mounting"—allows free turning of the stem but grips it snugly in any position. The stem can't lock at an off angle, always lines up as straight as a die. A remarkable innovation, worthy of the VanRoy tradition of eminently fine quality. VANROY COMPANY, INC., Empire State Building, N. Y. 1, N. Y.



SIGNET OF QUALITY IN PIPES

GAL WON'T GO



'CAUSE CAR'S A MESS



**Just try
No. 7**



You'll say it's the easiest you ever used. This polish removes Traffic Film quickly—restores original color and lustre. If you want a brilliant job in half the time, use Du Pont No. 7 Polish.

THIS QUICK SHINE-UP



MAKES "NO" A "YES"

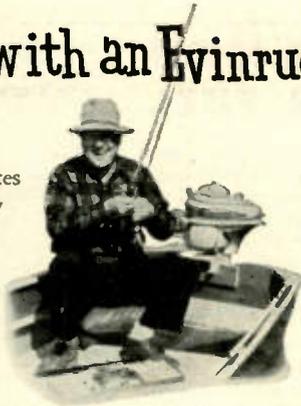


Better Things for Better Living
... Through Chemistry

NO. 7 POLISH

ALL YOURS with an Evinrude

Check every quality and feature you want in a modern outboard motor . . . chances are, you'll find that Evinrude offers every one . . . *and more!* Each developed and perfected the sure and steady way . . . through 37 years of progressive engineering, experimenting, *proving*. That background is worth remembering—when you choose an outboard motor!



Want Sure Starting? Fine! That's an Evinrude "specialty" . . . always, on every model, it's mechanically *built right in!*



Co-Pilot Steering! On every model the "unseen hand" that grips when you let go . . . holds the motor on the course you set.



Operating Ease! — with controls so simple and troubleproof that even youngsters handle an Evinrude easily and capably.



Quiet! Smooth! Perfected underwater silencing buries exhaust fumes and noise. Float in vibration-absorbing bearings.



Slow Trolling Speed!—enables you to check right down to a slow trolling glide without choking, stuttering or stalling.



Full Reverse! On two great fishing models — provides instant reverse, utmost maneuverability, 360 degree steering.



Four-cylinder Performance! Nothing like it for smoothness, thrilling responsiveness — and Evinrude offers it in four models!



Widest Range of Models! The right motor, for every boat, every service. Eight models, all with O.B.C. horsepower certification.

It all adds up to finer *performance!* And back of every Evinrude is the priceless advantage of organized, responsible, nationwide *service* . . . available everywhere through a veteran organization of selected dealers. *See your Evinrude dealer* — look for his name in your classified phone directory under "Outboard Motors". *Catalog free!* Address, EVINRUDE MOTORS, 5298 N. 27th St., Milwaukee 9, Wisconsin

In Canada: Evinrude Motors, Peterboro, Ontario



EVINRUDE

OUTBOARD MOTORS

HOW TO GET THE MOST OUT OF BETTER FUEL

Don't expect to fill your tank with the new, higher-octane gas and get top-grade performance from spark plugs you may have switched to during the war. Now that you're getting far better fuel—and have returned to normal driving—you need to consult your service station about changing to AC plugs that run *cooler* than those you may have used with wartime fuels.

The correct type of plug is *necessary* to avoid hard starting—loss of power—waste of gas—cracked insulators—rapid electrode wear—excessive oxide coating—misfiring under heavy loads.

The AC Heat Range, and today's wider heat range per plug, enable you to fit spark plugs exactly to engine operating conditions. That's why AC's were standard equipment on 2 of every 4 new cars and trucks—why your Registered AC Dealer can help you to get the *utmost reliability* in spark plug performance. Have your plugs checked today. Be sure you have the type that will give you the best in performance.

AC SPARK PLUG DIVISION • GENERAL MOTORS CORPORATION

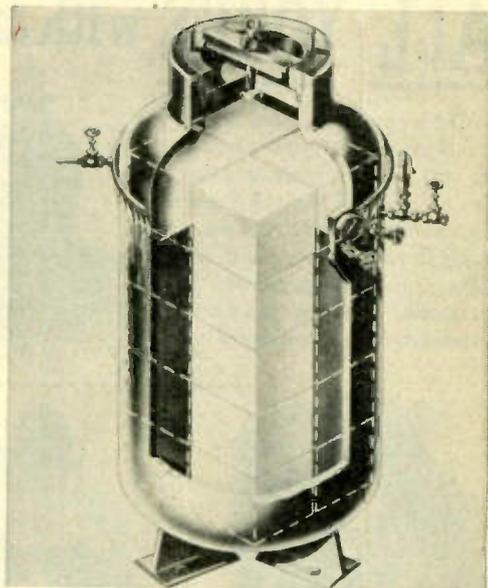


CLEAN PLUGS SAVE
UP TO ONE GALLON
OF GAS IN TEN



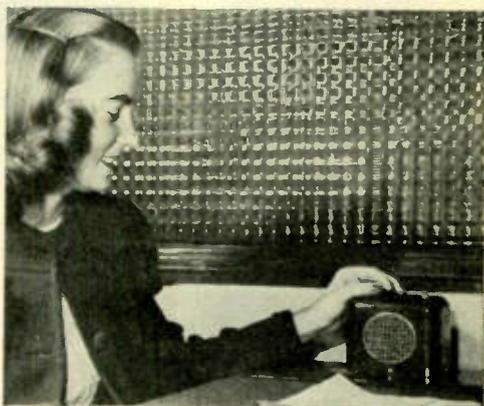
SPARK PLUGS

222 POPULAR SCIENCE



Liquefies Dry Ice in 10 Mins.

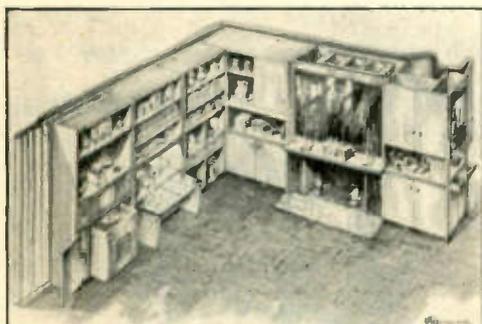
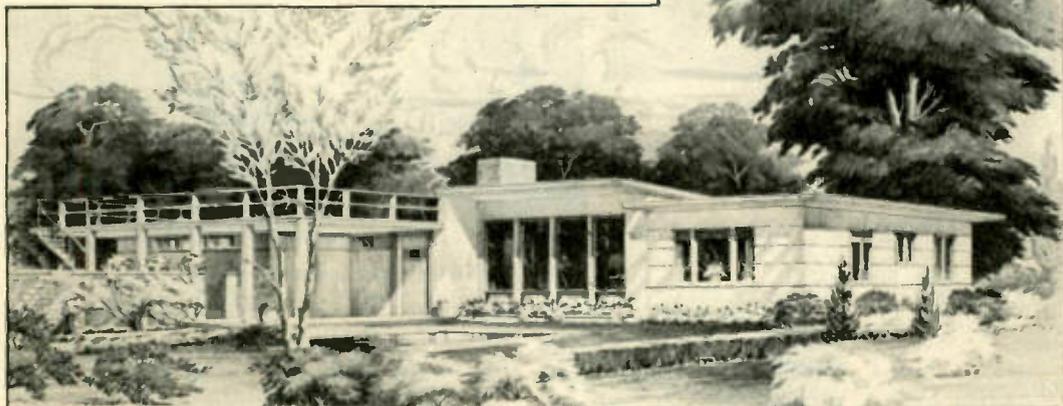
TWENTY 50-pound blocks of dry ice are converted to liquid carbon dioxide within 10 minutes in the new Jumbo Liquefier (above). Its 1,000-pound capacity is seven times as much as that of the type previously in use. Designed by Mathieson, the Jumbo Liquefier is being manufactured by American Car and Foundry Co.



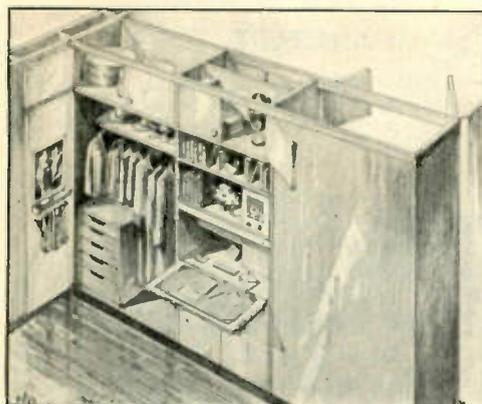
Play Phone Goes to Work

ORIGINALLY designed as a \$19.95 toy, the Utiliphone, two-way communication device made by Electronic Laboratories, Inc., of Indianapolis, has now been equipped with switches on both units for interoffice conversation. For adult use, it costs \$29.95.

Built For Your Future . . .
*with hands skilled
 by the past*



Defoe's "Working Walls"™ are distinctly a modern innovation. They put between-room wall space to work for the housewife and provide more storage while actually saving room space.



IT TAKES a lot of time and work to transform thought into reality. Things like the new Defoe Homes don't just happen. Back of them are the skill and experience born of more than forty years of painstaking workmanship under the exacting traditions of the shipbuilder's art.

• • For more than four decades everything Defoe has produced has been built to perform perfectly—and built to last! What the Defoe organization has learned in all those years has now been translated into the comfort, the convenience, and the economies of the new Defoe Homes. They will be a definite contribution to the better things for better living in the good times which lie just ahead.

*TRADE NAME REGISTERED



HOUSING DIVISION
 DEFOE SHIPBUILDING COMPANY Dept. PS-6
 BAY CITY, MICHIGAN

Please send me the descriptive brochure on the new Defoe Homes. Enclosed is 10c for handling and mailing costs.

Name _____

Street _____

City and State _____

IT'S JOHNSON THAT GIVES YOU ... THE "BIG THREE" OF OUTBOARD MOTORING



Full Range Performance! You've heard of the motor that packs real power... *silken* power... at high speed, yet gives you velvet smoothness at a crawl? That's Johnson. Dual Carburetion (which Johnson brought to outboard motoring 10 years ago) accounts for this beautiful performance.

Reverse! Of course you want reverse. Reverse, with 360° Steering, is one of the "big three" of outboard motoring. (It was a Johnson feature nearly 25 years ago.) Steer forward, sidewise, turn around or back up... The Sea-Horse at right develops 5.0 O.B.C. CERTIFIED brake horsepower at 4000 r.p.m.



JOHNSON BUILDS
SEA-HORSE
MOTORS ONLY
— NO OTHERS



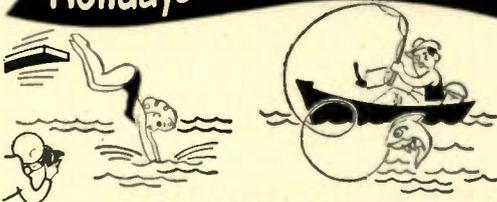
Wonderful Smoothness! Twin-cylinder Alternate Firing, developed and perfected by Johnson, was introduced to America by Johnson 17 years ago. It gives you a wonderfully smooth flow of power. It is one of the "big three" of outboard motoring... The Sea-Horses above develop 16.0 O.B.C. CERTIFIED brake h.p. at 4000 r.p.m. For information on Johnson deliveries see your Johnson Dealer. Look for his name under "Outboard Motors" in your classified phone book.

FREE HANDY CHART! Write for your copy today. Describes all 5 models of the '46 Sea-Horse line. JOHNSON MOTORS, 500 Pershing Road, Waukegan, Ill.

There is No Substitute for Experience

JOHNSON SEA-HORSES for DEPENDability

Holidays are Camera Days



MAKE SURE OF BETTER PICTURES

Come back with perfectly exposed pictures every time. It's easy with the new, improved G-E exposure meter to guide your camera. Gives you correct exposure in a jiffy. New, simplified dials make it easier, faster to use. Proved accuracy. Extreme sensitivity. And now lighter, sturdier. The ideal travel companion for your camera. A grand gift. See the G-E meter at photo dealers... it's 3 meters in one. *General Electric, Schenectady 5, New York.*

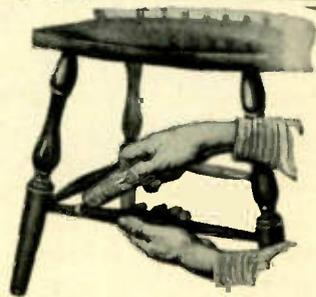


New, improved
G-E
EXPOSURE METER

GENERAL  ELECTRIC

605-170C

224 POPULAR SCIENCE



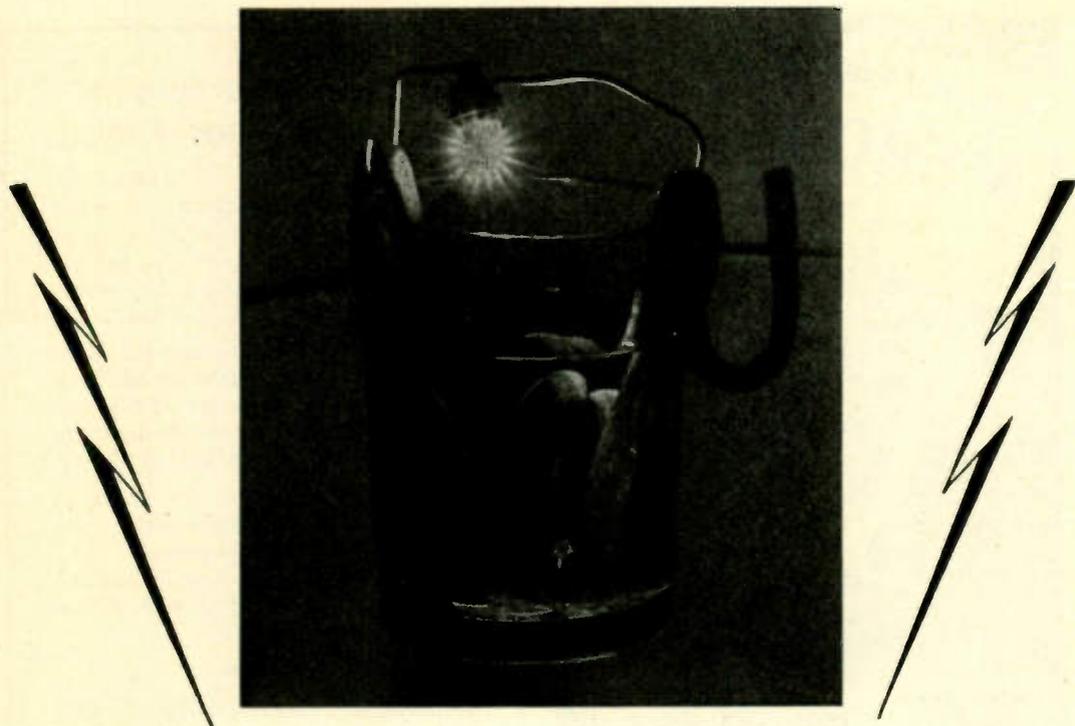
REPAIRS
FURNITURE, TOYS

... also broken china, glassware, torn luggage and books. This handy adhesive is waterproof, transparent and flexible. Get a tube today!



DUPO CEMENT

REG. U.S. PAT. OFF.



HOW YOU CAN MAKE A SIMPLE STORAGE BATTERY

Put two small pieces of scrap lead in an ordinary glass partly filled with a weak solution of sulphuric acid and water... pass direct current from a battery charger through the unit for about a half hour... then reverse the direction for the same length of time. You have a storage battery... of very low capacity and very short life... yet it embodies the basic theory of storage battery construction.

Between this home-made battery and one that will give dependable service, stretches a wide gap. Between it and an Exide Battery

this gap is bridged by 58 years of battery research, development and manufacturing experience. These are some of the reasons why so many millions of people say Exide is the world's finest storage battery. They know that—

"WHEN IT'S AN EXIDE YOU START"

Would you like to know how batteries function, and how to get the best results from them? Just mail a postal card to Exide and ask for FREE booklet, "The Storage Battery—Its Fundamentals, Use and Maintenance."

Exide

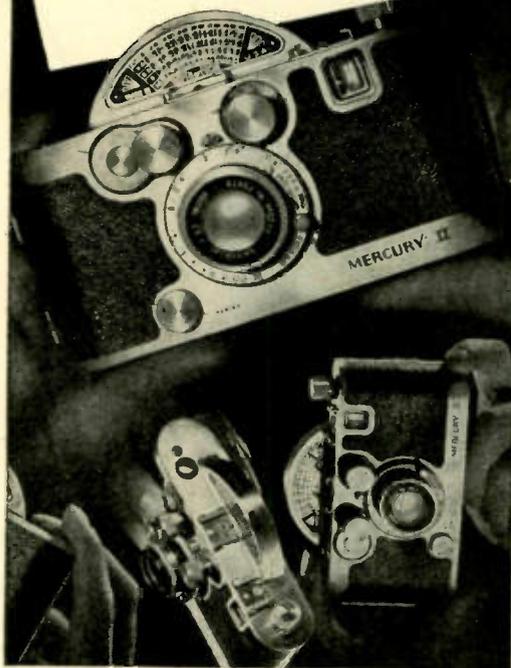
BATTERIES

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32

Exide Batteries of Canada, Limited, Toronto

JUNE
1946 225

ANY WAY YOU LOOK AT IT...
MERCURY II
 IS A BETTER BUY!



WORLD'S FIRST SUPER-SPEED, SUPER-PRECISION
 CANDID CAMERA

ESPECIALLY DESIGNED FOR COLOR!

CHOSEN BY HARVARD OBSERVATORY for supreme accuracy, the 1/1000 second rotary focal plane shutter is typical of the many advanced Mercury II features that assure you:

1. Sharper candid and action shots...
2. Richer portraits and still lifes...
3. Color shots clear and true right out to the edges, sharp in background as well as foreground.

NEW FILM ECONOMY—32 negatives on standard 35mm. 18-exposure color or black-and-white film cartridge, 65 exposures on 36-exposure cartridge.

UNIVERSAL CAMERA CORPORATION
 New York • Chicago • Hollywood

MERCURY II
 ... It's a UNIVERSAL

THIS INVESTMENT COMBINES DIVIDENDS WITH HAPPY LIVING

Pensacola, Florida, offers extraordinary opportunities for the development of beach vacation cottage colonies and other types of summer and winter vacation accommodations for which there is an active demand now.

Pensacola has large areas of beautiful, accessible, undeveloped Gulf beaches. Pensacola is growing in importance as a summer and winter vacation resort and as an industrial city.

A few thousand dollars invested in a Pensacola beach cottage colony development should yield you not only a good income but also happy, comfortable living in an ideal climate. Write for information today.

Department C,
MUNICIPAL ADVERTISING BOARD
 22 West Garden Street, Pensacola, Florida

Sand Casting—Forging—Heat Treating—Case Hardening **BRONZE FOUNDRY**



is again available in limited quantity without priority. Orders filled in sequence as received. **INVENTORS-SCHOOLS-CRAFTSMEN** use **FOUNDRYETTE** for making castings quickly for new inventions, for instruction, and general purpose. Order now for early delivery. Three sizes are available capable of making bronze castings of 1½, 3, and 6 pounds weight, aluminum, copper, brass, etc. \$17.50, \$24.00, \$34.50, f.o.b. Kansas City. Domestic gas supply and 110 volt AC or DC energy required for operation. Write for circular.

KANSAS CITY SPECIALTIES CO.
 Box 6022, Dept. S-67 Kansas City, Mo.

**MORE
 WORK
 IN LESS
 TIME**
 with ..

HOLD-E-ZEE
**AUTOMATIC GRIP
 SCREWDRIVERS**

Hold-E-Zees do the job better, faster. They excel wherever screwdrivers are used. Gripper instantly released by spring action, sliding up out of way when not in use. Highest quality materials throughout.

At Leading
 Dealers Everywhere



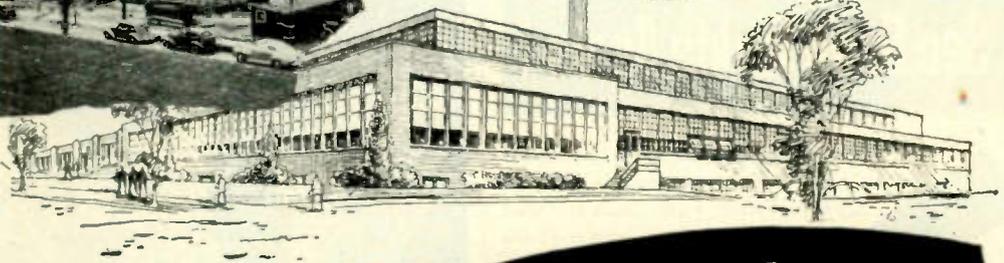
PATENTED



UPSON BROS., INC., 86 Exchange St., Rochester 4, N.Y.



At left is a recent photograph showing construction under way on Delta's new plant addition. The artist's sketch below shows how the completed building will look.



Building your Happiness

New plant addition now under construction speeds the day you can enjoy

DELTA HOMECRAFT* POWER TOOLS in your home shop . . .

We want you to enjoy the pleasure of using Delta Homecraft Power Tools. We want you to know the deep satisfaction that arises from working with *quality* tools like these.

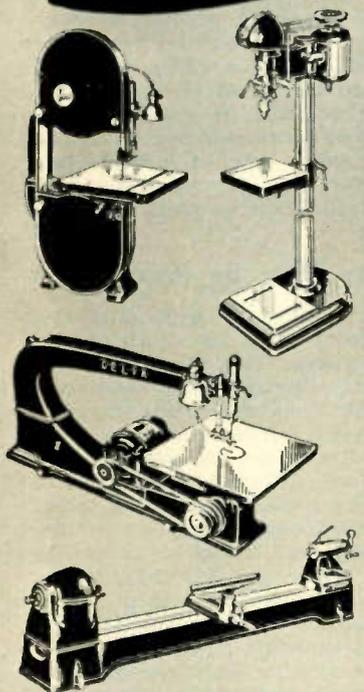
Right now, though, the widespread demand for these famous power tools far exceeds the number we can produce. But we are cutting down the time you must wait until you *can* become the proud owner of Delta Homecraft Power Tools.

Shown here is our new plant addition scheduled for completion this summer—considerably increasing our capacity for building these tools. This is one way in which we will hasten Delta tools onto the floor of your nearby store.

We sincerely appreciate your patience thus far. Thanks!

Keep in touch with the store in your neighborhood that carries Delta Homecraft Power Tools.

*Trade Mark Reg. U. S. Pat. Off. HM-37



Tear out coupon and mail today!

FREE!

"Happiness Herald" — a tabloid newspaper that gives interesting facts, in words and pictures, about the fascinating, woodworking hobby. Pictures typical shops and projects. Enjoy its inspiration and ideas. Send coupon for your free copy.

THE DELTA MANUFACTURING CO.
683F E. Vienna Ave., Milwaukee 1, Wis.

Please send me my free copy of the "Happiness Herald."

Name.....

Address.....

City..... (.....) State.....

JUNE 1946 227

DELTA
MILWAUKEE
1913-1946

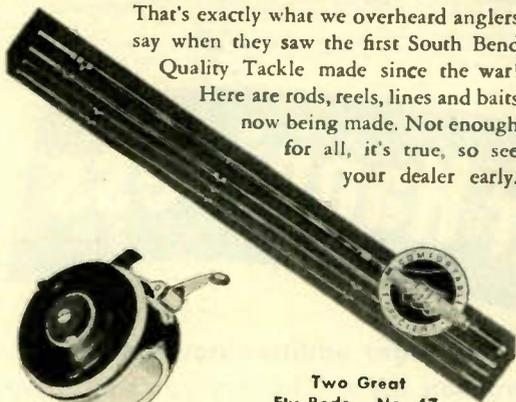
HOMECRAFT
POWER TOOLS

Subsidiary of Rockwell Manufacturing Co.

It's Good to See Good Tackle Again!

That's exactly what we overheard anglers say when they saw the first South Bend Quality Tackle made since the war!

Here are rods, reels, lines and baits now being made. Not enough for all, it's true, so see your dealer early.



Two Great Fly Rods—No. 47 and No. 59

The No. 47 Fly Rod, shown here, is the favorite of anglers who want the extra snap and fast action of flame-finished split bamboo. Exclusive South Bend Comficient Grip and end-locking reel seat. The popular No. 59, lower in price, is also in production now.



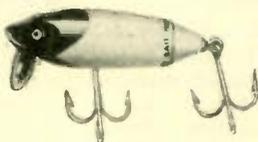
Most Popular Automatic Fly Reel

When you try an Oren-O-Matic, you'll know why it's so highly prized by fly rod anglers. Two sizes: No. 1130, capacity 26 yards D line; No. 1140, capacity 34 yards D line.



Dependable Black-Oreno—Now Braided of NYLON

World-famed Black-Oreno is now being made—of NYLON! Smooth, pliable, easier casting, longer lasting, new moderate prices. Made in 12, 15, 20, 25, and 30-pound tests.



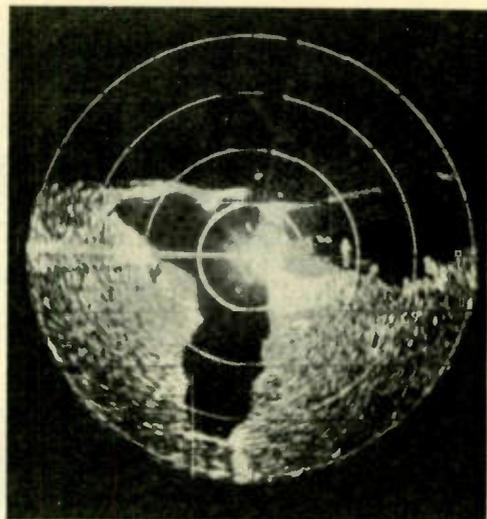
A Really Great Bait—The No. 1991 FISH-OBITE

We wish we could make enough of these wonder baits to meet the demand! Made of indestructible plastic, in the famous South Bend red arrowhead, white body pattern.

Fishing Photo Book—FREE

A 48-page book filled with action photos—every one a winner in the South Bend Fishing Photo Contest. Send a card today. Ask for "Fishing Photo Book."

SOUTH BEND BAIT COMPANY, 892 HIGH ST., SOUTH BEND 23, IND.



Mobile Bay by Radar Camera

THIS is a picture of Mobile Bay, scene of the famous Civil War battle, and its environs taken with the U. S. Army's new 35-mm. radar camera, a product of Fairchild Camera & Instrument Corp. The camera photographed the radar screen of an Army plane flying out of Eglin Field, Florida, and the picture it obtained shows an area about 60 miles in diameter. It can be used with every type of airborne and shipboard radar and is expected to be adapted for ground use as well.

Tooth Decay May Be Preventable

IT MAY soon be possible to prevent cavities by using a mouth wash and tooth powder containing ammonia. This hope is held out in a report to the Chicago Dental Society of studies that four University of Illinois scientists have recently made. But don't start using household ammonia or spirits of ammonia in a private attempt to end trips to the dentist. The prescriptions being tested use dibasic ammonium phosphate—something else again—and it will be 18 months to two years before the scientists can be sure that they will prevent tooth decay.

This much is now certain: Patients who have used the ammonia rinse and powder say that their mouths feel "exceptionally clean" and dental examinations show that their teeth are unusually free of white matter and deposits usually present in cases of active decay. Their mouths also show a marked reduction in the number of *Lactobacilli acidophilus*, micro-organisms that are used as a yardstick of susceptibility to tooth decay.

SOUTH BEND

A Name Famous in Fishing

8 HOURS FROM NOW YOU CAN SOLO AERONCA!

Your Personal Plane is here!



NO OTHER PLANE GIVES SO MUCH FOR THE MONEY!



ROOMY CABINS, wide comfortable seats. Aeronca gives 35 extra value features you'd never expect in a low priced plane.



VISIBILITY! Aeronca's greatly increased visibility has been hailed as one of today's greatest contributions to safety.



SMOOTH LANDINGS! Oleo landing gear makes Aeronca landings soft and comfortable. Improved brake system.

Take a demonstration flight
in the
"Plane that almost flies itself"

Look at these happy people! Soon they'll take off in their Aeronca to a favorite trout stream. It's hundreds of miles away. But no traffic lights or congested highways will delay them. They'll be there—in a few short hours.

Why put it off any longer! Go see Aeronca . . . the plane that has made flying simple.

Aeronca's new flying ease and economy of operation have made plane ownership practical. Two completely new models now in full production . . . Aeronca Champion (Tandem) and Chief (side-by-side model). Talk to your Aeronca dealer soon.

Aeronca Aircraft Corporation
Middletown, Ohio

So Safe—So Simple—Now
**ANYBODY CAN
FLY AERONCA!**
(THOUSANDS SOLD IN 8 HOURS OR LESS)

Over 1000 Aeronca Qualified Dealers to serve you.

AERONCA  *America's No. 1
Low Cost Plane*

From a smart Lad
to a worthy Dad-

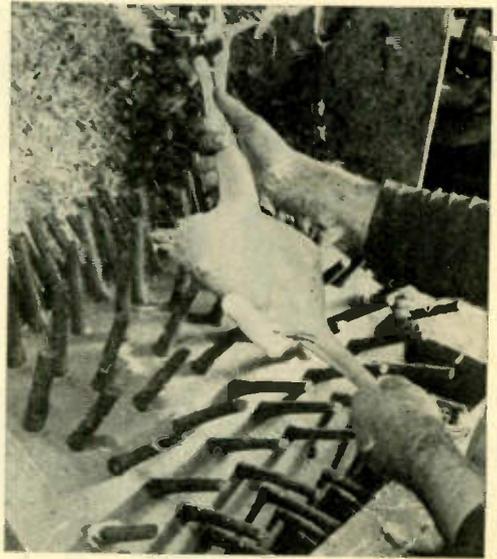


WATCH a man's eyes
light up at the sight of
a fine Biltmore Pipe. It's
the right gift alright, always.
Biltmores are choicest imported
brior, beautifully finished, rich-
grained, mounted with sterling silver
bands, and sweet-smoking from the
first puff Packed in velvet bags and
boxed. If not available at your dealer write
Biltmore Pipe Co., 220 Fifth Ave., New York City.

Biltmore "RESERVE," \$5.00 ★ Biltmore "BLUE RIBBON," \$3.50 ★ Biltmore "DE LUXE," \$2.50
Biltmore "EXECUTIVE," \$7.50 ★ Biltmore "GOLDEN CREST," with ultra grain, \$10

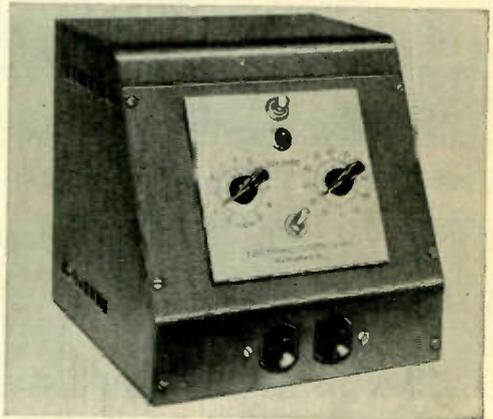
Biltmore

IMPORTED BRIAR PIPES



Electric Chicken Plucker

LAY a scalded chicken or turkey against the whirling 4½-inch rubber fingers of this electric machine, and in a jiffy the bird will be stripped of feathers. Half a minute per chicken is average. Machine is made by Mercury Company, Los Angeles, Calif. —



New Electric Timer

HIGHLY accurate timing of all kinds is possible with an electronic device made by Electronic Controls, Inc., Newark, N. J. The time range is from one to 120 seconds, and snap-positioning step switches assure precision control, since exact values of resistance are inserted in the circuit at each position. The type of tube used is a 2050 thyratron.



Delco batteries are sold by more than 37,000 Delco battery dealers. Wherever you go, you will find Delco batteries in the right size and type for your car.

DELCO-REMY... WHEREVER WHEELS TURN OR PROPELLERS SPIN



SAFETY
for your
SPORTS AFLOAT



Ta-pat-co

LIFE-SAVE VEST

New Features

That Give New Comfort and Safety

Government Approved

Light, easy to wear Ta-pat-co Life-Save Vests are back. Back with new safety and comfort features developed on war's testing ground. Topcoat flexibility - sit down, bend, twist, there is no binding action when you wear a Ta-pat-co. Unbelievable buoyancy - filled with finest new Java Kapok (five times more buoyant than cork), your Ta-pat-co can't lose air or come off in the water - even bullets couldn't sink it.

See the new Ta-pat-co Life-Save Vests and Life Preserver Cushions at your sporting goods store.



Ta-pat-co Sleeping Bags are back. Outdoor men everywhere are ready to hit the trail once more. When you see the new, lighter, warmer, and more compact Ta-pat-co you'll say "That's the bag for me".

The AMERICAN PAD & TEXTILE CO.

GREENFIELD

OHIO

232 POPULAR SCIENCE

We met in the Army



now I demand

Over 90 million yards of Reeves Army Twill were purchased by Uncle Sam during the war. It has great tensile strength—resists tearing, snagging and scuffing. Its dyes are fast to sun, water and perspiration. Sanforized Shrunk*, it tailors smartly, holds its lines. It comes in a wide variety of colors. Demand Reeves Army Twill for better, more economical work clothes.
*Residual shrinkage less than 1%.

REEVES BROTHERS, INC.

54 Worth Street, New York 13, N. Y.



Send 10c for Stanley Plan Set No. 14 Bird houses, nesting shelter and feed box, trellis and garden seat. Send 10c for 5 project designs. Stanley Tools, 266 Elm Street, New Britain, Conn.

Give Dad a HULL AUTOMOBILE COMPASS



A Father's Day gift for his comfort and welfare when driving. He'll use the HULL STREAMLINE AUTOMOBILE COMPASS the year around, to stay on the right road, avoid lost directions, backtracking, delays. Circular free. At your dealer's. Price \$3.95.



P.O. BOX 246-E7

HULL MFG. CO.

WARREN, OHIO



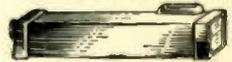
HUNTER'S COMPASS

Hunting Case,
Watch Type, All **\$3.50**
Metal, Jeweled

**Engineers All Metal Army
Type Hand-Sighting**

LEVELS

\$1.50



PUBLIC SPORT SHOPS

13 S. 16th St., Phila. 2, Pa.

No COD's

look **SHARP**

feel **SHARP**

be **SHARP**



use

Gillette

Blue Blades

with the **SHARPEST** edges
ever honed!



5 for
25¢

You look **SHARP** because you get the best-looking shaves any man ever had!



You feel **SHARP** because Gillette Blue Blades give you the quickest, most refreshing shaves of your life!



You are **SHARP** when you buy Gillette Blue Blades with the **SHARPEST** edges ever honed, because you get more shaves per blade and save money!



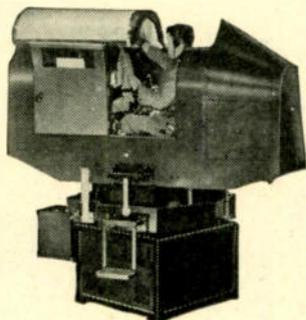
Copyright, 1946, by Gillette Safety Razor Company.

GILLETTE'S CAVALCADE OF SPORTS presents the major boxing event of the week every Friday night over American Broadcasting Company stations coast to coast

Gillette Safety Razor Company, Boston 6, Mass.

LINK

INSTRUMENT FLYING TRAINER



Long standard with the airlines and Army Air Forces, the Link simulates with amazing accuracy nearly all characteristics of a modern plane in flight. In the coming Air Age, Link training assures greater safety, skill and range for pilot and plane owner.

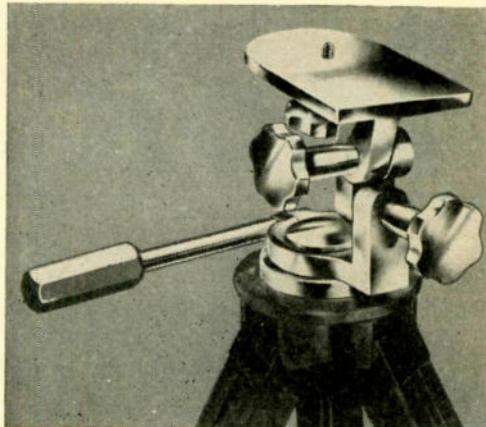
INSTRUMENT FLYING TRAINER
MAP-READING TRAINER
CELESTIAL NAVIGATION CLASS TRAINER
PRE-FLIGHT TRAINER
LINKANOE—SECTIONAL CANOE
AVIATION-MARINE SEXTANT

LINK AVIATION DEVICES, INC.

BINGHAMTON, N. Y.

Makers of Link Trainers, Crew Navigation Trainers and other devices contributing to the safety of flight.

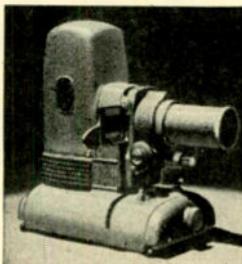
Link Training Is Your First Step Into The Flying Age



Tripod Head Doesn't Slip

A NEW tripod head for movie or still cameras, called the Oxford All-Purpose Tripod Head, turns in any direction. Yet, when set in one position, it remains absolutely rigid. Separate knobs for each adjustment assure that one setting will not slip while another is being made. It is made by Oxford Engineering, Inc., Oxford, Mich.

Versatile Slide Projector



FINER projection of transparencies is claimed for the Filmo Slide Master, made by Bell & Howell Co., Chicago. Among the new features are interchangeable lamps of from 500 to 1,000 watts, and wind-tunnel cooling, with a draft of air forced by a Neoprene-mounted motor and fan, thermostatically controlled. The condenser assembly includes a double heat-absorbing filter having a high light-transmission power. Anastigmatic lenses are interchangeable; may be locked in focus.

Gold Alloy Is Easy to Melt

RECENT studies of a gold and germanium alloy in the proportion of 88 percent to 12 percent have been made to determine its possibilities as a rectifier in radar equipment. While the melting point of gold is 1,945 Fahr. and that of germanium is 1,760, the alloy melts at 673 Fahr., which is only 50 degrees higher than the melting point of lead. Harder than ordinary gold alloys, it has the advantage of expanding slightly as it solidifies.

How to Avoid these "BOOBY TRAPS" in your home!

What you can't see CAN hurt you—says the National Safety Council



1 About 5,000,000 Americans are injured every year at home—33,500 fatally! Largest single cause: *falling*. A roller skate on a dark staircase; shin-catching obstructions; slippery objects: these can be lethal "booby traps." To avoid them, carry your "Eveready" flashlight in dark areas.

2 Be sure all obstacles are cleared away. Linoleum or carpeting should be tacked down firmly. In attic or basement, pack all loose objects in non-flammable boxes stored against the walls. Don't rely on *your* knowledge of where obstacles are located—the next person may not know.



3 Know *in advance* where your fuse box, main water and gas valves, etc., are located; be sure you have a clear path to them. Armed with your "Eveready" flashlight, you can approach without fumbling in an emergency. Be sure loose wires are so placed that you won't trip over them.



4 Keep your "Eveready" flashlight always in the same convenient place—so you won't be tempted to do without it because it can't be located. Keep it filled with "Eveready" batteries—they're again available at your dealer's. They are the *largest-selling* flashlight batteries in the world!

NATIONAL CARBON COMPANY, INC.
30 East 42nd Street, New York 17, N. Y.
Unit of Union Carbide and Carbon Corporation



The registered trademark "Eveready" distinguishes products of National Carbon Company, Inc.

JUNE 1946 235

NOW! DUSTLESS SWEEPING



The Dustless brush is the only brush ever perfected for "Dustless" sweeping. This brush has a reservoir in its back for Arbitrin sweeping fluid. In the process of sweeping, Arbitrin filters through the brush and makes the best kind of sweeping compound, out of every particle of dust it contacts. Besides reducing dust 97%, the Dustless brush also eliminates sweeping compound, saves labor and outlasts ordinary brushes 3 to 1. Get complete facts about this better method of sweeping. Write today.



- Dustless
- Speed Sweep
- Speed Wash brushes

MILWAUKEE DUSTLESS BRUSH COMPANY

528 N. 22nd Street • Milwaukee 3, Wisconsin

\$1 RIDES YOUR LAWN OF UGLY WEEDS!



WEED-NO-MORE

Magic Weed Killer

Destroys Ugly Weeds but Won't Harm Common Lawn Grasses!

NO MORE back-breaking digging! Destroy ugly leafy weeds with WEED-NO-MORE!

The 8-ounce lawn-size package treats 1600 square feet! Now you can enjoy a beautiful weed-free lawn for **only \$1!**

WEED-NO-MORE kills dandelion, plantain and other ugly weeds—yet won't injure soil.

Get it today! Rid your lawn of ugly weeds for **only \$1.** Just spray on . . . WEED-NO-MORE!

On Sale at Paint, Hardware, Garden Supply, Department and Drug Stores

WEED-NO-MORE

THE AMAZING NEW WEED KILLER

Made by THE SHERWIN-WILLIAMS Co. Cleveland, Ohio



LAWN ORNAMENT-NOVELTY PATTERNS

28 Lawn Ornament Patterns, 25c. Other patterns: 15-20" high; Dutch Girl, Dutch Boy, Pirate, Bull Terrier, Mexican Girl, Mexican Boy, Dwarf, Penguin, Flower Girl, 10c each. 25 Novelty Patterns, 30c. All 62 Full Size Patterns, \$1.00 Postpaid. Strother Pattern Service, Dept. 7-E, Box 383, Bellington, W. Va.

USE YOUR BENCH SAW

FOR JOINING & CUTTING MOULDINGS



With our six inch tool steel cutters make mouldings, casings, drop-leaf tables, grooves heading and jointing. Moulding cutters, A 1 in. wide \$1.50, 1 1/2 in. \$1.75. Jointing cutters, B 1 in. \$1.50, 1 1/2 in. \$1.75. E 1 1/2 in. for drop-leaf tables, \$1.50. F 1 1/2 in. Makes 3/4 in. cove & Quarter, \$1.75 Postpaid, Guaranteed. State size hole. List & Folder free.

JOHN A. SANDSTROM
Clearwater, Fla.
Rt. 1-P.



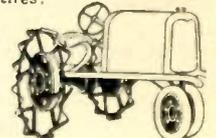
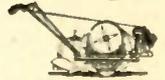
SHAW and Peppy-Pal "DU-ALL" GARDEN TRACTORS

• 1 to 9 H.P. Circulars on request. Building more now—We supply repairs for all SHAW Tractors sold in our 42 years in business.

BUILD YOUR OWN RIDING TRACTOR—"WAR HORSE"

using old auto parts, powered by 2 H.P. or larger air-cooled engine; or walking type Garden Tractor 1/2 to 3 H.P. or convert truck or auto into Farm Tractor. Each with steel or rubber tires; will plow, cultivate. Plans for building, in few hours, any one of above, postpaid for \$1.00 (state which wanted) or all 3 for \$2.00. Money Back Guarantee!

SHAW MFG. CO., 5706 FRONT ST.
Galesburg, Kansas
888PS North 4th St., Columbus, Ohio





ANY TRIP IS
MORE FUN
WITH
KARI-TOP
AUTO LUGGAGE CARRIER

SEE YOUR DEALER OR
WRITE FOR DESCRIPTIVE FOLDER
DEPT. 1

Hunting . . . Fishing . . . Camping . . . ANY
outing. KARI-TOP gives you loads of EXTRA
SPACE for equipment and luggage. Pat-
ented . . . Exclusive . . . NOTHING LIKE IT!
Water-proof, dust-proof, trouble-proof. —
On In a minute. —Fastens securely. —
Won't mar finish or interfere with doors.
Get yours NOW for years of REAL care-free
satisfaction. Service tested for years!

KARI-TOP

THIRD NATIONAL BLDG.
DAYTON 2, OHIO



Interested in Chemistry?

THIS MODERN, COMPACT, PROFESSIONAL-TYPE
CHEMISTRY KIT SERVES AS A PORTABLE CHEMICAL
LABORATORY. MERCK & COMPANY CHEMICALS.
TOP QUALITY MATERIALS THROUGHOUT.



The atom bomb, the new war-born synthetics, plastics and textiles have focused America's attention on chemistry. To meet this widespread interest, Kit Corporation has produced a complete professional-type chemical laboratory kit to enable hobbyists and students to perform a wide range of experiments. These kits are currently being used by leading colleges and universities to expand their laboratory facilities to care for the greatly increased enrollment in advanced chemistry courses. More and more companies are looking for men who understand the fundamentals of chemistry. Many advanced hobbyists who studied and experimented with chemistry purely for their own amusement have suddenly found that their hobby is paying them big dividends in advancement and more pay.

Write for free descriptive literature and your dealer's name. If your dealer is out of stock, shipment can be made direct to you.

The Kit Corporation Senior Kit contains chemicals manufactured by Merck & Company, standard textbook on chemistry, Pyrex Erlenmeyer 50cc flask, six chemical test tubes, test tube holder, Pyrex beaker 50cc, six chemical vials, built-in test tube rack, wooden spatula, 100 strips blue and 100 strips red Litmus paper, six 12" strips glass tubing, atomic element and weight charts, chromium plated forceps, alcohol lamp, and 5cc pipette. All these materials contained in a beautifully finished wood cabinet 18" wide x 14" high and depth tapering 7" to 4". Weight 20 lbs. Two bottom trays removable, leaving a water-proof bottom which acts as a chemical resistant laboratory table. **\$29.50**

Kit Corporation also manufactures the compact, well-balanced Junior Chemical Laboratory Kit, at \$14.95, and the Young Scientist Chemical Laboratory at \$4.95.

This authoritative, 140 page chemical experiment book is part of the kit.



KIT Corporation

212th STREET AND JAMAICA AVE.
QUEENS VILLAGE, N. Y.

"1001" Re-Blade Knife*

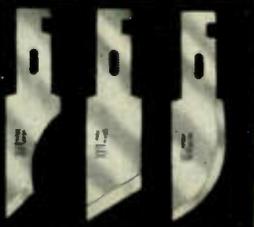
with interchangeable surgical
steel blades!



**KEEN!
EVER SHARP!
EVER READY!**

"1001" Knife
as above, \$1.29

Knife with 3
extra, differ-
ent blades
and honing
stone, \$1.59



The first really "balanced" craft knife

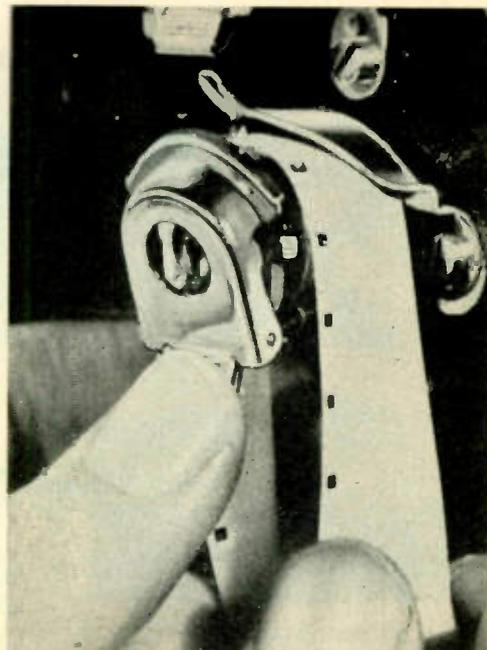
Whether you're an expert craftsman or just a passably fair workman or hobbyist, you'll do better work faster and easier with "1001"—the re-blade knife of 1001 uses! For "1001", thanks to its light, perfectly balanced, colorful plastic handle, is second to none for easy and exact whittling, chiseling, modeling and cutting of all sorts. Its patented, scientifically designed chromium finish blade holder simplifies the insertion and removal of "1001's" all-purpose blades, and keeps them firmly locked in place. Yourself—get a "1001"—feel the difference, see the difference in your work. It's as easy to handle as a pen or pencil.

● Buy "1001" wherever hobbycraft tools are sold. If your dealer cannot supply you, send check or money order for \$1.29 (or \$1.59) direct to

SOMAR SPECIALTY CORP.

Dept. M11—630 Fifth Ave., New York 20, N. Y.

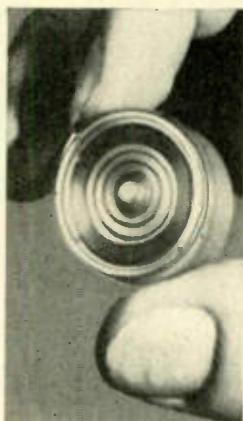
*PAT. PENDING



Makes Films Last Longer

MOVIE-SPROCKET, roller and guide wear are liable to scratch films carried through projectors. Bell & Howell Co. tackle the problem with projectors equipped with specially designed sprockets and rollers that do not permit the picture area or sound track of the film to touch any stationary or metal parts as it goes through the machine. The only metal that comes in contact with the film is outside the picture area.

Button-Sized Battery



A MIDGET dry-battery cell, used by the U. S. Signal Corps to power the handie-talkie, is being manufactured for commercial use by P. R. Mallory, Inc., Indianapolis. A bit more than one third as large as an ordinary small-sized flashlight battery, this dry cell is one inch in diameter by $\frac{3}{8}$ inch high. Compared

size for size, the Mallory cell's ampere-hour capacity is four to six times greater than that of the usual commercial dry cell.

FORD'S OUT FRONT in style, too!



The Big New 1946 Ford Sedan Coupe

Whatever model you choose, the big new 1946 Ford car is a streamlined beauty from the newly styled grille to the rugged rear bumper! And there's refreshing new elegance inside, too. Rich fabrics! Restful seats! A new instrument panel, smartly decorated with plastic trim! For performance, Ford is the only car in the low-priced field with 100 horsepower,

the only car with 8 cylinders . . . the only car with a V-type engine (the kind used in America's costliest cars) . . . the only car that gives you the safety of such big oversized, self-centering hydraulic brakes! See it at your Ford dealer's.

TUNE IN . . . The FORD-Bob Crosby Show—CBS, Wednesdays, 9:30-10 P. M., E. S. T. . . . The FORD Sunday Evening Hour—ABC, Sundays, 8-9 P. M., E. S. T.

There's a *Ford* in your future



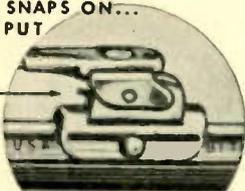
ANCO RAIN-MASTER

"Dead-Locker"

WINDSHIELD WIPER
ARMS and BLADES

BLADE SNAPS ON...
STAYS PUT

FINGER-
TIP
RELEASE

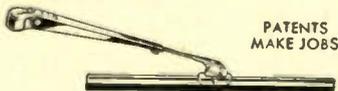


CAN'T FALL OFF
CAN'T BLOW OFF

(A war-born invention—by ANCO—first)
for military aircraft—now for your car.)

DON'T SHOOT YOUR GAS-PUMP MAN!

He's doing the best he can. Sure, he knows how dangerous it is for you to drive your car... in stormy weather... with your dull old windshield wipers that smear and smear. He'd gladly put on for you quickly a pair of keen new ANCO RAIN-MASTER Wiper Blades and Arms. He has them—Newest Models! But he forgets to remind you? Too busy? You can't shoot him for that!



PATENTS
MAKE JOBS

After all, it's *your* car to protect. So you remind him. Get RAIN-MASTERS... patented features... original equipment on many makes of high grade cars and trucks... used in war—on our fighting tanks and trucks and ships and bombers too... because ANCO RAIN-MASTERS clean quicker, clean cleaner... last longer. May save you a costly smashup.

Ask for RAIN-MASTER Windshield Wiper
Arms and Blades next time you buy gas.

THE ANDERSON COMPANY

Established 1918

GARY, INDIANA

PAINTERS' STRIPING TOOL

A TOOL...
NOT A BRUSH

NEW, IMPROVED

Modern—streamlined—fits the hand like a fountain pen! Easy to use as a pencil. Draws parallel lines—straight, curve or circular. Does expert job on autos, furniture, toys, bikes, model planes, signs, bulletins, linoleum. (Makes wall board look like tile.)

Every painter and craftsman needs one! Type "M" MASTER Painters' Striping Tool complete with tip for 1/16" stripe, \$1.00. Extra tips 1/64", 1/32", 3/64", 1/16", 5/64", 3/32", 1/8"—75c each. Tool with complete set of 7 tips \$5.00. (C.O.D. orders 25c extra.) Paint dealers, write!

WENDELL MFG. CO.

4234-A Lincoln Ave., Chicago 18, Illinois

\$1.00
POST
PAID



WRITE

For

FREE

Literature



BUILD YOUR OWN POWER LAWN MOWER

WHY BREAK YOUR BACK
MOWING FIELD OR LAWN?

Now anyone can save time and effort mowing field or lawn, by building their own whirl type power mower.

We furnish complete information, and whirl type blade attachment. Write today.

THE RITE-WAY
MOWER ATTACHMENT

T & H Mfg. Co.

811 E. 31, Dept. FS-3, Kans. City 3, Mo.



Your Lighter Will WORK
... better—with

RUMIN

Gold Coated FLINTS
and LIGHTER FLUID

ROCK FLINT CO., 123 Ooughty
Boulevard, Far Rockaway, N. Y.

SWISS MADE WATCHES

Wear 10 Days at Our Risk!

Swiss made watches are renowned for accurate time-keeping. This men's watch has a sturdy, finely-constructed chrome case, an open figure dial, genuine leather strap. SEND NO MONEY! Just pay postman for wristwatch \$8.50 plus few cents postage and 10% Federal excise tax. Wear for 10 days on our money-back if not satisfied guaranteed! Rush orders today—supply is limited. UNITED PRODUCTS CO., 7941 S. Halsted, Dept. MM-305, Chicago 20, Ill.



You CAN'T WORM WRONG

for tape, hook, whip, round (ascarid) worms when you worm your dog as directed with Pulvex Worm Capsules, a combination treatment which insures your worming right. Used by leading breeders. Packaged 2 ways: for puppies, for dogs. Either, 50¢; double-size, 75¢
At pet, drug, department stores.



PULVEX

★ COMBINATION TREATMENT
WORM CAPSULES

Snap-on Tools

TOP CHOICE
FOR AIRLINE
MAINTENANCE



NORTHWEST



PAN AMERICAN



UNITED



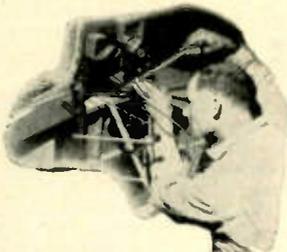
TRANS-CANADA



PENNSYLVANIA CENTRAL



CONTINENTAL



CHICAGO & SOUTHERN



BRANIFF



AMERICAN

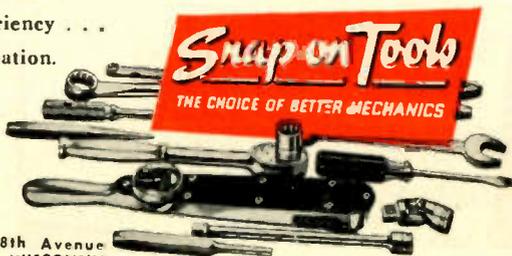


EASTERN



WESTERN

Matching the most rigid standards for speed, accuracy, safety . . . widely preferred by the maintenance executives and skilled mechanics who keep America's air fleets at peak efficiency . . . Snap-ons are everywhere recognized as the tools of aviation. Throughout industry Snap-on tools are *the choice of better mechanics* — almost unanimously selected by men who know that fine tools mean added earning power.



SNAP-ON TOOLS CORPORATION • 8060-F 28th Avenue
KENOSHA, WISCONSIN

JUNE
1946 241



THE DOORWAY TO DOLLARS

Get into the Plastics Field. Hundreds of money-making opportunities. Novelties molded from plastics are easy to make, easier to sell in today's novelty-loving world. . . . Millions are spent for them every year.

A COMPLETE COURSE

Tells how to make your own *flexible molds* at low cost—Liquid Marble, Plastic Flooring; Synthetic Granite, Plastic Wood, etc. Streamlined practical application . . . courses include proven formulas, processes and methods—skip unimportant dry reading. Start working a few hours after receiving your courses. Make these opportunities produce real cash for you.

UNLIMITED MARKET

Constant demand the year round—your problem not in selling, but in supplying demand! We supply you with names of *Big Buyers* for your finished products. Send today for full information—No Obligation.

BING PRODUCTS CO.

88 Broad St., Boston 10, Mass.

DEPT. B6

BING Products Company Date _____
 88 Broad St., Boston 10, Mass. Dept. B6

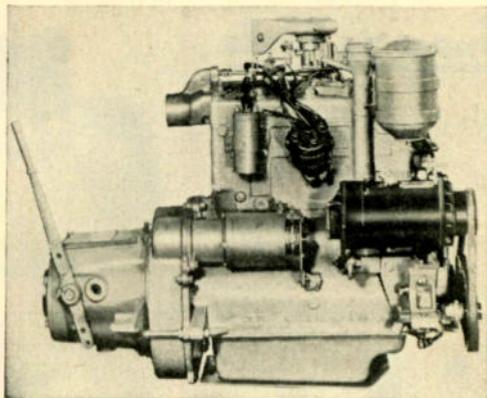
Please Send Me
FREE CATALOGUE

Name _____
 (Please Print Plainly)

Address _____

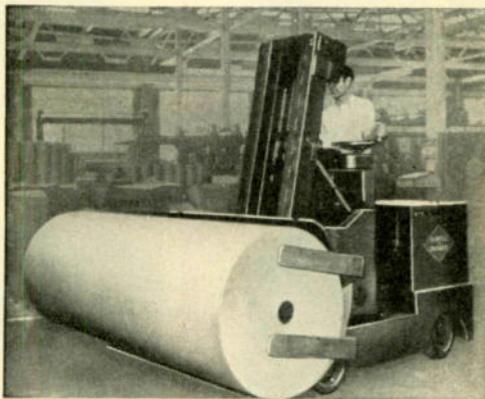
City _____ Zone _____ State _____

242 POPULAR
 SCIENCE



Jeep Power for Marine Use

CONVERSION of the Willys jeep motor into an inboard marine engine has been made possible by equipment manufactured by Osco Motors Corp., Philadelphia. Already being used for farm power, generators, pumps, etc., the motor may now be adapted to launches and other auxiliary boats. No special tools are required for installation, and no machine work is needed. Marine gear provides one speed forward, one reverse.



Versatile Power Handler

LONG CYLINDRICAL objects such as rolls of newsprint paper, weighing as much as two tons, can be easily and efficiently handled by power trucks developed by Elwell-Parker Electric Co., Cleveland, Ohio. The battery-driven truck has various attachments designed for gripping and manipulating its load. A rotating device enables the operator to transport, pick up or put down a roll with equal facility in either a vertical or horizontal position. By means of an elevation mechanism, he can raise the roll for stacking horizontally or to remove it from a stack of rolls. The truck cradle is adjustable to various diameters of loads.



COMFORT UNLIMITED—that's what you'll get when your home is equipped with Honeywell's remarkable new heating control system. It is called **MODUFLOW***.

And, "Comfort Unlimited" is the title of Honeywell's brand new booklet that tells all about Moduflow. Attractively illustrated in color, it is both interesting to read and easy to understand. Discover how Moduflow eliminates the up-and-down temperatures of ordinary on-or-off heating systems; how it reduces wasteful overheating at the ceiling and eliminates the unhealthy drafts and cold floors caused by intermittent heat supply.

Learn, too, how Moduflow can maintain different temperatures in different sections of your home; for example, 72 degrees in your living room, 65 degrees in your bedrooms and 50 degrees in your built-in garage.

Best of all, learn how Moduflow can be easily and inexpensively installed on your present automatic heating system. You don't have to wait until you build a new home.

All of this, and more, is told in this fascinating booklet. Whether you are planning to build, or modernize your present heating system, you should investigate Moduflow. So, mail the coupon today, for your free copy.

* **MODUFLOW** is the name of Honeywell's newest heating control system. It means *modulated* heat with a *continuous flow*. Moduflow will be a "must" in the better homes and apartments of tomorrow.

MODUFLOW

the new **HONEYWELL** heating control system

It's Free!

Minneapolis-Honeywell Regulator Co.
2765 Fourth Avenue South
Minneapolis 8, Minnesota
Please send my free copy of
"Comfort Unlimited"

Name _____

Address _____

City _____

State _____

JUNE
1946 243

BOOST YOUR INCOME

with the

"ARC BOOSTER"

... revolutionary feature of this NEW LINCOLN A.C. WELDER

Lincoln Electric... leader of the arc welding world... introduces the New "Fleet-Arc Jr." Welder, equipped with the exclusive "Arc Booster". Provides the easiest striking arc ever developed for repair shops. Simplifies repair, hard-facing, fabrication, construction welding. Increases your opportunities for profitable business.

Range 20 to 180 amps. with Continuous Current Control for easy, accurate adjustment of arc heat. Maximum input current of 35 amps. makes it ideal for rural power lines. Full details on request.

Write for free Bul. 365 today!



THE LINCOLN ELECTRIC COMPANY
Dept. 521 • Cleveland 1, Ohio
Largest Manufacturer of Arc Welding Equipment in the World

Do Expert Welding At Home WITH THE HANDY Magic Wand WELDER



"The Welder in the Carrying Case"

JUST plug the Magic Wand in on any standard 110-V, 60-cycle AC outlet and do welding and brazing jobs like a professional. Heavy-duty transformer with 6 stages of welding heat. Electrode holders adaptable for electric flame and metallic arc welding, brazing and soldering. Special polarized outlet plug. Built into a strong, shock-proof carrying case, weighing less than 30 lbs. packed. Kit includes welding, brazing and soldering rods and fluxes, extra carbon electrodes, comfortable welding helmet, valuable Instruction Manual. Quickly pays for itself. Sold by hardware dealers and automotive jobbers.

COMPLETE
\$34⁵⁰
F. O. B. FACTORY

For Free Descriptive Folder, address:
JOHN H. GRAHAM & CO. INC.,
General Sales Agent
Dept. E, 105 Duane St., New York 8, N. Y.

Magic Wand WELDER

MADE BY PATENT SPECIALTIES, INC., NEW YORK, N. Y.

244 POPULAR SCIENCE

KEEP A CAN OF BOTH ON HAND!

Heavy 3-IN-ONE

Refrigerators, mixers, motors, power tools, lawn mowers, ironers.

Light 3-IN-ONE

Sweepers, sewing machines, hinges, guns, locks, metal drawers.



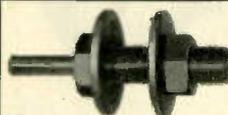
For over 50 years America's accepted household oil!

SOLD EVERYWHERE IN 1 AND 3 OUNCE CANS

Guaranteed by Good Housekeeping



3 - IN - ONE oil

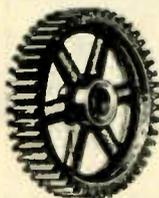


CHUCK ARBOR

49c

This versatile arbor will adapt an electric drill with 1/4" capacity for No. 8 S. A. wheels etc. Chuck for a meter threaded shaft and is 2 3/8" long. Sent postpaid if money with order! C.O.D. Postage extra.

E. A. THORNE ENTERPRISES, Inc. Allentown, Pa. 1509 Linden Street



GEARS

In Stock—Immediate Delivery
Gears, speed reducers, sprockets, thrust bearings, flexible couplings, pulleys, etc. A complete line is carried in our Chicago stock. Can also quote on special gears of any kind. Send us your blueprints and inquiries.

Send for Complete Catalog No. 220
CHICAGO GEAR WORKS
440-450 N. Oakley Blvd. Chicago 12, Ill.

arc welding manual and text book...\$2⁰⁰

Teaches you how to become an arc welding operator — one of highest paid trades today! Write today!
Hobart Bros. Co., Box P-162 Troy, Ohio

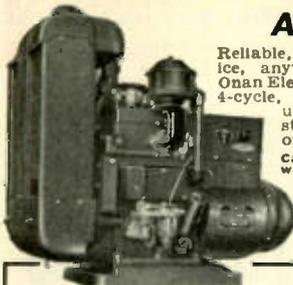
BUILD YOUR OWN ARC-WELDER

For Light or Heavy Work
No rewinding necessary—use coils taken from old auto generators. Works on 110 or 220 A.C. Has 20 different heats. Complete plans and BIG Catalog 35c.
LEJAY MFG., 3323 Lejay Bldg., Minneapolis, Minn.



ELECTRICITY FOR ANY JOB

ANYWHERE



Reliable, economical electric service, anywhere, anytime, with an Onan Electric Plant. Driven by Onan 4-cycle, gasoline engines. Single-unit, compact design and sturdy construction. Water or air cooled.

Capacity range 350 to 35,000 watts: 115 to 660 volts A.C. 50 to 800 cycles 6 to 800 volts D.C. Combination A.C.-D.C. types

65 different models. Write for folder.

ONAN

D. W. ONAN & SONS 1840 ROTALSTON AVE. MINNEAPOLIS 5, MINNESOTA

BEFORE YOU PAINT

Fill Cracks and Holes
Caulk Windows and Doors
Quickly, Easily, with

PRESS-TITE CORDS



The soft, non-hardening plastic material of Press-Tite Caulking and Sealing Cords is the quickest, easiest and neatest method of filling unsightly cracks and holes in wood or plaster before painting.

Just press a rope-like section of Press-Tite Cords into the crack or crevice with fingers—no tools required—can be painted over immediately. Will not stain—always remains soft and pliable.

Get a better, smoother paint job by sealing all holes and cracks first, with easy-to-use Press-Tite Cords, at your dealer's hardware or paint counter.

Other Household Uses Include:

Sealing around bathtubs and sinks—Sealing around baseboards—Sealing against bugs and vermin—Glazing windows—and hundreds of others.

PRESSTITE ENGINEERING COMPANY

3976 Chouteau Avenue

St. Louis 10, Missouri

5 SECRETS... OF WINNING GOLF



Easy to Learn "Dynamic Swing" Every Pro Uses

PLAY IN THE 70's. Enjoy your game. Amaze your friends. Get out of the "dub" class by using golf's most powerful and accurate swing. **Five basic secrets** give you rhythm and power, eliminate hook and slice... make you **MASTER OF EVERY CLUB**. Easy to make long drives and beautiful approach shots. Learn in a few days—10 minutes' practice a day. **COMPLETE COURSE NOW ONLY \$1.00** postpaid, or \$1.00 plus 24c for postage and C. O. D. fee. Your money back if you're not amazed with results, so order NOW!

THE SYLVAN COMPANY 125 Seventh Ave., Dept A-2 LaGrange, Ill.

CARBIDE SCRIBER NON-MAGNETIC

FOR HARDEST STEEL, GLASS, ETC.

Tungsten Carbide—the hardest metal made by man—carefully ground on diamond laps, brazed into stainless steel 6" handle for marking steel and other metals—for etching, marking, cutting glass. Cuts all directions. Easy to follow any contour. In plastic case with pocket clip



PRICE POST PAID

Dealers, Distributors and Salesmen Wanted

LUCAS-MILHAUPT ENGINEERING CO.
5049 SOUTH LAKE DRIVE • CUDAHY, WISCONSIN

MEASURING ACCURACY..

\$2.00
EACH



Streamline's accuracy is unsurpassed by any steel tape on the market today. Its extra long tip for holding tape steady, its compact chrome plated case and lever brake to hold readings—are only some of the features which make Streamline the rule to carry at all times. Fits easily into any pocket and is ready to use at an Instant's notice.

Can be used for direct inside measuring as well as a caliper, height gauge or scriber.

Get yours today at your local hardware store or building supply dealer or use coupon.

Streamline 8 ft. size \$2.25
8 ft. replaceable blade 70¢

MASTER

WOOD AND TAPE RULES
TRADE MARK

MASTER RULE MFG. CO., INC.

815 E. 136th St., New York 54, N. Y., Dept. J-6
Branch: P.O. Box 1587, Oakland, Cal.

Enclosed find \$2.00 for the new 6 ft. "Streamline"
(Spare blade 65¢ extra.)

NAME _____
ADDRESS _____
CITY _____ STATE _____

FOR DOZENS OF REPAIR JOBS



Leaks and cracks in plumbing and heating systems . . . dripping joints . . . loose hinges, handles, casters . . . screws, bolts and rivets that won't stay tight . . .

YOU can fix them yourself with Smooth-On No. 1 without waiting for plumber or repair man. This time-proven iron repair cement is inexpensive, results are lasting. You'll actually get a kick out of using it, and noting its effectiveness. Smooth-On is a metallic powder that you mix to a putty with water and apply into cracks, holes, loose spaces. It hardens like iron, and stays put—for it expands slightly as it sets.

Most neighborhood hardware stores have Smooth-On No. 1 in 1¾-oz., 7-oz. and larger sizes. If yours hasn't it, order from us direct.

FREE 40-PAGE REPAIR HANDBOOK

40 pages. 170 diagrams. Clear, easy-to-follow, practical, short-cut directions for countless metal repairs in house and garage—all tested. Pocket size. Handily indexed. Just send coupon.

SMOOTH-ON CEMENTS



for use
Motor Car and Boat.
Home, Factory and
Power Plant

--- SIGN AND MAIL NOW ---

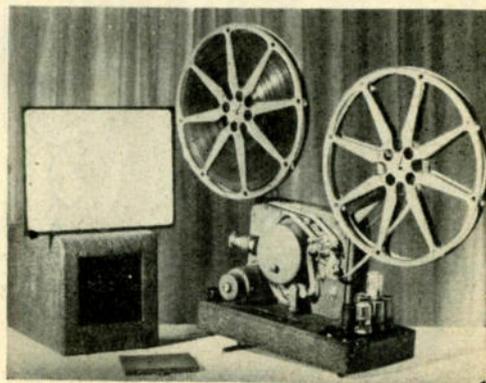
Smooth-On Mfg. Co., Dept. 58,
570 Communipaw Ave., Jersey City
4, N. J.
Please send the Smooth-On Hand-
book

Name.....

Address.....

6-46.....

Do it with **SMOOTH-ON**
The Iron Repair Cement of 1000 Uses

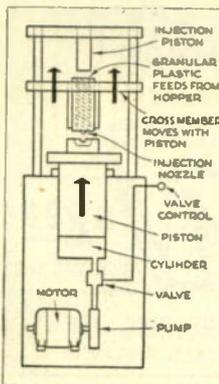
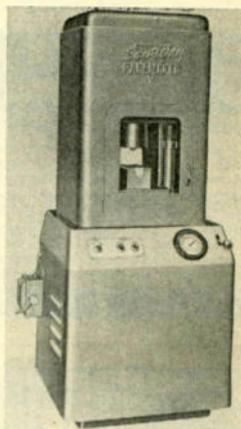


Compact Talkie Projector

SLIGHTLY larger, packed, than a portable typewriter, a 16-mm. sound-on-film projector called the Movie-Mite Model 63-L has made its appearance. The whole outfit, with everything necessary to put on a show, weighs 27½ pounds. It can be unpacked, completely set up, threaded, and "on the screen" inside of three minutes. Both projector and amplifier operate on either A.C. or D.C. A centrifugal blower cools operation.

Plastic Machine In Small Unit

A SMALL and relatively low-cost injection-molding machine has recently been developed by Sav-Way Industries, Detroit. It has a 20-ton capacity and a mold-casting area of four square inches, for about two ounces of plastic material, which



may embrace all the thermoplastics, including polystyrene, cellulose acetate and the vinyl resins. Electric heating elements control temperature up to 600 F., and the motor-powered hydraulic system gives line pressure up to 2,000 pounds per square inch.

The first pipe smoke!



Sir Walter Raleigh's servant dashes water on his master, to "put out the fire."
From an old print—Beltman Archives.

The best pipe smoke!



The famous ZEUS Filter Cigarette Holder is back in Aluminum, with handy ejector.

Write for "Pipes—for a World of Pleasure." It's FREE
L & H STERN, INC., 56 Pearl St., Brooklyn 1, N.Y.



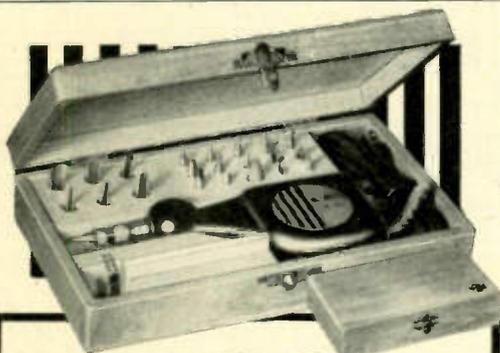
Sir Walter Raleigh, father of pipe smoking, never knew the pleasures of a Sterncrest pipe. Poor chap, he was born too soon to puff an LHS of genuine Imported Briar, vita-fused for sweetness from the first puff.

IMPORTED BRIAR
Model #14 \$5

Dozens of others—antique or smooth.

LHS STERNCREST 14K, with gold band, imported briar \$7.50

Other LHS Pipes:
\$10.00, \$3.50, \$1.50.
at all good dealers



Presenting De Luxe
BURGESS
vibro-tool

Trade Mark Reg. U.S. Pat. Off.

The Vibro-Tool fitted into a handsome hinged hardwood box; natural polished finish, brass hardware trimmings . . . plus 22 improved accessories for engraving on plastic, metals, glass, etc. . . for tooling leather, working on wood and many other jobs . . . and quality sharpening stone. Deluxe Vibro-Tool Kit V-150 Complete, \$16.50

SEE YOUR DEALER, or Order Direct

HANDICRAFT DIVISION

BURGESS BATTERY COMPANY
176 N. WABASH AVE., CHICAGO 1, ILLINOIS

Authenticast Exclusive!



FAMED USS MISSOURI

Full-hull official scale model with replica of surrender plaque



All plaque is size of a quarter ready for mounting.

A DREAM OF A MODEL . . . you'll have hours of fun building it! And you'll enjoy owning this fine model for years to come.

Authenticast assembly kit includes easy directions, diagram, tools, over 100 cast-metal precision-perfect parts. Scale: 1 inch to 500 inches, finished model is 21 inches long. Priced \$12.95 complete at hobby shops.

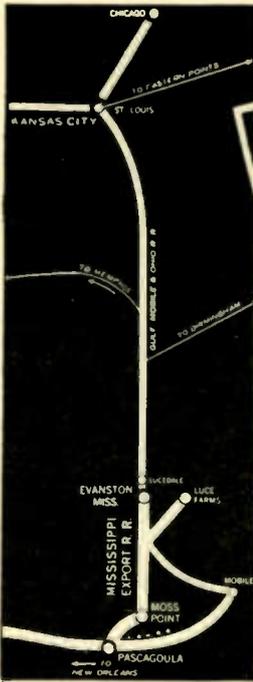


Send 35c in coin for colorful 32-page *Authenticast* catalog.



91-12 132nd Street, Richmond Hill 18, L. I., N. Y.

JUNE 1946 247



FACTORY SITES

Ship the fast, direct.
MISSISSIPPI EXPORT R. R.

Forty miles of ideal factory sites from the rich agricultural area at Luce Farms, Mississippi, to the Port of Pascagoula on the Gulf.

LOCAL OWNERSHIP gives "PERSONAL SERVICE"

Modern equipment — excellent road-beds afford safe, fast service at competitive rates.

Our section has skilled home labor and raw materials available — good climate — natural resources and ideal outdoor recreation.

WRITE TODAY FOR PARTICULARS

MISSISSIPPI EXPORT R. R.

GENERAL OFFICES:
 Moss Point, Miss.

dieselized

Start a SAW REPAIR BUSINESS!

MAKE A GOOD LIVING IN YOUR OWN BUSINESS—sharpening saws with the Foley Automatic Saw Filer. It makes old saws cut like new again. All hand saws, also band saws and cross-cut circular saws can be filed on this ONE machine.

THERE ARE HUNDREDS OF SAWS TO BE FILED in your own neighborhood, used by farmers, carpenters, homes, schools, factories, etc. W. L. Tarrant writes: "I left my old job last September and in 10 months have filed 2,159 saws. We have a lovely business worked up and cannot keep up with the work."

Send for **FREE PLAN**

Shows how to start this steady cash business. No experience needed, no eye-strain, no canvassing. Send coupon today.



FOLEY Automatic SAW FILER

FOLEY MANUFACTURING CO.
 619-6 Foley Bldg., Minneapolis 13, Minnesota
 Send Free Plan on Saw Filing business, no obligation

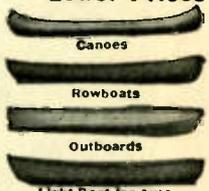
Name _____
 Address _____

248 POPULAR SCIENCE

Thompson BEATS the World on BOATS



Better Built Lower Prices



Safe Boats With Full Length Spray Rails
 Keep passengers perfectly dry—even at high speeds. Catalog also shows two new models of "Take-Along" Boats. Two big factories—save you freight.

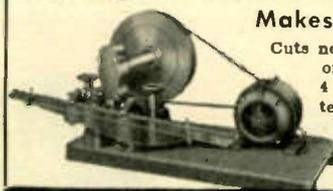
CATALOG FREE
 Write for your copy. State kind of boat in which you are interested.
THOMPSON BROS. BOAT MFG. CO.
 219 Ann St. PESHTIGO, WIS. (either place)

Light Boat for Auto
 119 Elm St. CORTLAND, N.Y.

AUTOMATIC RETOOTHER FOR HAND SAWS

Makes New Profits

Cuts new teeth in 50 seconds! Any size tooth 4 to 16 points. Old teeth fall off as chips. Simple to operate. A perfect job.



BURR MFG. CO. 8931 Venice Blvd., Los Angeles 34, Calif.

GAS ENGINES IN STOCK ONLY \$9.95



The G. H. Q. miniature gasoline engine that really operates is now available. Over 10,000 sold to date. 1/8 H. P. Complete with coil and condenser and full illustrated instructions for only \$9.95. Fully bench tested and ready to run. Power for all models. Send only \$1.00—Shipped Collect. C.O.D. same day. Send for free illustrated Catalog of hundreds of hobby items.

AMERICA'S HOBBY CENTER, Dept. S66T, 156 W. 22 St., N.Y. 11, N.Y.

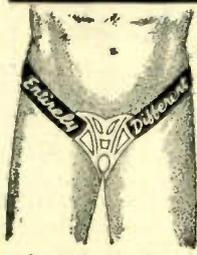
LIQUID MARBLE COLORED POTTERY

Different! Marvelous! Color-glazed, Brush, spray, mold tiles, table-tops, ornamental **SANITARY COMPOSITION FLOORING**—Dustless, noiseless; put on like plaster, plain or tile designs; yielding as cork, setting as stone. **RUBBERELASTIC Mold Compound**—For plaster casting, novelties, statuary, toys, plaques, dolls. **TILEX Colored Roofing**. Build Modern **PLASTIC HOMES**. Illustrated literature free. **RAPID MARBLEIZING SERVICE**, Dept. 12-A, Edwardsville, Illinois

THE INFERIORITY COMPLEX

has its roots in unreasonable fear and results in self-consciousness, nervousness, mental conflicts, lack of confidence in self, etc. Amazing psychology course points the way to SELF-MASTERY and a MAGNETIC SUCCESS. **WINNING personality!** Sent postpaid for only \$1.25 (no C.O.D.'s or checks). Money back if not satisfied. Free literature on request. Dr. G. Malcolm Smith, Dept. 304, 1104 Union Ave., Montreal 3, Canada

If Ruptured



Do What Others Now Do—
Wear a Form Fitting MILLER TRUSS

which provides natural freedom and comfort in working, walking, playing, horse back riding, dancing, swimming or sleeping. You just cannot afford to be without this protection and convenience.

Wear two weeks then consult your physician before deciding to keep it.

Write me today for **FREE** descriptive circular. Sent in plain, sealed envelope.

FRED B. MILLER Manufacturer
 Dept. P.S. Hagerstown, Maryland.



FOR DEAF PEOPLE
New Help!

PARAVOX
 ONE CASE - ONE CORD
HEARING AID

Outstandingly free from
 cord and case noise.

NO SEPARATE BULKY BATTERY CARRIER

Comfortable in summer and winter — easy to carry — no extra wires — just one case and one cord. Clear amplification—wide range in tone. Replacement or repair of mechanical parts guaranteed for one year if found defective.

SERVICE PROBLEM SOLVED by the Paravox replaceable chassis. No sending of sets to factory — no bothersome loan sets.

Accepted by the Council on Physical Medicine, American Medical Association

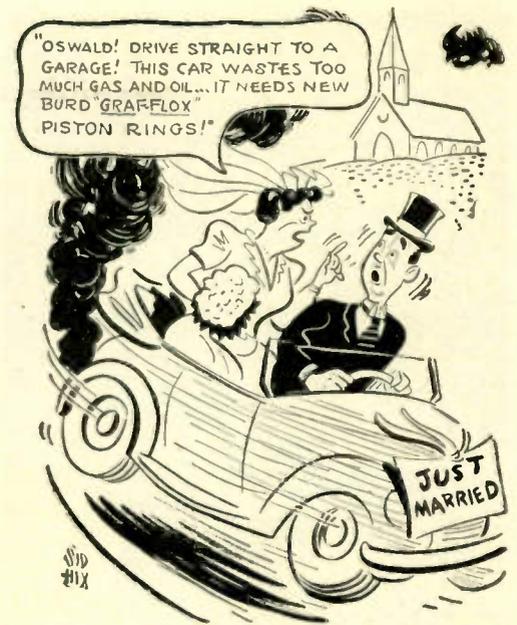
PARAPHONE HEARING AID, INC.
 2042 East 4th St. • Cleveland 15, Ohio

Builders of one-case, one-cord vacuum tube hearing aids since 1942

Get This **FREE BOOKLET**



"NEW Satisfaction From Hearing Aids"



STOP FUEL AND OIL LOSSES WITH BURD "GRAF-FLOX" PISTON RINGS

When your car starts smoking and your fuel and oil mileage drops alarmingly, it's high time to go to your favorite repair shop and ask for a re-ring job with Burd "Graf-Flox" Piston Rings. You'll be amazed at the improvement in engine performance . . . at savings in gas and oil. The secret of Burd's superiority lies in (1) using electric furnace iron for castings, for strength and uniform tension; (2) precision grinding and finishing; (3) by an exclusive Burd process, applying deeply penetrating colloidal graphite to the finished piston rings for quicker seating and longer wear. The result: Burd "Graf-Flox" Piston Rings stop fuel and oil losses and restore "new car" pep. Mail the coupon today for two FREE booklets described below.

BURD PISTON RING CO., DEPT. PS, ROCKFORD, ILL



THIS COUPON BRINGS FREE BOOKS

BURD PISTON RING CO., DEPT. PS,
 Rockford, Illinois

Gentlemen:

I'd like a FREE copy of your "Handy Handbook" which tells how to keep my car in good working order. Also send a "Car Economy Record Book."

Name.....
 Address.....
 City..... State.....



PULVEX FLEA POWDER **DDT**



now also contains
 GUARANTEED BY BUYERS OF BOOKS
 Guaranteed by Good Housekeeping
 FORTNIGHTLY ON OCT 15 ADVERTISED THEREIN

Kills the fleas QUICKLY!
 Keeps others off for days!
 Still 25¢ and 50¢

STOP THAT DRIP



NO DRIP TAPE

EFFECTIVE IMMEDIATELY

New—for homes! A sure cure for condensation drip from cold water pipes. Pliable, cork-filled NoDrip Tape eliminates wet floors, makes idle space usable! Quick, Clean, Easy to Wrap on—No tools, no experience needed. Covers joints as well as straight pipes.



At hardware, department stores and lumberyards.

Roll, enough for **\$1.25**
 7 feet of 1/2" pipe
 Higher west of Rockies & Canada
 Write for NoDrip Tape circular
J. W. MORTELL CO. 534 Burch St. KANKAKEE, ILL.

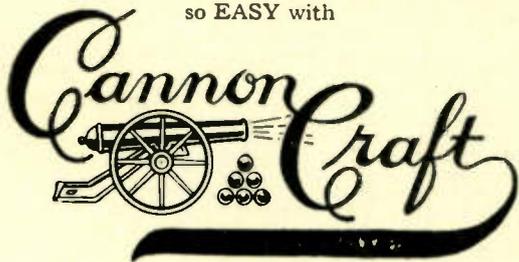
BOYS! MEN!

now you can

MOLD PLASTICS AT HOME!



Get in on the newest hobby craze! Make beautiful buttons, pins, ornaments, etc. of colorful plastics. Fascinating! Modern! And so EASY with



PLASTIC MOLDING SETS

Designed by expert Plastics Chemists and Engineers. Contain everything the home craftsman needs to start this absorbing pastime—assorted plastics in various colors, a practical, easy-to-use press, assortment of die-cast aluminum molds, fuel tabs, finishing materials, complete instructions—all packed in a sturdy metal box.

The Number 1 Outfit costs only..... **\$2.60**

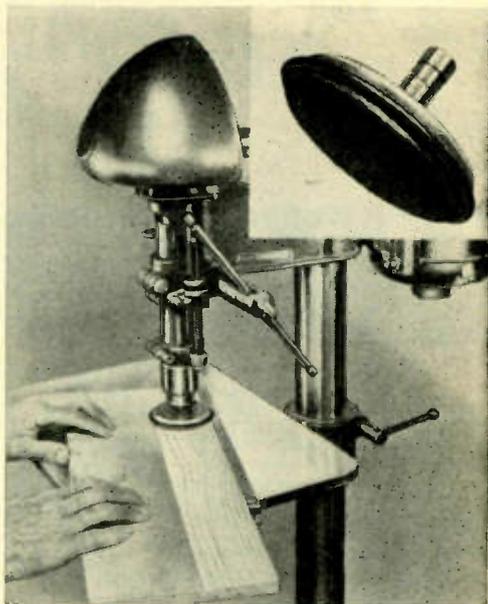
Number 2 Outfit (illustrated)—more different kinds and colors of plastics in larger quantity, more and larger molds..... **\$4.85**

If your dealer cannot supply you, send money order or check direct. We pay postage.

(DEALERS: Write for particulars)

CANNON & COMPANY

218 Elliott Street, N. W., Atlanta, Ga.



Smoother for Drill Press

LEVEL SURFACING of woods, plastics and flat metallic materials is efficiently accomplished with a new tool that fits into the chuck of any standard make of drill press. The Barron Rotary Surface Sander, shown above, consists of a half-inch steel arbor inserted into a cast aluminum head. Cup-shaped aluminum-oxide cloth sanding disks can be quickly slipped on. Felt pad on under side eliminates harsh abrasive action.

Home and Workshop Index Provides Quick Reference

WITH A COPY of the new Home and Workshop Index, you can quickly find any article that you may remember seeing during 1945 on the craftwork pages of *Popular Science Monthly*. All articles that appeared from January 1945, to and including December 1945, on craftwork, woodworking, house repairs, new shop ideas, radios, automobiles, and related subjects are listed alphabetically and cross-indexed.

To obtain your copy, send a dime to Popular Science Home and Workshop Index, 353 Fourth Avenue, New York 10, N. Y., enclosing a self-addressed, stamped legal-size envelope (No. 10). A limited number of 1942, 1943 and 1944 indexes also are still available. Send 10 cents for each copy that you wish, and be sure to specify which year.

SWIMMING MOUSE



One of the most popular and consistent fish catching lures ever developed. Its action on retrieve so faithfully imitates a live mouse swimming that bass just can't resist it. A perfectly weedless surface lure. Fish it in snags, weeds, lily pads or fallen trees, or cast it on edge of shore. Made of live rubber, a lifelike reproduction of a real mouse in size, shape, color and action. Cups at sides make a purring noise on retrieve, and produce ripples like a live mouse swimming. Has a P & K American made weedless treble hook, with needle sharp points. Cat. No. 7. Bait Rod size, 90c each. Cat. No. 701, Fly Rod size, 45c each.

We prefer that you buy P & K at your favorite dealer—**BUT, if he hasn't it, you can order direct.**

"ADVENTURES IN FISHING"

Just off the press. 32 pages—articles by Cal Johnson, famous outdoor writer and fishing authority—pictures in full color of P & K Lures and Accessories—hunting and fishing photos, etc. A regular 10c package of Raparound, the Invisible Ribbon Sinker, a MUST for Fly Fishermen, and this booklet, for only 10c, mailed postpaid. SEND YOUR DIME TODAY!



PACHNER & KOLLER, INC.
3454 Archer Ave. Chicago 8, Ill.

TESTED AND PROVED LURES AND FISHING ACCESSORIES

PRECISION DRIVES for your POWER EQUIPMENT

CONGRESS

PULLEYS & COUPLINGS

Available in a large range of sizes, CONGRESS DRIVES increase the performance of your workshop. They are the same precision drives that are being used as standard equipment by many of the worlds largest manufacturers of high priced precision machinery.

Better hardware, hobby shop and farm equipment dealers are selling CONGRESS DRIVES. They are available in all popular sizes with diameters ranging from 1½" to 14". You pay no more for CONGRESS than for ordinary drives.

CONGRESS DIE CASTING DIVISION
Detroit 12, Michigan



LOOK FOR THIS DISPLAY

It identifies the dealer selling superior CONGRESS pulleys and couplings.



keep that engine Factory-Clean

For MAXIMUM POWER
SMOOTH PERFORMANCE
EASY STARTING



If you want the full power, the long lasting, economical service of which your car is capable, you must keep the engine factory-clean. The Petroleum Solvents Corporation has specialized in this problem for over fifteen years—the elimination of petroleum residues.

Millions of automobiles, trucks, buses, tractors, boats, Diesels and stationary fuel systems in daily service are cleaned and kept factory-clean with **LOOSITE** and **SILOO**.

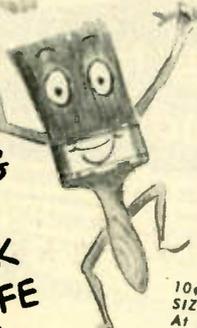
LOOSITE and **SILOO** will show immediate results in power, pick-up and performance on any make car regardless of type or brand of oil used. The treatment is simple, safe and inexpensive. **SILOO** is ideal for break-in on new cars. See your dealer or service station today.

SOLVENTS FOR ALL TYPES OF PETROLEUM RESIDUES
Petroleum Solvents
CORPORATION

General Offices: 331 Madison Avenue, New York 17, N. Y.
Plant and Laboratories: Port Reading, New Jersey
Petroleum Solvents Corp. of Canada, Ltd.
Dominion Square Bldg., Montreal

IF YOU MEAT WITH OIL — WRITE FOR INFORMATION ON
SILOO FUEL OIL TANK SOLVENT

BRING 'EM
BACK
TO LIFE
with



10¢
SIZE
At paint, hardware,
department and
5 & 10¢ stores.

DIC-A-DOO Paint Brush Bath

It's the life and spring in the bristles that makes a paint brush good. Dic-A-Doo Paint Brush Bath reclaims old paint-caked brushes and keeps new brushes in top-notch condition.

Cleans Fast, Efficiently. Brush Bath works quickly. Paint, lacquer or varnish comes off fast, leaving your brush clean right up to the hilt.

Used By Painters and Decorators. Brush Bath is the quick, safe method. Its gentle action can't harm or loosen bristles. (Recommended for nylon brushes, too.) Experts use it — it has to be good!

FOR A SURFACE LIKE NEW

just

DIC-A-DOO

Use Dic-A-Doo Cleaner for any painted surface — walls or woodwork — inside or out. Put it on — wipe it off. It lifts dirt out. Safe for the surface—good for your hands. A Dic-A-Doo'd surface saves paint!



PATENT CEREALS COMPANY, GENEVA, N. Y.



Collect U. S. Army Shoulder Patches



An Interesting, fascinating hobby. From 20¢ to 50¢ each. Master set of 400 patches—\$97.50.

As-
sortments \$1, \$5, \$10, \$25,
\$50. Official patches available
for every major Army and Air
Corps Unit. Send \$1 for sample
selection of patches and PATCH
CATALOGUE. Orders from
Canada—add 20%.

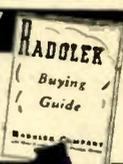


SPRINGER'S 286 San Francisco Street EL PASO, TEXAS



Everything in Radio!

Make Radolek your buying headquarters for Radio-Electronic repair and replacement needs. Large stocks assure finest, most complete selections of all available items at lowest prices. Your orders receive special attention for fastest delivery. Send today for FREE Radolek Buying Guide.



RADOLEK CO., Dept. A-115, 501 W. Randolph St., Chicago 6, Ill.

FREE RADIO BUYING GUIDE



GERSTNER Tool Chests

Better construction, therefore a better value in every Gerstner chest at no more cost. Free catalog for Tool, Die and Pattern Makers.

GERSTNER TOOL CHESTS
546 Columbia St., Dayton 7, Ohio

FREE! FAMOUS BLUE BOOK CATALOG

GAME SUPPLIES

Club Furniture - Counter Games - Punchboards - Magic Cards Readers, Read the backs - Inks - Daubs - Poker Chips - Tops Flats - Layouts - Game Boxes.



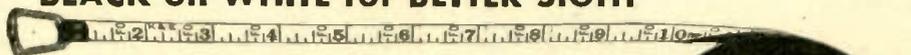
K. C. CARD CO., 838 South Wabash Ave., Chicago 3, Ill.



NEW OTTAWA Wood Saw

FOR TRACTORS Makes wood sawing fast; easy. Cuts enough wood to pay for itself quickly. Easily moved while attached. Big blade; send for FREE details. OTTAWA MFG. CO., W-601 Oak Ave., Ottawa, Kans.

BLACK on WHITE for BETTER SIGHT

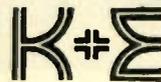


WYTEFACE Steel Tapes have black graduations on a crack-proof white surface. Easy to read in any light, from any angle. Faster measurements with fewer errors. Designed for hard service. Resists abrasion from rails, pipe, rocks, concrete. Protected against rust.



KEUFFEL & ESSER CO.
EST. 1867

NEW YORK • HOBOKEN, N. J.
CHICAGO • DETROIT • ST. LOUIS
SAN FRANCISCO • LOS ANGELES
MONTREAL



Drafting
Reproduction
Surveying Equipment
and Materials
Slide Rules
Measuring Tapes

"A Six Room House, \$2800

Complete, Ready for You
to Move In"

BY GEORGE W. PEARCE

The author, a mechanical engineer, reviews the history of housing and shows how building costs have risen in the last 150 years until few families can buy a house adequate for their needs.

He then describes how, by the use of various money-saving building methods, a large, modern, 6-room, thoroughly insulated, fire resistant, 2-bath bungalow with garage can be had most anywhere in the United States for \$2800.00.

Included with the book are 10 folded drawings, 12" wide x 18" long. These drawings by Mr. Pearce show all the details of construction for this house—the wiring, the plumbing, the automatic oil heating system and the fluorescent lighting. The book is devoted to showing how similar savings can be made on any house of any style, size or floor plan.

A very readable and interesting book. Every prospective home owner should have a copy. 138 6" x 9" pages, 26 illustrations, leatherette bound. 10 large drawings.

Send \$2.00 to TECHNICAL PRESS, Box 6 D, Swampscott, Mass., and your copy will be rushed to you postpaid. Distributed solely by Technical Press—Not sold in book stores.



From HAWAII —YOU'LL LOVE IT!!

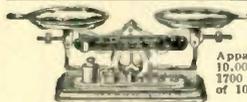
A beautiful one-piece picture frame with facing panels "forever joined." Made from a single piece of hardwood. An ideal keepsake or gift. Send 50 cents for complete instructions and blueprint. Make it yourself.

Sherman Park Antiques (ex-G.I.)
5088 Easton Ave. St. Louis 13, Mo.

Balance 4"x 9" Base. With either \$6.00
Metric or Avordupois Weights.

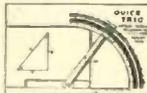
Catalog with 3000 illustrations of laboratory
Apparatus sent for 75 cents. Catalog listing
10,000 chemicals, drugs, minerals, etc., and
1700 scientific books sent for 25 cents. Catalog
of 100 scientific books, 10 cents.

LABORATORY MATERIALS CO.
7317 Vincennes Ave. Chicago 21, Ill.



TRIG SLIDE RULE

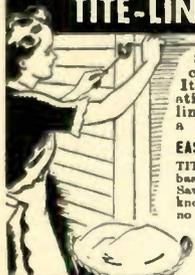
Patent Pending



● Fits the pocket. Quickly solves trigonometry, radio, and electricity problems. Simply set the slides and read the answers for all three sides and angles of a triangle. Gives degrees, sines, cosines, and tangents of angles. Entirely automatic. No figuring on paper necessary. FREE easy instructions included. Price only \$1.00 or we will mail C.O.D. plus postage.

REED MFG. CO., 124-C W. 4th St., Los Angeles 13, Calif.

PREVENT WASHDAY MISHAPS with TITE-LINE Clothes Line Holders



String your clothes line on TITE LINE clothes line holders. It's quick. It's easy. It's the surest way to prevent that exasperating washday disaster—broken clothes lines. Each section is securely gripped—a line break affects only one section.

EASILY INSTALLED ON FLAT OR ROUND SURFACES

TITE-LINE clothes line holders are used in attics, basements, outdoors—wherever clothes line is used.

Saves time, prevents knots and kinks, holds line tight, no tying. Get TITE-LINE at your favorite hardware or variety store. If not in stock, send us your dealer's name.



THE MIDLAND COMPANY
SOUTH MILWAUKEE, WISCONSIN

NEXT TIME SAY BRIGHT STAR

and you will get a
FLASHLIGHT & BATTERIES
famous since 1909
for QUALITY,
STYLE and
SERVICE



BRIGHT STAR BATTERY CO. CLIFTON N. J.

**ALL OUTDOORS
IS YOURS ON A
HARLEY-DAVIDSON!**



THE fun and beauty spots are calling you! Majestic mountains — lakes and rivers — forest and open country — broad highways and country lanes — are awaiting you and your **NEW HARLEY-DAVIDSON**. Pack your evenings, weekends and vacation days with pleasure! Join other Harley-Davidson riders on tours and endurance runs — or take in race meets, hillclimbs and other thrilling motorcycle events. See your Harley-Davidson dealer early.

MAIL THE COUPON NOW!

**HARLEY-
DAVIDSON
MOTORCYCLES**

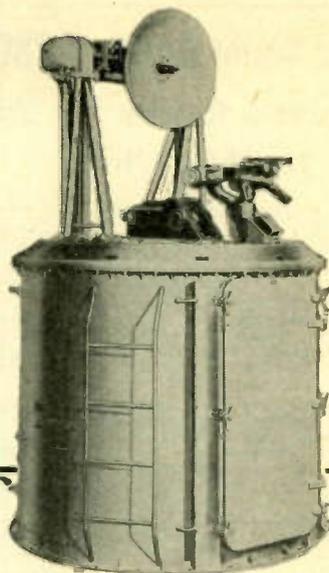
HARLEY-DAVIDSON MOTOR CO.
Department PS, Milwaukee 1, Wisconsin

Please send free copy of 24-page
"Enthusiast" Magazine, filled with
motorcycle action pictures and stories.

Name

Address

City State



Target Seeker Penetrates Darkness and Weather

THE electrically controlled director shown above causes a gun to seek out and follow a target in any degree of light or weather. This automatic blind-firing gun director was devised as the answer to Jap "kamikaze" suicide planes. It was perfected with the co-operation of the Norge division of the Borg-Warner Corporation, Johns Hopkins University's applied physics laboratories, and other organizations. The system predicts where the target will be when the projectile reaches it, and, by remote control, positions the gun accordingly. A "slew" sight enables the control officer to spot targets other than the one being followed by the operator and to shift the director to another target. For the device the engineers developed a "labyrinth" seal to prevent sea-water penetration. This consists of specially designed ridges of metal around the circumference of the director.

Civilian Jobs in Orient

CIVILIANS are being recruited by the Army Signal Corps to replace enlisted technicians now stationed in the Philippines, Japan, and Korea. Jobs offered are for those skilled in the maintenance and repair of radio, radar, telephone, electric power equipment, etc. Appointments, for a minimum of one year, carry salaries from \$1.50 to \$1.70 per hour.

Home Comfort



**RIGHT NOW
AT MODEST
COST!**

• There's amazing comfort and convenience—for living or travel—built into the Schult Luxury Liner. You get every facility of a 2-bedroom house in this mobile home built to quality standards. Comfort wherever you go, summer or winter.

FURNISHED! Complete kitchen includes oven range, refrigerator, double sink,

SCHULT CORPORATION, DEPT. 3106, ELKHART, IND.

ample food storage space. Separate bedroom has permanent bed with luxurious mattress, wardrobe, hi-boy. Large closets, wardrobes and drawers. Living room sofa converts to extra double bed; sliding doors give 3-room privacy!

See your Schult dealer or send today for latest catalog featuring 1946 Luxury Liner.

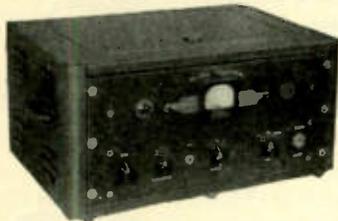
MEMBER: TCMA

SCHULT Trailer Coaches

**New!
Exclusive!
Ready Now**

WRL GLOBE TROTTER

TRANSMITTER KIT



**25 WATT
OUTPUT
KITS**

\$59.95

Complete including all parts, chassis panel, streamlined cabinet, less tubes, coils, and meter.

Cat. No. 70-300 Kit same as above, wired by our engineers \$75.00
Complete kit of 8 tubes Cat. No. 70-314.....\$5.95
3 in. meter Cat. No. 70-318..... 4.95
Coils, per set, any band Cat. No. 70-316..... 2.95
Crystals, 40-80 meters, mounted Cat. No. 70-322 ea..... 2.65
Quality crystal mike and stand Cat. No. 70-320..... 9.45
Here is the latest, most outstanding transmitter value on the market today. The WRL Globe Trotter is capable of 25 Watts output on all bands from 3500 KC through 28 Megacycles. Incorporates the Tritet Oscillator using a 40 metal X-tal and providing sufficient drive at 10 meters for the 807 final; Heising choke modulation; three bands, all pretuned; 10, 20, and 80 meters; metering provided for both oscillator and final stages; two power supplies, one for 807 final and modulator tubes, and one for the speaker amplifier and oscillator stage.

FREE!

**Our Latest FLYER
of radio parts.
Giant Radio Reference
Map 3 1/4 x 1 1/2 ft.15c
Tube Base Calculator 25c**



Formerly Wholesale Radio Laboratories

Address Dept. PS6, Council Bluffs, Iowa

A TOOLSHOP IN YOUR HAND!

- GRIND • DRILL • ROUT
- PDLISH • ENGRAVE
- CUT • SAND • SAW • etc.

MAKE THINGS FROM WOOD
PLASTICS—METALS—GLASS
LINOLEUM—LEATHER
ALLOYS—HORN—STONE
BONE, etc.

HANDEE TOOL OF 1001 USES

Smooth, steady power at your fingertips! You can turn out professional looking projects for pleasure or profit—ship, plane or train models, costume jewelry, wood carvings, puppets, initialed tumblers, etc. Handee, first small portable tool and today's finest, uses 300 different accessories. AC or DC. 25,000 r.p.m. Weight, 12 oz.

WITH 7 ACCESSORIES. POSTPAID **\$18.50**

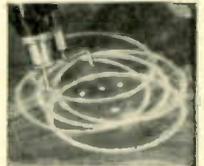
Get a Good Start
Get the
HANDEE KIT

HANDEE Tool and 45 of the most popular accessories, all packed in handsome, compact steel carrying case. You'll be amazed at what you'll accomplish! Complete, postpaid **\$25.00**

FOR YOURSELF OR A FRIEND...
THE GIFT OF A LIFETIME!

NEW PRECISION ATTACHMENTS

Fit DeLuxe Handee only. Enable novice or craftsman to perform precision operations not possible with other portable tools. Magically, easily, your offhand carving, routing, shaping, etc. will be perfect as to depth of cut, accuracy of line. Set of 6 attachments with instructions, postpaid **\$7.95**



ORDER NOW—USE COUPON

**FREE
64-PAGE
Catalog**

CHICAGO WHEEL & MFG. CO.
1101 W. MONROE ST., DEPT. PD,
CHICAGO 7, ILL.

Send me HANDEE TOOL HANDEE KIT PRECISION ATTACHMENTS REMITTANCE ENCLOSED SEND C.D.D. SEND 64-PAGE CATALOG.

Name.....

Address.....

SWIVEL-HEAD FLASHLIGHT

nothing else like it!

**HEAD TURNS
LIGHT AT
ANY ANGLE**

Greatest advance in flashlight design in a generation. Turn powerful pre-focused beam where you want it... stand it up... clip it on... both hands are free. A handsome, durable, all-purpose flashlight for everyone. Ask your dealer.



No. SW-22
Patented

No. 75 Heavy-Duty Dated Cell. Fresh—Lasts longer. 10¢

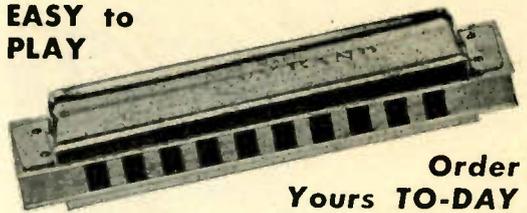
USA LITE

Flashlights & Batteries

If dealer cannot supply, send \$2.00 to Dept. 0 UNITED STATES ELECTRIC MFG. CORP., New York 11, N. Y.

*USA LITE Red-Head Safety Flashlight—a "MUST" for the motorist.

**EASY to
PLAY**



**Order
Yours TO-DAY**

The New Luellen HARMONICA

Most wonderful pocket instrument ever made is the harmonica. Easy to master, fun for Everyone. The Luellen has 10 holes, 20 notes. Key of C. Beautiful tone. Now ready. Postpaid Only **\$2.10**

INSTRUCTION BOOK. Simple for youngest child. No notes, scales nor exercises. Ten lesson charts show everything. Includes 75 popular songs. Price \$1.00. Here's our special introductory offer: The Instructor and the Harmonica, both postpaid, both for \$2.69. Send Check or Money Order Today.

JOHN LUELLEN & CO., 17034 Page Avenue, Dept. 604, Hazelcrest, Ill.

BUILD YOUR OWN FAN with that old motor



One piece cast aluminum propeller used for cooling and ventilating. Also available to dealers at discount.

Size	Polished	Unpolished	Bore
Inches 15	\$2.50	\$3.50	\$2.00
18	3.00	4.00	2.50
20	3.25	4.25	2.75
24	3.50	5.00	3.00
30	5.00	6.00	4.00

Let us give you our prices on your aluminum castings.

KLOPPENBORG FOUNDRY Dept. 2, Davenport, Iowa

EASY TO LEARN CODE

Learn or increase speed with an Instructograph—the Code Teacher that takes the place of an operator-instructor and enables anyone to master code without further assistance. Available tapes from beginners alphabet to typical messages on all subjects. Speed range 5 to 40 WPM. Always ready—no QRM. Thousands have "acquired the code" with the Instructograph System. Write today for convenient rental and purchase plans.

INSTRUCTOGRAPH COMPANY
4715 Sheridan Road, Chicago 40, Illinois



LUCITE

Complete illustrated fabricating instructions, used in Craft Classes throughout the world, price list on Lucite, dyes, complete supplies. Booklet 10c, with sample 35c. GEM-O'-LITE, P.O. Box 686X, North Hollywood, Calif.

TRAILER AXLES, HITCHES, AND PARTS

• If you are interested in purchasing trailer axles, hitches, and other trailer parts, contact us promptly.

Write for free literature
HAMMER BLOW TOOL COMPANY, Dept. D-10, WAUSAU, WIS.



6 handy tools in ONE!

- 1 MITERING GUIDE
- 2 DIAMETER GAGE
- 3 ACCURATE SQUARE
- 4 MARKING GAGE
- 5 CENTER FINDER
- 6 CONVENIENT RULER



Miter Master takes the place of an expensive miter box accurately set to any angle. Scale marked for mitering 5, 6, and 8-sided frames. Steel construction.

Built to last a lifetime. If your dealer can't supply you we will send it postpaid anywhere in the U.S. for \$1.50. (Foreign \$1.75). Unconditional guarantee. If not satisfied within ten days for any reason whatsoever, your money will be refunded.

\$1.50

POSTPAID

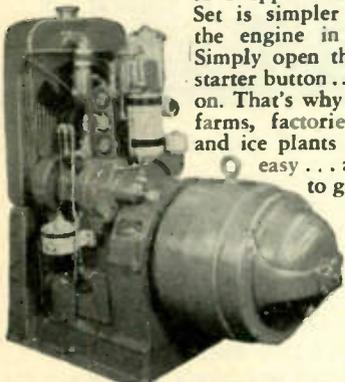
MITER-MASTER

MASTER SPECIALTY COMPANY

3024 EAST LAKE STREET • MINNEAPOLIS 6, MINN.



It's Easy...
EVEN THE MISSUS
CAN RUN IT!



A Sheppard Diesel Generating Set is simpler to operate than the engine in the family car. Simply open throttle . . . press starter button . . . and the power's on. That's why many hatcheries, farms, factories, tourist camps and ice plants have found it so easy . . . and profitable . . . to generate their own electricity.

- Generating sets
2,000 to 35,000 watts
- Power Units
3% to 56 H.P.
- Marine Engines
3% to 62 H.P.

R. H. SHEPPARD CO., INC., 68 Middle St., Hanover, Pa.



LENSES 500,000 OF THEM!!
 Buy them for a fraction of their original cost, U.S. Army and Navy surplus lenses and prisms.
RIGHT ANGLE PRISM 40 m/m sq. face ea. \$ 1.75
ACHRO. OBJ. 32 m/m Dia. 130 m/m F.L. cemented ea. 1.50
ACHROMATIC BINOCULAR OBJECTIVE 53 m/m Dia. 174 m/m F.L. coated and cemented. Perfect ea. 3.75
5X TANK TELESCOPE (M71) Brand New assembled ea. 22.50
METAL PARTS only to make a complete 5X Tank Artillery Scope. Diagram included. ea. 7.50
 Send Money Order or Check—3 cent stamp for list.
A. JAEGER'S BOX-848 SO. OZONE PARK 20, N. Y.

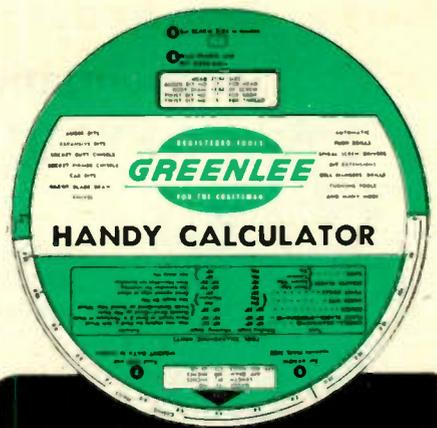
ATTENTION HOMECRAFTSMEN!
PLANS For Dutch Windmills, Lighthouses, Bird Houses, Lawn Chairs, Arbors, Trellises, many kinds of fine furniture, also a great variety of Lawn Figure patterns. SEND 10c FOR CATALOG ILLUSTRATING OVER 100 PRACTICAL PROJECTS
 Craftsman's Model Co., 2030 N. 41st St., Dept. K6, Milwaukee, Wis.

OSWALD RABBIT
Cartoon Home Movies



Oswald, the great "fun maker," delights his audience from beginning to end of every film.
OSWALD FEATURES
 50 Ft. 8MM. \$1.50
 100 Ft. 16MM. \$3.00
 Dog Team Race 1-A
 Oswald's Ball Game 3-A
 The Duck's Birthday 6-A
 Dr. Oswald 9-A
 For an evening of enjoyable HOME entertainment show an OSWALD feature, also a Mickey Mouse, Donald Duck and 3 Monkey film.

See At Your Photo Dealer Or Order Direct,
 Catalog And Prices On Request. Write To—
HOLLYWOOD FILM ENTERPRISES, INC.
 6060 Sunset Blvd., Dept. 116 Hollywood 28, Calif.



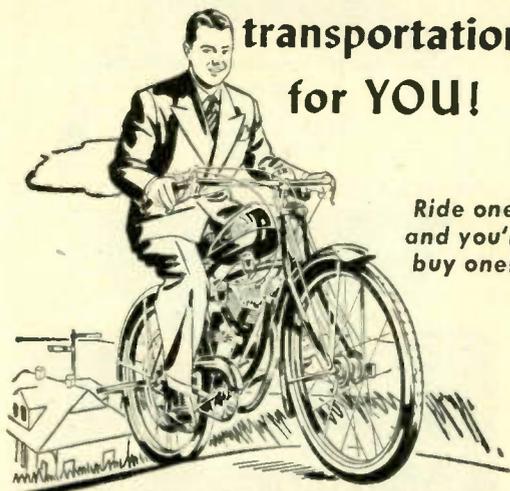
SPECIAL OFFER - ONLY 10c
TIMESAIVING WOODWORKING
CALCULATOR, BY GREENLEE
MAKER OF FINE TOOLS

Let this popular, easy-reading GREENLEE HANDY CALCULATOR swiftly solve your woodworking problems. Just set the dial . . . convert linear feet to board feet . . . get slope per foot in degrees . . . compare hardness, weights, shrinkage, warping and working ease of various woods.

More, too: bit sizes for head, body, thread of screws . . . nail specifications . . . tool sharpening hints . . . protractor, 6" diameter, fits your tool kit. Heavily varnished cardboard. Special offer. Order now, send 10c (not stamps) in next mail. Greenlee Tool Co., Division of Greenlee Bros. & Co., 2126 Columbia Avenue, Rockford, Illinois.



Here's door-to-door transportation for YOU!



Ride one
and you'll
buy one!

New **WHIZZER** Motor
makes your bike a motor bike

Why walk, when you can *ride everywhere* you go? New Whizzer fits any standard balloon-tired bike. This compact $2\frac{1}{2}$ -horsepower motor will carry you swiftly, surely and comfortably along streets, highways and trails. At speeds from 5 to 35 miles per hour, the 5-quart tank carries gas enough for 150 miles or more!

Whizzer transportation is *all-purpose* transportation. Ride to the station, to business, to work, on errands, shopping trips, on vacation jaunts. Put a Whizzer on *your* bike now! **WHIZZER MOTOR COMPANY, Pontiac 15, Mich.**

FACTORY
LIST PRICE

\$89⁵⁰
PLUS
TAX

Precision-designed, precision-built by automotive craftsmen in the heart of the auto industry. And auto-type assembly line production has brought its price within reach of all!

IF NO LOCAL DEALER, USE COUPON

WHIZZER MOTOR COMPANY
Dept. 186, Pontiac 15, Mich.

I enclose \$91.60, including \$2.10 Federal Excise Tax. () check or () money order. Send me one Whizzer motor, complete, tax paid, with full installation instructions. Written guarantee with every motor.

If descriptive literature only is desired, check here ().

NAME _____

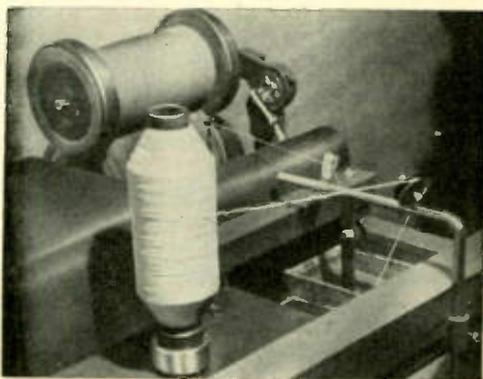
ADDRESS _____

CITY _____ STATE _____



Making Thread from Feathers

EVERY YEAR, according to record, we throw away 85,000 tons of poultry feathers. These will be put to good use if the U. S. Department of Agriculture is successful in its experiments at its Western Regional Research Laboratory at Albany, Calif. Feathers, like silk and wool, are essentially protein, but this must be converted into fiber in which the protein is not treated so roughly as to break down its molecular structure. The spinning solution is obtained by treating feathers with a reducing agent and a special type of detergent in water solution. Then the fiber is formed by forcing this through the tiny holes of a spinneret.



Yarn Dipping Binds Fibers

STRONGER YARN is produced by impregnation with resinous material on the above machine, followed by curing under high tension. Fibers are locked together so that they resist slipping, and tests have proved that yarns treated by this new process are at least doubled in strength. The process will be licensed by Walter Kidde & Co., Inc., Belleville, N. J., and the Riverside and Dan River Cotton Mills, Danville, Va.



Be the authority on accuracy in your shop!

A man's work is only as good as his measurement. You can be the "accuracy man" in your shop. Learn to work with genuine Ford "Jo-Blocks," guaranteed accurate to within 2, 4 or 8 millionths of an inch, plus or minus. For a small investment, you can own a fine working set of Jo-Blocks—keep your mikes and gages at millionth-inch precision. There is only ONE true American-made Jo-Block, made only by—

WRITE FOR THESE FREE BOOKLETS!

An absorbing story of the search for precision. A new De Luxe Catalog of Ford Jo-Blocks and Accessories.

FORD MOTOR COMPANY
Johansson Division
 Dept. 611, Dearborn, Michigan



Johansson

GAGE BLOCKS



To-night... pick up your pipe

A load of Christian Peper Pouch Mixture will help you forget the problems of the day as you settle back and relax with this friendly smoke.

There's down-to-earth satisfaction in the honest fragrance, the just-right mildness of "Peper's Pouch," superb blend of fine imported and domestic tobaccos.

POCKET-SIZE PACKAGE AT TOBACCO COUNTERS **25c**

Christian Peper · St. Louis
Fine Tobaccos Since 1852

For Men who Really Know Pipes

Royalton CROWN



MOUTHPIECE TUBE
 prevents backflow of moisture

CONDENSING CHAMBER
 traps and holds bitter juices and sediment

BOWL GUARD
 keeps shank and bowl dry

REMOVABLE SECTION
 eases thorough cleaning

CHAMBER GUARD
 bars tobacco fragments from bit

Patented

\$150

Selected Briar



THIS REMARKABLE PIPE frees smokers from the annoyance of bitter juices and tobacco slugs. These nuisances are trapped by Royalton Crown's condensing well and other patented safeguards. For day-long, dry-cool smoking, no pipe can quite compare with a Royalton Crown.

HENRY LEONARD & THOMAS, INC. OZONE PARK 17, N. Y.



Great Moments of
THE WAR!

— by Graflex

FREE! Here it is! A dramatic story of photography at war! Together with 26 great war pictures — all in the new **GRAFLEX** picture booklet, **GREAT MOMENTS OF THE WAR!** Ask your local **GRAFLEX** Dealer for a free copy, or send 10¢, to cover handling, to Room 60, **GRAFLEX, Inc.**, Rochester 8, New York.

VISIT Graflex Information Centers — At 50 Rockefeller Plaza, N. Y., and 3045 Wilshire Blvd., Los Angeles, Cal.

GRAFLEX, INC.

Now
for **EVERY WORK SHOP!**

NEW
Invention
Electroplates
by **BRUSH**

Easy to Plate **CHROMIUM**
GOLD, SILVER, NICKEL, COPPER
... For Pleasure and Profit!

If you have a workshop — at home or in business — you need this new Warner Electroplater. At the stroke of an electrified brush, you can electroplate models and projects — you can replating worn articles, faucets, tools, fixtures, silverware, etc. with a durable, sparkling coat of metal — Gold, Silver, Chromium, Nickel, Copper or Cadmium. Method is easy, simple, quick. Everything furnished — equipment complete, ready for use. *By doing a bit of work for others, your machine can pay for itself within a week.* So make your shop complete by getting a Warner Electroplater right away. Send today for **FREE SAMPLE** and illustrated literature. **ACT AT ONCE! Mail Coupon.**
WARNER ELECTRIC CO., DEPT. H-12
663 N. Wells St., Chicago 10, Illinois

FREE Details & Sample!

WARNER ELECTRIC CO., 663 N. Wells St., Chicago 10, Dept. H-12
Gentlemen: Send Free Sample and Details to:

Name _____
Address _____
City _____ State _____

HAVE FUN WITH Hobby Craft

KITS 50¢ UP

Work with leather, clay, felt, metal, wood, plastics, etc. Complete kits with materials, tools & instructions. Sell what you make! Send 10¢ for 32 pg. catalog, "Have Fun with Hobbies."



FREE: To new Guild members, 20 booklets on hobbies. Inquire today!

HOBBY GUILD
34A West 33rd St., N. Y. 1

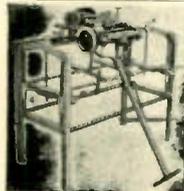
MENTAL TELEPATHY

NATIONWIDE RELEASE *Secrets and Methods of the Tibetan Mystics*

- Clearing the Mind
- One-Pointedness
- State of Void—Mindreading
- Mental Telepathy

Principles and exercises used to improve voice and health—gain inner peace, poise and mental powers
(Enclose Two Dollars For Release T-2)

F. L. Friedrich Press, 161 Wagaraw Road, Hawthorne, N. J.



MASTER CHAMPION
LAWN MOWER SHARPENER

Also Mfg., Saw Sharpening & Key Machines

FRANK'S MFG. CO.
LUCAS 6929, 3312 Tweedy Bl.
SOUTHGATE, CALIF., U.S.A.

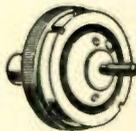
HIGH BLOOD PRESSURE

A DANGER SIGNAL

Often associated with Hardening of the Arteries, a Stroke, Paralysis, Heart Trouble, Kidney Disease, and other grave complications. Resultful treating methods of the Ball Clinic have proven dependable for nearly a quarter of a century. Send for **FREE Blood Pressure Book** today. No obligation.

BALL CLINIC, Dept. 5160, Excelsior Springs, Mo.

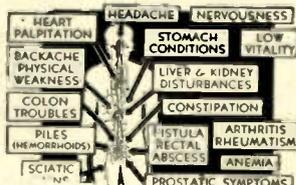
AMAZING MYSTERY
BUTTON



Startles Everybody. With this **Electronic Button** you can make your own Telephone—Amplifier—Detectophone. Attach this button to piece of cardboard—transmit conversation to another room. Music also transmitted to distant places. Most interesting electrical apparatus ever discovered. Enables you to perform hundreds of experiments. So tiny it can be concealed in dozens of places. A Pre-War Product. **Electronic Button** including 5000 word instruction booklet with 50 illustrated experiments postpaid only \$1.00. **Electronic Products Company, Saint Charles, Ill.**

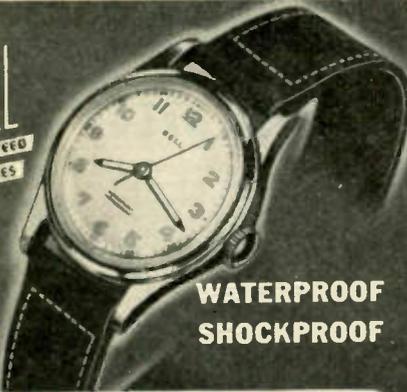
Piles May Lead to Chronic Ailments

FREE BOOK—Explains the Causes and Effects



No obligation. Write to **Thornton & Minor Clinic, Suite 649, 926 McGee St., Kansas City, Mo.**

BELL
GUARANTEED
WATCHES



**WATERPROOF
SHOCKPROOF**

NOW AVAILABLE! Sturdy, handsome, reliable, a watch for every occasion—backed by the famous BELL guarantee.

Anti-magnetic, radium dial and hands, unbreakable crystal, stainless steel back, precision tested.

No. SA 195
15 jewels, small second hand..... **\$25.95**

No. SA 197
17 jewels, sweep second hand..... **\$29.75**

No. SA 189 SELF-WINDING
17 jewels, sweep second hand..... **\$49.50**

ORDER BY MAIL: Send check, money order, or pay postman C.O.D. Prices Incl. Fed. Tax & Postage, Gift Box. Wide choice of fine watches for men and women. Write for FREE Illustrated Booklet "SA"

BELL WATCH COMPANY
Time and Life Bldg., Rockefeller Center, New York 20, N. Y.

NOW....

ELECTROPLATING

Learn this profitable, interesting trade. Hobby or full time business. Chromium, Nickel, Gold, Silver, etc. Postcard brings full details. **FREE.**

PLATER HYDE
Dept. S, P.O. Box 176. National City, Calif.

\$\$\$\$ if trained in arc welding

Big income jobs await you. Learn quickly and thoroughly. Enroll under G. I. Bill. Write today. Hobart Trade School, Inc., Box P-563, Troy, O.

Protect Life and Property



With This Reliable Fire Extinguisher

Every home, car, building should be protected by an Underwriters' approved fire extinguisher. Every 90 seconds a home or place of business burns. Fire takes one American life every hour. Insurance is no substitute for fire protection. S.D.S. FIRE GUARD, America's great utility fire extinguisher, gives you this protection. Acts instantly to guard your home, car, truck, boat, plane, or office. See your dealer today or write The General Detroit Corp., 2270 East Jefferson Avenue, Detroit 7, Michigan.

S. D. S.
Fire Guard
1 Quart

YOU CAN PLAY

HOT LIPS

IN A FEW MINUTES

WOODY HERMAN'S

Sweetwind

Be the "Solid Jackson" in Your Crowd!

Get hep! Be the life of the party with this easy-playing musical instrument! In just a few minutes you'll be sending 'em right out of this world. "SWEETWIND" is featured in Woody Herman's Band... it bears his signature. Has a sweet flute-like tone, a range of 2 1/2 chromatic octaves. Of black plastic with white mouthpiece. Get your "hot licks" in first—**ORDER TODAY!**

Woody Herman's own instructions tell you how to play quickly, easily. Complete with 12 melodies.

1.95 plus postage

Hollywood Studios



SEND NO MONEY — WE MAIL C. O. D.

or save C.O.D. charges and send check, cash or money order for \$2.

HOLLYWOOD STUDIOS, DEPT. PS-1
5155 Santa Monica Blvd., Hollywood 27, Calif.
Please send me Woody Herman's "SWEETWIND" at \$1.95, plus postage.
Add 2 1/2% Sales Tax in Calif.

Name.....
Address.....
City.....Zone.....State.....

Satisfaction Guaranteed or Money Back

THE NEGATIVE FOR POSITIVE RESULTS



You can't get more in the print than you have in the film... and that's where Gevaert precision quality counts! Try famous Gevaert 35-mm. Panchromosa and Panchromosa Microgran... fast, color-sensitive, fine grain... for tops in minicam results. It's yours, for greater photographic fun.



* the **Gevaert Company of America, inc.**
 423 West 55th Street, New York 19, N. Y. • Manufacturing Division:
 Williamstown, Mass. • Branches—Chicago: 150 N. Wacker Drive
 Los Angeles: 6370 Santa Monica Blvd.

Be Your Own Boss



There's a great feeling to being in something for yourself, where all the profits go into your own pocket. American floor sanders make it possible for you to realize this ambition without special schooling or a big investment. Begin small and work up to as large an enterprise as you desire... It all depends on your ambition to get ahead.

Ask for "tell-all" booklet entitled "Opportunities in Floor Surfacing". Use coupon and enclose 25 cents in coin or stamps to cover handling.

AMERICAN FLOOR SURFACING MACHINE CO.

532 So. St. Clair St. • Toledo 3, Ohio
 Gentlemen:

Enclosed find 25c in stamps or coin for booklet "Opportunities in Floor Surfacing," telling me how I can start my own floor sanding business.

Name _____
 Street _____
 City _____ State _____



AGENTS EARNING UP TO \$300 A WEEK SELLING AMAZING NEW FLOOR FINISH REINFORCED WITH PLASTIC RESIN... REQUIRES NO WAXING OR LABORIOUS MAINTENANCE

FREE SALES KIT!

Get in on the ground floor of one of the biggest money makers ever put out! Every home, office, store, restaurant, beauty parlor, church and factory a red hot prospect. Sells on sight. Anyone can apply. Just mop it on. Send for free sales kit today. Exclusive territory. Write our Mr. Allen today.

FAIRCHILD CHEMICAL & COATINGS CO., INC.
 280 Madison Ave., New York 16, N. Y.

WOOD WORKERS

Lumber—Plywood Available
 Harold Hunt wants to send you big new No. 15 Catalog. Over 124 pieces of wood-working ideas. 12 pages of rare woods in color. UNEQUALLED BARGAINS in imported and American woods, supplies, hard-to-find hardware. Send only 10c to cover postage and handling.
CRAFTSMAN WOOD SERVICE CO.
 2729 S. Mary St., Dept. 8-70, Chicago 8, Ill.

only 10¢



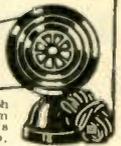
NOW AVAILABLE!

Crosman Silent Rifles—America's favorite compressed air rifles for indoor and outdoor shooting are back again! Available in 22 cal. single shot and Magazine Loading Types. At your dealer—or order direct. Ask for Crosman SUPER-PELLS too—the better ammunition for all compressed air rifles. .177 Cal.—\$1.80 per M. .22 Cal.—\$2.00 per M.

CROSMAN ARMS CO., INC. • Rochester 7, N. Y.



SING-TALK thru your own Radio with **RADIO MICROPHONE**



Put on your own broadcast at home with this Radio Mike. Sing. Talk from any room in the house. Make announcements. Lots of fun! It's wonderful voice practice. Easily attached to any radio. SEND NO MONEY. Pay postman \$1.98 plus postage. Send check or money order and save postage.

DISCO SALES, INC., 154 Nassau St., Dept. 20, New York 7, N. Y.

Burn Your Name On Tools Electro Name Etcher

Only \$1

PROTECT valuable tools from thieves and tool borrowers! The Name-Etch BURNS your name, any design, permanently on tools, instruments, dog collars, any metal. Easy! Simple as writing with pen or pencil. Simply attach to any auto battery, dry cell, or toy transformer. (not supplied). SEND NO MONEY! Pay postman only \$1 plus few cents postage on delivery. Use \$1.00 money back if not delighted. **Name-Etch Co.**, Dept. H-603, Strader Ave., Cincinnati 26, O.



MAKE MONEY AT HOME

RUBBER MOLDS Low as 6¢ EA.

Amazing rubber mold-making outfit makes perfect flexible molds of plaques, ash trays, bookends, etc. Molds cost 6c to 25c each. Each mold makes hundreds of novelties and gifts to sell for \$1.00 apiece and more. No experience necessary. Everything furnished. Quick and easy. Start profitable business in your home—sell to stores, gift shops, friends, restau. road stands by mail. Full or spare time. Write for complete FREE details and easy instructions.

SO-LO WORKS, INC., Dept. G-801, Loveland, Ohio



LATHE OWNERS CONVERT YOUR LATHE

WITH A **PALMGREN** MILLING ATTACHMENT



Now — you can do milling, slotting, grinding, grooving, squaring shafts, sawing at angles, and many other important operations on your lathe. PALMGREN MILLING ATTACHMENT is a necessary fixture for small shops, schools and emergency work in large plants. Fits South Bend, Atlas, Craftsman, Logan, Sheldon and all other makes. It has 360° graduation for rotary angle adjustments, also graduated feed and adjustment screw. Easily mounted by straddling lathe's regular tool post. Try one—it will quickly pay for itself.

No. 250

IMMEDIATE DELIVERY

No.	Width Jaws	Depth Jaws	Jaws Open	Weight Pounds	Base Opening	Price F. O. B. Factory
150	1 1/2"	1"	1 1/2"	6 1/2	1"	\$18.75
250	2 1/2"	1 1/2"	2 1/2"	11	1 1/4"	24.75
400	4"	2 1/2"	4"	25	2"	39.75

Order from your dealer or jobber. Write for circular No. 349

CHICAGO TOOL AND ENGINEERING CO.
Mfrs. of PALMGREN PRODUCTS for Over 28 Years
8396 South Chicago Avenue Chicago 17, Illinois



POCKET WATCHES SWISS MOVEMENTS



Now available "EXPERT" watches. Swiss made watches are known the world over for their accurate timekeeping and quality construction because they are made by master watch craftsmen. This handsome men's pocket watch has a sturdily-constructed chrome case and open figure dial. A timepiece you will be proud to own. SEND NO MONEY. Simply pay postman \$8.50 plus 10% tax and postage. Wear 10 days on our money back if not satisfied guarantee. United Products Co., 7941 S. Halsted, Dept. P-415, Chicago 20, Ill.

LAW
STUDY AT HOME for PERSONAL SUCCESS and LARGER EARNINGS. 37 years expert instruction —over 108,000 students enrolled, LL.B. Degree awarded. All texts furnished. Easy payments. Send for FREE BOOK — "Law and Executive Guidance"
AMERICAN EXTENSION SCHOOL OF LAW
Dept. 66-5 646 N. Michigan Ave., Chicago 11, Ill.

WISE-GRIP WRENCH

Vise-Grip does more things, easier and quicker, than any other tool! Remains locked to the work with hands removed. Holds anything, any shape. Light, trim, handsome. Made of fine alloy steel. Electroplated.

Sold by Tool Jobbers and Dealers.

PETERSEN MFG. CO., Dept. S-66, De Witt, Nebr.

**Gives 1 Hand
TON-GRIP**

**Double
Lever
Action**

FREE Send for it NOW



New 1946 Radio Parts and Equipment CATALOG

SERVICEMEN! Dealers! Soundmen! Amateurs! Builders! Here's your handiest, most complete 1946 Buying Guide for Everything in Radio! Features latest sets, parts, equipment of nationally known quality at lowest prices. Assures fastest service from world's largest and most complete stocks under one roof. Expert staff ready to help you.

- NEW RADIO SETS
- COMPLETE SOUND SYSTEMS
- LATEST HAM GEAR
- ALL SERVICE EQUIPMENT
- BUILDER'S SUPPLIES
- RADIO BOOKS

OVER 10,000 ITEMS

Everything for every radio use. New model radio sets, phonoradios, recorders, communication receivers, Ham kits, code apparatus, parts, tubes, tools, test instruments, public address equipment and accessories, low-cost easy-to-build kits, diagrams, matched parts lists, leading technical and non-technical books—at lowest prices.



ALLIED RADIO

ALLIED RADIO CORP.
833 W. Jackson Blvd., Dept 7-F-6
Chicago 7, Illinois

Date

Rush new FREE 1946 CATALOG

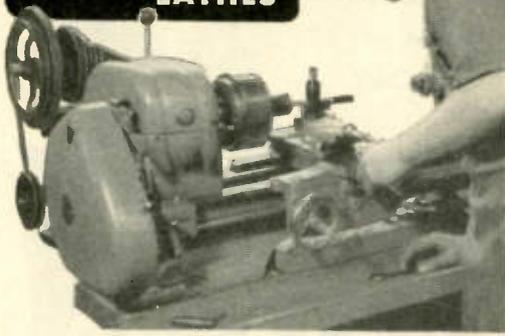
Name

Address

City Zone State

Atlas

6"-10"
LATHES



The ALL-SEASON HOBBY FOR THOUSANDS OF MEN...

SEND FOR FREE CATALOG



There's always something fascinating to do in a home workshop. And the handy man can make his time very profitable by keeping home equipment in repair and building many useful articles. The Atlas lathe has every precision and easy-operating feature you want. Ask your Atlas distributor for full details. Send for this free catalog.

ATLAS PRESS CO.
655 N. Pitcher St., Kalamazoo 110, Mich.



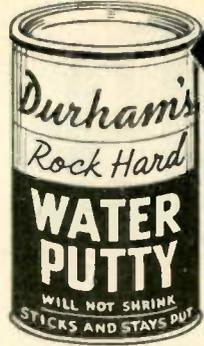
IT HAD TO BE GOOD TO BECOME "America's Fastest Selling Enlarger"

NOW! BETTER THAN EVER
to keep **FEDERAL**
FIRST with AMERICA'S PHOTOGRAPHERS
Complete with F:6.3 Lens
Designed for ease of operation, the new Federal has all the quality construction features required to produce magnificent enlargements



"ENLARGING IS THRILLING" strips mystery from enlarging with simple easy to follow language. 25¢ at all Camera Stores, or send coin, check, money order (no stamps - please!) to -

FEDERAL MANUFACTURING & ENGINEERING CORP.
Makers of Photographic & Electronic Devices
213 STEUBEN STREET • BROOKLYN 5, N. Y.



The Modern PLASTIC for lasting Home Repairs

PERMANENTLY mends cracks or holes in wood, tile, stone or plaster. Sticks and stays put—Does not chip, shrink or fall out. Easy to use. Economical. Mold it, chisel it, polish or paint it. If unobtainable from your lumber, paint or hardware dealer, the big 4-lb. can will be sent you post-paid (in U.S.) for only \$1. Full money-back guarantee, order now.

DONALD DURHAM CO.
Box 804-J, Des Moines, Iowa



MAKE YOUR OWN COSTUME JEWELRY BIG EARNINGS AT HOME

YOU can make costume earring and pin sets, brooches, necklaces, dress clips, combs, etc.
WE supply the jewelry findings; bar pins, ear screws, jump rings, chains, screws, stone sets, sequins, shells, boxes, cement, cards, etc.

WRITE FOR FREE CATALOGUE

PHILADELPHIA BADGE, 1007 FILBERT ST., PHILA. 7, PA.



DRILL-INDEX

A compact container for indexing and filing twist drills. Eliminates search. Made entirely of steel in nine sizes. See your dealer or write to

HUOT MFG. CO.
436 Foot Schultz Bldg. St. Paul 1, Minn.

RUPTURED?

Get Relief This Proven Way

Why try to worry along with trusses that gouge your flesh—press heavily on hips and spine—enlarge opening—fail to hold rupture? You need the Cluthe. No leg-straps or cutting belts. Automatic adjustable pad holds at real opening—follows every body movement with instant increased support in case of strain. Cannot slip whether at work or play. Light. Waterproof. Can be worn in bath. Send for amazing FREE book, "Advice To Ruptured," and details of liberal truthful 60-day trial offer. Also endorsements from grateful users in your neighborhood. Write:

Cluthe Sons, Dept. 14, Bloomfield, New Jersey
(Serving the Ruptured Since 1871)

NEW OTTAWA SAW

World's Fastest 6 H.P. EASY TO MOVE
Fells trees.
Saws big logs, small logs, limbs. Pulley for belt work. Easy to handle, weighs less than lower powered units. FULLY GUARANTEED. Cash in on fuel shortage. Turn wood lots into cash.
OTTAWA MFG. CO. 601 PINE ST. OTTAWA, KANS.



RHEUMATISM

ARTRHITIS - NEURITIS - SCIATICA
Why continue to suffer the agonizing pains of these diseases when the usual remedies have failed? Learn about a new trustworthy, modern, non-surgical treatment method. This marvelous treatment is completely explained in the Ball Clinic's FREE Book. Write today. No obligation.
BALL CLINIC, Dept. 5100, Excelsior Springs, Mo.



Do a Better Job

WITH ONE OF THESE

EMPIRE LEVELS

EMPIRE TORPEDO LEVEL
Smallest, most handy and accurate level made. "Cigar-shaped"—no sharp corners to tear pocket. Aluminum stock. Only 3 oz. wgt. 9" long. Has Level, Plumb, 45° Vials.
No. 26\$1.75

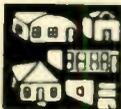


ALUMINUM LEVEL — No. 151
Cast and Machined, a Beautiful Tool, with Patented, Removable Level and Vial.
With 2 Plumb, 2 Levels, 2 — 45° Vials. 18"\$5.00
24"\$5.50 28"\$6.25

Order EMPIRE LEVELS from your local dealer.
Write direct for literature.

EMPIRE LEVEL MFG. CO.
707 S. 6th St. Milwaukee 4, Wis.

BUILDING CONSTRUCTION



with cement composition and cheap wood builds 3 room house low as \$250. Farm building low as \$30. Homemade forms make blocks, panels and tiles in color, and wallboard of sawdust and other compositions. Wall-high blocks, insulated, with finished sides. Stream-lined roof and walls. Cement gutters. Cabins, stores, sectional, Troweled roofs and floors. Tea formulas. 100 money and labor saving ideas. Mixer and buzz saw easily made from an old auto. Make doors and windows, 50 proved ways to earn \$10.00 \$15.00 a day. Guaranteed. Illustrated book, \$1.00. **MAKE FURNITURE OF COMPOSITION** cement, sawdust, paper, asbestos. Homemade cement. Some part scrap wood, and metal make tables, cabinets, chests, racks, shelves, inclosed sinks, lawn novelties and toys. Over 500% profit. 50c. **HOW TO MAKE ACCURATE SHOP MACHINES**, saws, drills, forge lathes, tools, electric weed cutters and many other things from old auto parts and washing machine motors. Illustrated, 50c. **HOME MFG. ENTERPRISES**, 50 selected home shop projects, 50c. Special: All four booklets described above, \$2.00 postpaid, No C.O.D. **HOME INDUSTRIES**, 1318 So. 30th Ave., Dept. P5, Omaha 5, Nebr.

YOUR ELECTRIC DRILL

Has 100 Other Uses

when used with K-Jax 1-2-3 Line

1. for Wood and Metal Sawing.
2. for Metal Shearing.
3. for Riveting-Chiseling and Drilling holes in concrete.

Write for illustrated circular #5

K-JAX, P.O. BOX 3044, OALLAS, TEXAS

WATCHES WANTED

BROKEN OR USABLE

—all kinds, even Ingersolls. Highest prices paid for jewelry, rings, spectacles, gold teeth, etc. Cash mailed promptly. Write for Free Shipping Container.

Low's, Holland Bldg., Dept. P5, St. Louis 1, Mo.

If They'll Bite You Can CATCH 'EM With The FISHING GADGET Sets Hook Automatically



The greatest fishing invention since the fishhook! Automatically sets the hook on fish that bite. First days results in dozens. Lifetime use. Will last for years. Made of

non-corrosive metal. Use on any line... for any kind of fishing. See your dealer or send coupon and \$1 bill for your Fishin' Gadget

Now! Money Back Guarantee

Send Coupon and \$1 Bill Sent Postpaid Get Yours Now!

GRAHAM-CAMPBELL CO.
1409 Walnut St.
Kansas City 6, Mo.

Here is a \$1 Bill. Send me a Fishin' Gadget quick!

NAME.....
STREET.....
TOWN.....STATE.....

BANDSANDER

NEW TOOL READY!

Precision Ball Bearings

WAR INDUSTRY'S MOST VERSATILE MACHINE

Is Now Available TO HOME SHOPS

The Mead Bandsander



Signs & Display



Model Building



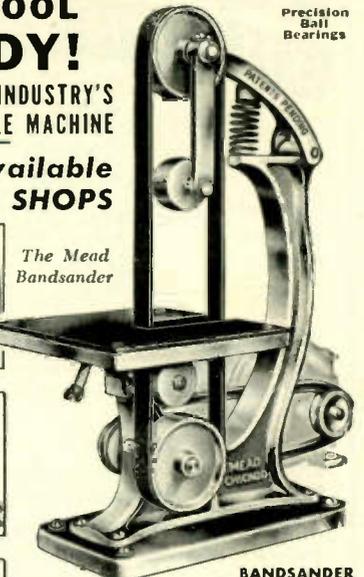
Plastics, Novelties



Ornaments



Pattern Shops



BANDSANDER

Cuts Fast, Clean—Saves Filing and Sanding Work!

- SHAPES • PROFILES • SMOOTHS
BEVELS • GRINDS • POLISHES
SANDS • CARVES • CLEANS

Let the versatile war plant production-proved Mead Bandsander save you sweat and time on hand-filing and sanding jobs—on wood, metal, plastic! A godsend to home craftsmen, hobbyists, model-makers, pattern-makers, industrial shops. Handier than a grinding tool for sharpening drills, chisels, tool bits, garden tools. This all-around utility tool works equally well on irregular outside surfaces or inside cut-out openings. Gets into places no others can. For example, to work inside a cut-out opening, simply lead band through hole in work and in front of idler pulleys. You can work to the center of pieces up to 17" wide! Table tilts back or forward for bevelling or chamfering edges of any contour. Table top is rust-and-sweat proof. Bandsander operates on 1/4 h.p. motor at 1700-2200 r.p.m. Abrasive band surface passes work at 1600 feet per minute cutting fast, cool, clean. Narrow bands may be used for intricate patterns.

Rush Coupon for FREE Circular

Send no money—simply mail coupon for Free, lavishly illustrated Bandsander Circular. Read about "the machine that amazed the experts." Surprisingly low cost. Sold on 5 Days' "No Risk Money Back" Trial. Ideal to give or get.

MEAD SPECIALTIES CO.

4114 North Knox Avenue
Dept. 26 Chicago 41, Illinois

MEAD SPECIALTIES COMPANY,
4114 North Knox Avenue, Dept. 26,
Chicago 41, Illinois.

Gentlemen: Without cost or obligation, send me your lavishly illustrated Circular on Mead Bandsander—the tool that takes the work out of home workshops!

NAME.....
ST. & NO.....
CITY.....STATE.....

World's Smallest!
VITAMITE Wet-Cell



TOPS FOR WORKING MODELS!

WEIGHS ONLY 1 OUNCE!

VITAMITE wet-cells for model airplane, boat and other miniature motors. Big-battery engineering, only 2 1/4 inches high! Check these other features of this wonder-battery:

- SIZE!** Half the size of any other wet-cell!
- WEIGHT!** Half the weight of any other wet-cell!
- POWER!** 2.2 volts, equal to larger batteries!

LEAK-PROOF CASE! NON-SPILL CAP!

Ask for guaranteed **VITAMITE wet-cells** at hobby shops everywhere! **\$2.35**

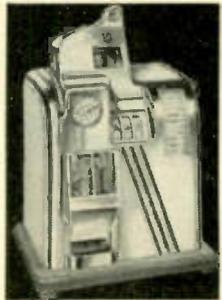
CONTINENTAL PRODUCTS CO.
227 West 64th St. • New York 23, N. Y.



Save 1/2
MAKE YOUR SPARE TIME PAY!

Assemble These Beautiful Home Furnishings Yourself NO TOOLS... NO WORKSHOP NEEDED!
Your spare time is worth money! Make these smart, modern furnishings for your home... or as luxurious gifts for your friends! Styled by Paul Hudson Stanley, nationally known designer, these ultra-new accessories combine the natural beauty of clear-grained Harvest Oak and the trim lines of sparkling Lucite!
IT'S EASY AND IT'S FUN!
A tabletop Hobby! Each beautiful accessory comes in complete Kit form. All parts and materials of selected woods and gleaming Lucite are accurately pre-cut and ready for assembly. Nothing to cut, carve or shape... **NOTHING ELSE TO BUY!** Step-by-step instructions guarantee easy assembly, beautiful results!
HERE'S HOW YOU SAVE ONE-HALF!
Leading stores now feature identical items at assembled retail prices exactly **DOUBLE** your cost for complete Hobby Kits! You **SAVE ONE-HALF**... make your spare time **PAY** by building these articles with your own hands! For Pleasure and Profit... write today for free details of this enjoyable new Hobby!
MECRAFTERS GUILD Dept. F-6
360 N. MICHIGAN AVENUE • CHICAGO 1

CRYSTAL CLEAR LUCITE AND GOLDEN GRAIN HARVEST OAK



"JACKPOT"
Home Model COIN MACHINE

Great fun-maker for recreation room or club. Soon pays for itself. Fully automatic payout, three reels, with all the usual winning combinations... cherries, lemons, plums, etc. Double jackpot. Set for 60% payout to the player, 40% profit for the house. Guaranteed to satisfy or money back. Rugged lifetime construction. Ht. 18 1/2 in. Takes space only 14 1/4 x 11 1/2 in. **CHOICE OF 1c, 5c, 10c, or 25c PLAY.** Shpg. wt. 47 lbs. Send \$50.00 deposit, balance C.O.D. Express F.O.B. Chicago.
Immediate delivery... Each, \$198.00

Webb DISTRIBUTING COMPANY
6 SOUTH KEDZIE AVENUE - CHICAGO 12, ILLINOIS

NEW CHEAP OIL BURNER
FOR COOKING & HEATING STOVES-FURNACES
HEAT YOUR HOME. COOK YOUR MEALS WITH CHEAP FURNACE OIL
NO MORE SHOVELING COAL OR ASHES. New Fuelizer Starter Vaporizing System turns Cheap 130 Flash Furnace Oil into Oil Gas heat without clogging up. **LIFE-TIME GUARANTEE** against defects. **\$1.00-BONUS OFFER FOR TESTING.** We will let you try it in your own stove or furnace for one month. Get Yours for introducing. Big profits. Be first. Send in your name today.
NORTHWEST MFG. CO., 562-G 5th Ave., Mitchell, So. Dak.

1 New - Improved OIL FOR ALL ---
HOUSEHOLD-SPORTSMAN-MECHANIC
Lubricates - Prevents Rust - Cleans Metal
3 oz. 40c
FIENDOIL

REPAIR CRACKED BLOCKS AND HEADS-
External and internal leaks in blocks, cylinders and valve ports quickly and easily with **LUSCO PLASTIC SEAL.**
90 day Service Guaranteed or your money back. Send money order or check for full pint—more than **\$3.00** sufficient for average repair... Postpaid
C. F. LUSK CO., 4620 EUCLID AVE., CLEVELAND 3, OHIO

JACKASS CIGARETTE DISPENSER



Something New!
1000 LAUGHS
NOVELTY SENSATION
Lots of fun for you and your friends. By pressing the head downward the Jackass will extend a cigarette for your guests. Movable head and tail, design shows Mexican wearing large hat and shawl sitting on the Jackass. Silk screen picture. Four flashy colors bring out every detail. A swell gift for anyone. Order now. Be the first to own one. Send cash or money order when ordering; you save postage and C.O.D. fee. Sent C.O.D. plus charge. **PRICE \$2.00.**
SPECIAL OFFER TWO FOR \$3.50
\$16.80 a doz. Special price in larger quantities.
SPECIAL CIGARETTE LIGHTER, \$1.00
Only One Sold With Each **"JACKASS CIGARETTE DISPENSER"**
FARLEY SINEATH
Manufacturing Novelties
800 Eighth Avenue, Department New York 19, N. Y.

**V-8
DUALS
& SINGLES**



**A GENUINE PACKED
MUFFLER
WITH A BEAUTIFUL
DEEP TONE...**

Reduces back pressure
and increases engine performance
Sandee time proven dependable mufflers

are available in sturdy steel or durable aluminum. Savings in gasoline will usually pay for one of these new mufflers.

Ford V-8 and **1750** Aluminum \$20.00
Mercury Duals

Singles fit in place of regular mufflers.
Chevrolet, V-8, Plymouth to '42—Steel \$5.50, Aluminum \$6.50. Chrysler, Oldsmobile, Buick, etc.—Steel \$7.50, Aluminum \$8.50. Sandee steel mufflers will outlast two regular stack replacements. Sandee "Aluminums" are guaranteed for the life of the car.

SANDEE MUFFLER CO.
7523 S. WESTERN AVE., LOS ANGELES 44, CALIF.

**Don't Buy Apparatus -
BUY GOOD HEARING!**

Investigate the "ATOMEER", believed the world's smallest and lightest single-unit hearing instrument — Full Power—5 1/2 Octave range—no separate battery pack—Audiometrically Fitted. Write today for information.

THE MAICO COMPANY, INC.
Dept. 706 Maico Building Minneapolis 1, Minn.

Low Price The OTTAWA "Buzz" Master

CLEARs LAND FAST! Powerful 6-HP motor with friction clutch for safe operation. Cuts down timber, brush and hedge; turn blade vertical; saw logs to length. Can be equipped to fell largest trees. Has clutch pulley for belt work; guaranteed.

FREE Details

OTTAWA MFG. COMPANY, 601 Brush Ave., Ottawa, Kans.

SILVER SOLDER KITS!
For Silver Soldering ALL METALS

TUBE-O-FLUX

SOMETHING NEW. For Electricians, Jewelers, dentists, garages, field service repair men, plumbers, farmers, refrigerator, and all types of brazing and fix-it-shops. **\$2.00** POST-PAID

KIT INCLUDES
One 3 oz. Tube XCEL-FLUX "88" Silver Solder Paste. Twenty 5-inch lengths (total 100 inches) of SILFOS and EASY-FLO Silver Brazing Alloy—1/8" - 1/16" and 1/32" wires, and one EASY-FLO .005" x 1" strip. TRIAL SIZE with 45 in. Silver Solder Wire \$1.00.

PREST-O-LITE 4-in-1 TORCH OUTFITS
For very fine to heavy Brazing & Silver Soldering, complete with carrying case \$6.50. Type MC gas tanks, 10 cu. ft. \$6.50, Type B, 40 cu. ft. \$12.50. Prices F.O.B. shipping point. Cash with order.

AMERICAN PRODUCTS CORP., 807 Lowell Bldg., Chicago 5, Ill.

Quilted ASBESTOS MITTS
... they last twice as long

These asbestos mitts for handling hot metal molds and shapes are reversible to fit either hand. Both sides quilted, won't shred or fray on rough, jagged material. Double wear, double life. Wool lined. All seams double stitched. The answer to troublesome problems. \$2.20 a pair. Discounts for quantities. One of 4300 production-speeding, time-saving safety gloves, aprons, sleeves, spats, etc. Write for Free catalog.

INDUSTRIAL GLOVES CO.
6547 Garfield Blvd., Danville, Ill.
(In Canada: Safety Supply Co., Toronto)

STEEL GRIP



**Magnificent Natural Color
Wesco KODACHROME SLIDES**

HOW the baby volcano has grown! Three years ago Paracutin wasn't any bigger than a molehill. Wesco slide No. 184 shows the active youngster in full color. It's one of the marvelous photographic transparencies in an outstanding series of Wesco collector's items, which has caught for your lasting enjoyment the true spirit as well as the breathtaking beauty of Mexico. The series is part of Wesco's incomparable "odd-o-slide" Kodachrome library.

OVER 200 subjects to choose from, packed in individual envelopes with detailed captions. **50¢** ea.

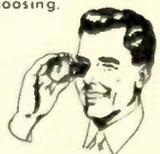


Also SETS of 12

Realistic beyond comparison are Wesco slide views of western lakes, mountains, deserts and missions... authentic and beautiful reproductions of Mexico, Guatemala, Hawaii and Alaska, by such famous photographers as Mike Roberts, Micki Carter and Father Hubbard. They can be obtained at 50¢ each; or in sets of 12, in self-viewing panels complete with captions. **\$5.85**

A Complete START for \$4.95

In case you are not already a devotee of this fascinating hobby, ask your dealer to show you Wesco's "starter set," consisting of a third-dimensional-effect viewer and six slides of your own choosing. You will find the brilliance and keen detail of Wesco slides in no way diminished by being enlarged twenty to thirty times in projection.



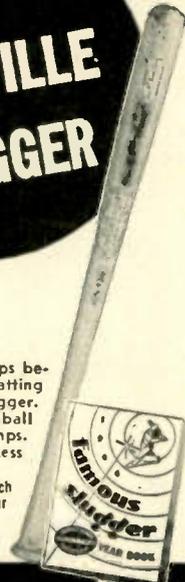
Every Wesco Slide a Photographic Gem
Send for a complete list of Wesco subjects, with illustrations—yours FREE for the asking.

Wesco PHOTOGRAPHIC GEMS

**Western Movie Supply Co.,
28 Geary Street, Suite E,
San Francisco 8.**

**KODACHROME SLIDES
AND VIEWER SETS**

Slug your way to the TOP
with a... **LOUISVILLE SLUGGER**



By following the example of the champs before them, Baseball's "greats" in batting got that way with a Louisville Slugger. To make the most of YOUR baseball chances, follow the lead of the champs. It's safe to stake your batting success on a Louisville Slugger!

Ask your dealer or send \$6 to Dept. Z-34, Hillerich & Bradys Co., Inc., Louisville 2, Ky., for your copy of The 1946 Famous Slugger Yearbook.

LOUISVILLE SLUGGER
HILLERICH-BRADSBY CO.
LOUISVILLE, KY.

Louisville SLUGGER BATS
FOR BASEBALL & SOFTBALL

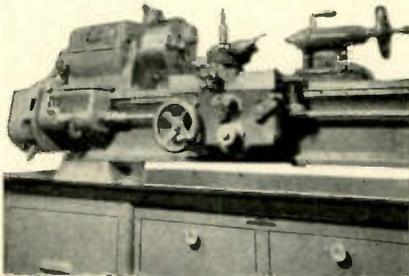
WHITTAKER'S KIT
10 assorted soft white pine blanks—ready to whittle to the finished products. Also included an X-ACTO MODELING KNIFE with complete instructions. EASY-FUN! Complete kit send prepaid for \$2.00. Write now to

OLD WHITTAKER, Dept. PS-5, 1402 Charles St., LaCrosse, Wisconsin

There's no substitute for capacity

Whether your shop is a hobby or a business, there are times when you need real industrial capacity in your lathes. The SHELTON S-56 Precision Lathe will give you tool room accuracy, small lathe convenience and big lathe capacity—11 1/4" swing, large 1 3/4" hole thru spindle (1" collet capacity, 56" bed (35" between centers) and a 4-speed (8 spindle speeds) underneath motor drive mounted on a 5-drawer steel bench, as illustrated.

Also supplied as a bench model (without bench) with 3-speed (6 spindle speed) overhead motor drive (Model 1136-BMWQ)



SHELDON MACHINE CO. Inc.
4268 N. KNOX AVE. CHICAGO 41

268 POPULAR SCIENCE

Attention!

CALLING ALL MODEL PLANE COLLECTORS and HOBBYISTS! NOW AVAILABLE!!
The Only Collection of Its Kind In the World

Distinctive miniatures are 100% molded plastic 1/72nd scale model airplanes, cast from the same dies that produced the OFFICIAL recognition models used by the Armed Forces in vital identification programs carried on throughout the WAR.



B-26 Marauder
B-26 MARAUDER—\$4. Martin twin engine medium bomber typical of this low cost wonderful collection. Others from \$1.50 to \$9.

It's a fact you cannot buy a put-together solid model of near equal quality or preciseness at anywhere near the remarkable low cost of Superior Craft Model. Now is the time to get them while stock is on hand and collection complete. All models compactly packed and shipped plus postage anywhere. Send 25c in coin for illustrated brochure listing all models. The 25c will be deducted from your first order. WRITE NOW, right now! Find out how to obtain your copy of Encyclopedia of Aviation—FREE.

SUPERIOR CRAFT COMPANY Dept. S-2, 60 E. 42 Street Suite 558, New York 17, N.Y.

HOW TO CUT RAFTERS

New vest pocket book gives lengths, side cuts, plumb cuts, deductions. For all rafters for any building from one inch to forty feet wide. Gives numbers to cut on square. Also degrees for same cuts for Radial Saws. All standard pitches from 1/4 to 5/8. Just open book to pitch page and there are your lengths, side cuts, etc. Anyone who knows what a rafter is can frame a roof if he has this great book. Price one dollar prepaid. BUILDERS' TOPICS, Dept. 5, Med. Arts Bldg., Seattle 1, Wash. Original teachers of the course in five easy lessons by mail. Send for FREE list of plan books—Kamp Kabin to Mansions.

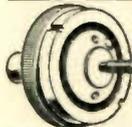
THE GEM MAKER

Amateurs or professionals... hobbyists or jewelers... Polish your own gems with a B&I Gem Maker. You will find this a profitable adventure. All necessary lapidary equipment is furnished, including a super-charged diamond blade for sawing, and all wheels for grinding, shaping and polishing, also complete instructions. The complete equipment as shown, less motor and belt, for only \$29.50. C.O.B., Burlington, Wis. Write today for information and literature on the Gem Maker and accessories. B&I MFG. CO., Dept. M, Burlington, Wis.



STOP CUSSIN'
use **2-WAY**
SPECIAL INSECT REPELLENT

Mash & Kinsella Labs., Inc. • St. Louis, Mo.

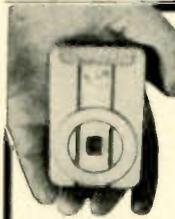


"WONDER"
ELECTRIC BUTTON

Most interesting electrical apparatus ever discovered. Make your own Telephone-Amplifier-De-telephone. Transmit your voice or music to distant rooms. Perform hundreds of fascinating experiments. So tiny it can be concealed in dozens of places. Send \$1 now for button and free 6,000 word instruction booklet with 80 illustrated experiments. SPECIAL OFFER 6 buttons and booklets sent post-paid for \$5. Write now to
BUCK MFG. COMPANY North Aurora, Illinois

NEW TINY POCKET SIZE RADIO!

Slips in your pocket or purse—Wt. only 3 ozs! Complete READY TO PLAY as shown with self contained phone for personal use. Smooth durable black and silver plastic case. Has patented fixed Crystal-Slide Tuning Dial NO TUBES, BATTERIES, OR ELECTRIC PLUG IN REQUIRED—Little up-keep cost—Should last for years—USUALLY RECEIVES LOCAL BROADCASTS without outside aerial wires.

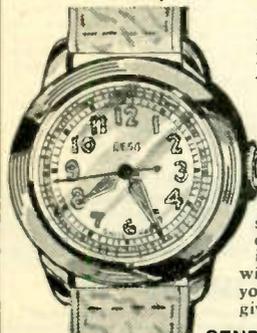


GUARANTEED TO WORK when connected and used according to instructions sent with each radio. Can be used in homes, offices, hotels, cabins, in bed after hours, etc.

Send Only \$100 (cash, money order, check) and pay postman \$2.00 for postpaid delivery. IDEAL GIFT FOR CHILDREN OR ADULTS! ALIKE! NEWEST PRACTICAL NOVELTY! Get your PA-KETTE RADIO NOW for real enjoyment. Order today—NOW! Dealers in most cities.
PA-KETTE ELECTRIC CORPORATION Dept. PS-6 Kearney, Nebraska

LOOK! SERVICEMEN—CIVILIANS TOO!
PRECISION BUILT MILITARY WRIST WATCH

Sweep Second! Radium Dial!



Swiss Movement
 Precision Made by
 Expert Swiss Craftsmen

**SUPPLY LIMITED—
 RUSH YOUR ORDER**

A fortunate purchase makes this amazing offer possible. Latest military styling, red sweep second hand, and radium dial—easy to tell time in the dark. Comes complete with leather strap. A watch you'll be proud to wear or give as a gift.

ONLY \$8.50
 plus 10%
 Fed. Tax

SEND NO MONEY—PAY POST-MAN \$8.50 plus 85c Fed. Tax and COD charges, or, send \$9.35 with order and we pay postage. Return within 5 days if not delighted.

Hurry—Order Now—Supply Limited!

AMERICAN MERCHANDISING CO., Dept. PS-W
 12 Adams Ave. Montgomery, Alabama

Arc Welded Design "Know-How"

Only \$3.50 each Each volume contains over
 3 different volumes 100 welding designs. Write
 \$10.00 postpaid Hobart Bros. Co. Box P-561, Troy, O.

FREE RADIO CATALOG

Latest radio and electronic parts and devices, newest ham gear, gadgets, war surplus items. All in this new FREE catalog. Don't delay,

BURSTEIN-APPLEBEE CO.
 1014S McGee, Kansas City 6, Mo.

BLOWERS COOLING HEATING

Cooler supplies. Pads—pad frames. Cooler Pumps. Fan Blades. Gas & Oil conversion burners. Forced air furnaces. Wanted Men to sell and install our conversion burners and furnaces.
 PEERLESS SALES 4218 Sheridan Blvd. LINCOLN 6, NEBR.

PROVES WONDERFUL

to promptly relieve misery
 and kill cause* of

ATHLETE'S FOOT

Helps
 Guard
 Against
 Re-Infection!



Here's a product that *really* does what it claims. It's a Doctor's wonderfully soothing yet powerfully medicated liquid called Zemo. First applications relieve itching and burning between cracked, peeling toes and aid healing. Zemo actually kills on contact the vicious germs* that cause and spread this trouble. That's why Zemo has such an amazing record of *continuous* success. First trial convinces. All drugstores.

ZEMO

OTTAWA TRACTOR SAW



FREE BOOK
 and
 Price List

350 CUTS PER MINUTE

Make money sawing wood. Use Ottawa—fastest cutting. Cuts large, small logs easiest way. Falls trees. One man operates. Thousands in use. Built to last with heavy, stiff saw blade. Positive safety clutch control; uses power take-off any tractor.
OTTAWA MFG. CO., D601 Forest Ave., Ottawa, Kan.

MOTO-TOOL ★ THE "POCKET-SIZE" MACHINE SHOP

PUT THIS "WAR VETERAN" TO WORK



MOTO-TOOL KIT
 Kit, No. 2 with 23 high grade accessories and Model 2 Moto-Tool in hardwood case \$23.50 Model 2 Moto-Tool, with 1 accessory \$16.50

Tough grinding and polishing jobs in tool rooms and machine shops fade away under the speed and versatility of Dremel Moto-Tools. Thousands of Moto-Tools helped establish production records in plants such as General Electric, Westinghouse, Remington Arms, Ford, Nash-Kelvinator, Consolidated Aircraft, Northrup, and Douglas. Others earned the respect of the armed forces in far flung repair depots.

Only Moto-Tools Have All These Features

A Model 2 Moto-Tool develops a speed of approximately 27,000 rpm. Weighs only 13 oz. Shaped to fit the hand. Sturdily built. Has shock-proof bakelite housing. Balanced for vibrationless operation. Uses 110-120 A.C. or D.C. current. Patented automatic chuck lock pin makes removal of accessories easy. Pin disengages automatically, prevents accidental burning out of motor.

Money-Back Guarantee
 Ask your Dealer about Dremel Moto-Tools and accessories. If he does not handle them, send direct to factory. We send prepaid if cash in full accompanies order. \$2.00 brings Moto-Tool C.O.D. for balance, plus postage. Write today for FREE CATALOG.

MOTO-SAW COMING
 Dremel Moto-Saw . . . the sensational electric scroll saw . . . will be back as soon as materials are available.

- Sharpening
- Finishing
- Touching Up
- Sanding
- Grinding
- Mortising
- Engraving
- Burring
- Grinding



A Few of the Jobs That Can Be Done Better and Faster with a Moto-Tool

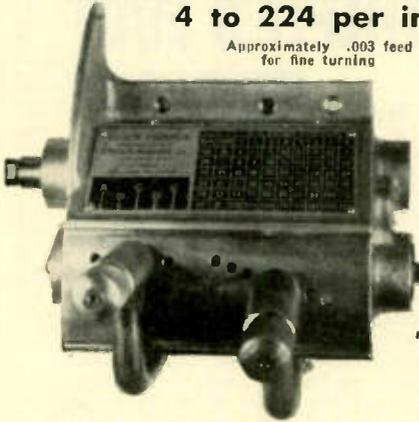
- Cleaning
- Routing
- Cutting
- Rasping
- Carving
- Brushing
- Dressing

DREMEL MFG. CO. Dept. 126-F Racine, Wisconsin

Quick Change Gear Box for Atlas, Logan, Craftsman and Power-Kraft Lathes

Cut threads from
4 to 224 per inch

Approximately .003 feed
for fine turning



Only
\$7500

F.O.B.
Chicago

Sold on
money-back
guarantee
if not
satisfied.

This gear box is constructed of all-steel gears in aluminum casting with bronze bearings throughout. New reverse switch furnished with Gear Box for Atlas Lathe. Easy to install. Full instructions with shipment. Speedy production; maintained accuracy. Easy to set. Prompt delivery. Write Today!

THE O'BRIEN MACHINE CO.

Dept. PS-6 1620 Highland Ave. Chicago 26, Ill.

NOW AVAILABLE

PLASTICS

CATALOG and HANDBOOK

FUN AND PROFIT AHEAD

Plastics, colorful and glamorous materials of the future, offer you a fascinating hobby — or a profitable plastics fabricating business of your own.

CATALOG LISTS NEW MATERIALS
Ready now, the new 40-page Carmen-Branson CATALOG gives you complete prices and data on all materials you need. Plexiglas, Lucite, Bakelite, Lumarith, Lignallite, Tenite etc. in sheets, rods, tubes and special forms—crystal-clear and in many rich, glowing colors. Catalog also lists numerous cements, dyes, compounds, accessories, supplies and semi-fabricated kits.

HANDBOOK GIVES INSTRUCTIONS
The new Carmen-Branson PLASTICS HANDBOOK tells how to fabricate plastics easily and simply into beautiful objects for gift or sale. Contains construction plans for many simple and advanced projects. Profusely illustrated. Gives practical advice on how to start your business in this profitable field.

10¢ BRINGS BOTH BOOKS

Take the first step TODAY toward your brilliant future in plastics. Send only 10 cents NOW for your copies of the Carmen-Branson CATALOG and Carmen-Branson PLASTICS HANDBOOK.

CARMEN-BRANSON COMPANY
165 East 3rd Street, Dept. 6-A Mount Vernon, N. Y.

10¢
BRINGS
BOTH
BOOKS



5 lbs. HANDY ASSORTMENT \$1.98

For Mechanics — Garages
— Workshops — Home Use

SCREWS • NUTS • BOLTS • WASHERS
RIVETS • SPRINGS • BRACKETS • MISC.
MORE THAN 1,000 PIECES—5 full pounds—a veritable



treasure chest of fastening devices for every practical use. Satisfaction guaranteed. Order now \$1.98

SPECIAL—2 assortments, over 2,000 pieces, for \$3.69

Get on our **FREE** Bargain Mailing List—Many other valuable assortments to meet every need!

Hudson Trading Corporation
JN 1519 N. Wells St.
Chicago 10, Ill.



TELESCOPING MEASURING TOOLS

Measure All Holes, Slots, Etc.—5/16 Inch to 6 Inches . . .
Gives You Outside Micrometer Accuracy on Inside Measurements
FINISH YOUR OWN SET OF FOUR TOOLS



Only **\$2.95** C.O.D.

Plus Usual Small Postal Charge
PART OF THE MACHINE WORK ALREADY DONE—ONLY SIMPLE LATHE WORK NECESSARY TO COMPLETE. No special tools required—Threading, Knurling, etc., already done. Kit includes all material (not machined); simple drawings, and detailed instructions. Send \$2.95 cash with order and we pay postage.
ALCO SHOPS, Dept. O, Box 2214, Terminal Annex, Los Angeles 54, Calif.

NEW! Ideal Gift for Your Service Man!

Heavy 10K Solid Gold Souvenir Service Ring of World War II. A beautiful and authentic ring that your service man will be proud to wear and cherish forever. It plainly shows that he is a Veteran of our Armed Forces of World War II. Available in all sizes. We pay postage and Fed. Tax. No. 1214 Sterling Silver . . . \$6.00
10K Solid Gold . . . 18.00
Send for Circular of Service Jewelry.



EDWIN W. LANE CO., Dept. PS, 32 W. Randolph St., Chicago 1,

Make Your Own RUBBER MOLDS

with
RED LATEX MOLDING COMPOUND
Earn money, have fun; make your own molds for plater objects. Produce novelties and gifts for home and to sell to friends. **RED LATEX MOLDING COMPOUND** (60% density) now available in quart and gallon quantities. Gives perfect results, easy to apply. Send for complete information and prices. **OHIO SUPPLY CO., Dept. G3, 474 Lilly Ave., Columbus 5, Ohio.**

TUBULAR AXLES for TRAILERS, FARM WAGONS, TRUCKS and UTILITY

2,000 lb. capacity—58" track. Adaptable to Ford, Chev., Ply., and wheel hubs using Timken, Bower BT, New Departure or Tyson bearings No. 09074 and 15118. (Spring seats included) Send Check or Money Order. Other Types Quoted On Request. Immediate Delivery —Forged Steel Coupler Balls.
SPARTAN INDUSTRIES 8213 McDougall Detroit 11, Michigan

SPECIAL
\$745
F.O.B.
DETROIT

ANYONE CAN DO THIS IF THEY HAVE OUR CHART

Blue print 27 x 36" now printed on both sides showing squares full size. Shows how to find the length of any rafter, find any angle, in degrees, frame any polygon three to sixteen sides, read the board foot and brace-table, octagon scale, rafter tables, many other uses, can be scaled down for model work as well as full scale framing. Also chart changing pitches to degrees. For use with radial saws. About 13 square feet of printed copy sent post paid for \$1.00. No checks or stamps. **MASON ENGINEERING SERVICE, 2032 N. Burdick St., Dept. 6, Kalamazoo 81, Mich.**

SPECIAL
OFFER
FOR
AGENTS

SIGNS EASILY AND EXPERTLY PAINTED WITH LETTER PATTERNS AND SHOWCARDS

MANY SIZES & STYLES WRITE FOR FOLDER!
JOHN F. RAHN 1330-33 N. CENTRAL AVE. CHICAGO 51, ILL.

POWERlite

6-VOLT 2-LITE
ELECTRIC LANTERN

Millions now in use. 2-Lites: spotlight plus floodlight. Runs 80 to 100 hours on one battery. Rugged. Lenses don't break. At Hdwe., sport, electric dealers.

\$3.65
LESS
BATTERY



Delta

DELTA ELECTRIC CO.
MARION, INDIANA

Precision-Machined solid aluminum
CIGARETTE LIGHTER
Lightweight—beautiful design—
perfect workmanship—made to last.
\$1.39 Postage Extra
Sent C.O.D.—postage add'l. Money refunded if
not satisfied. Send check or money-order to:
Prisco Lighter Company, 132 Wyckoff Avenue, Brooklyn 27, N. Y.

TOY PISTOL **\$1.49** each
Beautiful TEXAS REPEATER. 10 1/4" length, polished nickel with ivory handle, engraved stock and barrel, revolving cylinder automatic opening device—just the thing for a real July 4th celebration—ORDER NOW—supply limited—money refunded if not completely satisfied.
Pistol only \$1.49
Pistol & eleven packs roll caps (2750 shots) \$2.50
EXTRA CAPS ONE PACK (250 shots) .20
C. C. GROFF FOR FIREWORKS
116 N. BROAD ST., LANCASTER, PA.

Here's a New **POWER CUTTER KIT**
with a cutting range of 5/8" to 2 1/2"

Two Bruno Adjustable Hole Cutters in one convenient kit for home users, mechanics, farmers, technicians! High speed steel blade cuts clean, fast holes in metal, wood, plastics. Quickly adjustable and easily sharpened. For drill press, portable drill or hand brace. Money back guarantee!

Only **\$7.85** Complete

MODEL	SHANK SIZE	EXPANSION	PRICE
100	1/4" st. shank	5/8"—1 1/2"	\$3.00
101	3/8" st. shank	1"—2 1/2"	\$5.00
790 KIT		5/8"—2 1/2"	\$8.00*

*Full Trade Minimum \$7.85

At all hardware stores or write direct, Dept. PS-6

BRUNO TOOLS 9330 Santa Monica Blvd. Beverly Hills, Calif.

HANDY KIT of TOOLS in ONE TOOL!

- Adjustable End Wrench
- Lock-on Wrench
- Pipe Wrench
- Gripping Tool
- Pliers
- Hand Vise
- Clamp

For home, car, shop garage, farm

BMC **PRESSURE LOCK WRENCH**

GIVE YOURSELF THIS FATHER'S DAY GIFT . . .

Fits as it Grips . . . and it HOLDS!

At last — a wrench, pliers, vise and clamp all in one tool. Gives a tight, slip-free grip — without fussy adjustment — on any shape piece that you can get hold of . . . nuts, studs, pipe, short, broken or irregular pieces. More than a ton gripping power . . . applied and locked with one hand, and released with the flick of a finger. Stays locked until you release it. Serves as a vise or clamp . . . or as a toggle press for gluing, welding, straightening, etc.

JAWS ALWAYS PARALLEL

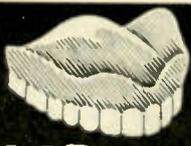
BMC Pressure Lock Wrench will take a locking grip on any size piece up to 1" — with the jaws always parallel. That exclusive, patented feature prevents rounding of nuts . . . assures even pressure and a firm grip when used as a vise or clamp. Ideal for the tool kit of your car.

On sale at leading hardware, auto equipment and mill supply stores. Three sizes:

- No. 7 - Max. jaw opening 3/4" - \$2.75
- No. 9 - Max. jaw opening 1" - \$3.50
- No. 11 - Max. jaw opening 1 1/2" - coming soon

BMC MANUFACTURING CORP.
BINGHAMTON, N. Y.

IF FALSE TEETH SLIP OR DROP



USE **REFIT MAGIC** **PLASTI-LINER**

MAKES ALL PLATES FIT PERFECTLY OR PERMANENTLY BACK MONEY

ONE APPLICATION LASTS FOR LIFE OF PLATE

PLASTI-LINER is a professionally developed reliner for home use that ends forever the mess and bother of temporary applications that last for only a few hours or a few months. It is NOT a paste, nor a powder; but a strip of genuine dental plastic!

SAFE AND EASY TO USE

PLASTI-LINER is non-toxic, pure, non-irritating, harmless, odorless, tasteless, smooth, molds to mouth. No heat necessary. Just 3 easy steps.

"Excellent Results" say users

"I bought your product over a year ago. Have had no trouble with my plates since. I have told my friends and now all of us with false teeth use PLASTI-LINER. It really works." Mrs. E. S., Brooklyn, N. Y.

FREE! Our competent staff dentist will answer all your plate problems.

SEND NO MONEY — ORDER TODAY

PLASTI-LINER CO., Dept. 70
Walbridge Bldg., 43 Court St., Buffalo 2, N. Y.

Rush PLASTI-LINER with complete directions. I will pay Postman \$_____ plus postage charges. I may return package for refund if I am not satisfied.

\$1 for UPPER or LOWER \$2 for Both

Name _____

Address _____

City _____ Zone _____ State _____

You Save Postage by Enclosing Money

Say You Saw
It In Popular Science

AIR RIFLES BENJAMIN AIR PISTOLS
ARE IN PRODUCTION

ORDER BENJAMIN AIR RIFLES & BENJAMIN AIR PISTOLS from your DEALER. Send for our FREE FOLDER and Complete Specifications TODAY. Both Calibre Benjamin H-C Pellets are available now.

BENJAMIN AIR RIFLE CO., 811 MARION ST., ST. LOUIS 4, MO.

RADIO PHONES only \$9.95



Made to U. S. Army Specifications, passed by Signal Corps Inspectors. Dynamic Microphone and dynamic receiver of finest quality. Water, shock, weather and altitude proof, used on tank and aircraft (P110) intercom systems. For recording, for battery-less telephone. Talk through your radio set or use earphones for pocket-size set loud speaker. Complete two receiver, cord set, head band, and dynamic hand microphone including special connecting cord set. Less than regular cost of dynamic mic.

Postpaid \$9.95

King of ELECTRIC SWITCHES

Versatile Switch of a Thousand Uses



Millions in Post War Applications

Floodlights your porch when the door is opened—sounds alarm when window is opened—signals arrival of mail—controls heating of furnace—filling of water tank, these and many other services are performed by this versatile switch. Shipped with instruction sheet showing numerous illustrated uses for this device at the low price of \$1.00 postpaid.

KING PRODUCTS COMPANY BATAVIA 1, ILLINOIS

FREE!! 40 PAGE HOBBY CATALOG

Over 1000 items — Over 300 Photos

Our new 40 page catalog is the "bible" of wide-awake modelers. Hundreds of models to choose from! Planes, engines, boats, jeeps, tanks, gliders, supplies, etc. Send for yours today!

NEW "THOR" 1/6 H.P. GAS ENGINE . . . \$10.20 P.P.

AMERICA'S HOBBY CENTER, INC.

Dept. S66, 156 W. 22 St., N. Y. 11, N. Y.



MACHINE SHOP EQUIPMENT

Every man who owns a workshop should have a copy of this new, authentic catalog of Machine Shop Equipment . . . the latest tools made by the biggest manufacturers in the United States. Replete with illustrations, descriptions, prices. Prompt delivery on most tools listed in this catalog. Available at the cost of printing—50c a copy—Get yours today! Price of Catalog Refunded on First Order over \$5.00. Send check or Money Order to

CENTER TOOL CO.

152 Centre St., New York 13, N. Y.

PICNIC STOVE

and TRASH BURNER

Looks like tree stump—made of durable reinforced Haydite concrete colored in natural gray or brown—complete with grill, charcoal pan and grate. Beautifully your yard—satisfaction guaranteed. Use as trash burner—safe in wind—Will not harm grass, trees, etc. Only \$29.45—Freight prepaid east of Rockies. For free descriptive circular write to:



W. O. JOHNSON CO., Dept. PS-S, Omaha 6, Neb.

WANTED

1000 FOOT SUFFERERS

to test CUSTOM MADE RESEARCH FOOT BALANCERS at our risk. Amazing foot relief awaits you. Rush name and address for FREE Trial Offer and Foot Analysis Chart.

KINDSCHI FOOT APPLIANCE PRODUCTS
Dept. C1 321 W. Jefferson Dallas 8, Texas

RADIO PARTS GRAB BAG!!

\$25 value assortment of Coils, Condensers, Transformers, Resistors, Controls, etc. An experimenter's dream. Order today! Only

\$3.98

MARKO SUPPLY, Dept. P.S. 6
2924 Logan Blvd. Chicago 47, Ill.

Your Favorites are Returning — Watch for Them

BASS OUTDOOR FOOTWEAR



WEEJUNS FOR LEISURE-WEAR



QUAIL HUNTERS FOR FIELD & STREAM

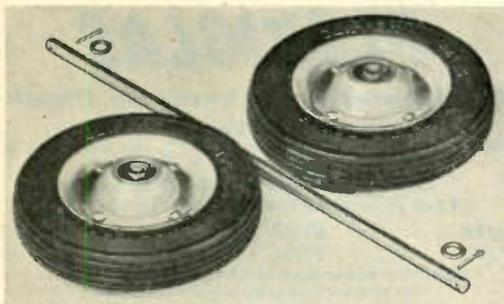


SPORTCASINS FIRST ON THE FAIRWAY



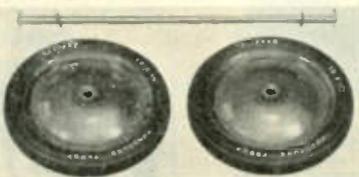
SKI BOOTS SMOOTH ON THE SLOPES

G. H. BASS & CO., 44 MAIN STREET, WILTON, MAINE

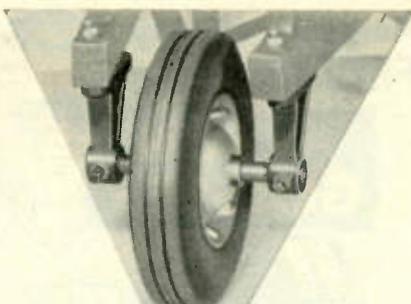


Wheel Kit No. W.K. 50 for Home Craftsman, 2 wheels, size 8 x 1.75 (cast aluminum) with $\frac{3}{8}$ " and $\frac{1}{2}$ " Oilite bearings or, $\frac{1}{2}$ " ball bearings, axle and fittings. Load test 125 lbs. per set. Price— **\$10.00**
F.O.B. Factory

Wheel Kit No. W.K. 75 for Home Craftsman, 2 wheels, size 10 x 1.75 (cast aluminum) with $\frac{3}{8}$ " and $\frac{1}{2}$ " Oilite bearings, or $\frac{1}{2}$ " ball bearings, axle and fittings. Load test, 125 lbs. per set. Price— **\$12.00**
F.O.B. Factory



Juvenile Coaster wagon wheels kits. Beautiful 16 gauge disc steel wheels, and WELLER Roller Bearings, with 10x1.375 semi-puncture proof tires, with two $\frac{3}{4}$ " axles and fittings. 100 lb. load test per set of four. Price—F.O.B. Factory..... **\$12.50**
Can also be had with Heavy Duty Tires. Test per set of four, 250 lbs. Price—F.O.B. Factory **\$14.50**



Wheelbarrow Wheel Kit No. WB 758 One 10 x 2.75 zero pressure tire (1- $\frac{3}{4}$ " face), with cast aluminum wheel, and two $\frac{3}{4}$ " ball bearings, $\frac{3}{4}$ " axle, wheel spacing collars, and mounting brackets. Satisfactory for industrial purposes. Tested for 500 lbs. Price — F.O.B. **\$14.50**
Factory

Kit No. WB 200 One 10 x 2.00 wheelbarrow wheel kit, same as Kit No. WB 758 except narrower tire (1- $\frac{1}{4}$ " face) and tested for 400 lbs. Price— **\$12.75**
F.O.B. Factory

All axles are standard 20" lengths, except wheelbarrow, which are 9" lengths. \$.50 charge will be made for each additional foot. Sold direct by manufacturer. ORDER TODAY. Cash, check or money order. \$1.00 deposit required on all C.O.D. orders (not refundable).

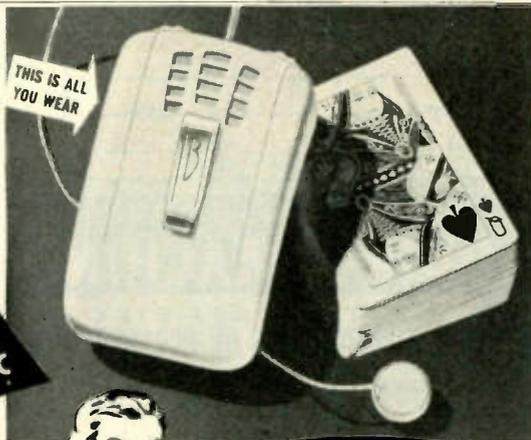
WELLER PRODUCTS INC., Dept. PS-6, 2307 N. 34th St., Milwaukee 10, Wis.

Again Beltone reduces size of AMAZINGLY IMPROVED ONE UNIT HEARING AID

NEW REVOLUTIONARY
Beltone
MONO-PAC

About $\frac{1}{3}$ size and weight of old-style Hearing Aids.

Amazing "X-Cell" outperforms units 5 times its size! All one unit—no cumbersome separate battery pack—no battery wire nuisance—no "harness." Comfort-Curv design—wafer-thin case! Increased power gives better hearing under all conditions. Range Selector to filter out annoying background noises. Ever-level full tones bring back clear, lifelike hearing. Find out WHY there are more Beltone one-unit Hearing Aids in use than all others combined.



**SO TINY! SO LIGHT!
YET EVERYTHING SOUNDS
CLEARER-TRUER**

BELTONE HEARING AID CO., 1450 W. 19th St., Chicago 8, Ill.

**MAIL
COUPON
NOW
FREE
BOOKLET**

BELTONE HEARING AID CO., Dept. PS-6
1450 W. 19th St., Chicago 8, Ill.
Gentlemen: Please send me FREE Beltone
Hearing Aid booklet. No obligation.

Name _____
Address _____
Town _____ State _____

JUNE
1946 273

Amazing 10-Day FREE Trial Offer

**AIR
CORPS
TYPE
SUN
GLASSES**



\$6.98

**Sells
EVERYWHERE
UP TO \$18!**

Never before an offer like this! Genuine 12 Karat Gold-filled AIR CORPS type SUN GOGGLES—complete with ray-absorbent, "No Glare" lenses, ground and polished before curving; Pearlloid SWEAT BAR and nose pads—crush-proof case included.

10-DAY FREE TRIAL

Send no money, pay no money until satisfied. Mail coupon; sun goggles will be mailed postage paid. Wear them 10 days—if they're just what you've wanted, send us \$6.98—otherwise return glasses. You don't risk one cent. But order today, supply is limited.

PAY NOTHING UNTIL SATISFIED!

**MIDWEST SCIENTIFIC CO., Dept. FT-200
1148-1160 W. Chicago Ave., Chicago 22, Ill.**

Please rush Air Corps Type Sun Glasses complete with crush-proof case. I agree to wear them 10 days, then send you \$6.98—otherwise I will return glasses, and I will owe you nothing.

NAME _____

Address _____ R.F.D. _____ Box _____

Town _____ State _____

(PLEASE PRINT PLAINLY)

WORLD'S LOWEST PRICED ADDING MACHINE

**VEST POCKET SIZE
IDEAL FOR BUSINESS OR PERSONAL USE**

FREE TRIAL
ONLY \$2.50
TOTAL COST

SEND NO MONEY

Each Baby Calculator in Beautiful, rich-looking Leatherette case—at no extra cost. **FREE!!**



Fits vest pocket or purse. Guaranteed accurate. Operated as easily, and as reliable, as machines costing many times as much. Not a toy. Substantially made of 28-gauge steel—guaranteed for life against defects in construction. You positively can't buy a calculator of equal quality for as little money. **ACCEPTED AS THE FINEST LOW PRICED CALCULATOR FOR OVER 30 YEARS!** Operates with a flick of your finger. Adds, subtracts, multiplies, divides—counts up to ten million. Pays for itself over and over in mistakes avoided, and time saved. **MAKES IDEAL GIFT.**

Sold on a positive money back guarantee. Send only \$2.50. Calculator sent postpaid, or send name and address and pay postman \$2.50 plus postage. **MONEY BACK IN 10 DAYS IF NOT DELIGHTED!** (If outside U. S., send \$3.00.) **AGENTS WANTED.**

**CALCULATOR MACHINE CO., (Mfrs.)
Dept. 467, P.O. BOX 248, GLENVIEW, ILLINOIS**

PLEXIGLAS

The Crystal-Clear Versatile Plastic

Colored And Transparent
Our complete warehouse facilities afford you great savings on guaranteed Grade "A" Plexiglas

ORDERS PROMPTLY FILLED

CLEAR PLEXIGLAS SHEETS—NEW PER SQ. FOOT:

1/16\$1.24	3/16\$1.97
1/8\$1.61	1/4\$2.34

COLORED PLEXIGLAS SHEETS: 10% ADDITIONAL

Add 10% for packaging on orders under \$10.

Write for free literature on Plastics and how to work them. Price list on request for complete line of rods, sheets, tubes, odd shapes in all types of plastic. Also dyes, cement, buffing compounds.

HOUSE OF PLASTICS

7604 Fenkell Detroit 2, Michigan

GENUINE PRE-WAR QUALITY FIREWORKS!
OH-BOY

Banner has always been right there with the newest and best in fireworks. Now we give you **JET PROPULSION**... an amazing rocket plane that can be used over and over again. Write quick for details of this newest sensation in fireworks. It's astounding. It's colossal.

BIG SPECIAL OFFER \$4.95

Giant assortment of over 150 pieces, including 2-3-5 inch salutes, star shells, aerial bombs, flower pots, skycreamers, battle-in-the-clouds, Roman candles, tubular salutes, and many others... regular \$8.15, retail value for only \$4.95. Rush your order. Supply limited. Catalog FREE.

**BANNER FIREWORKS MFG. CO., INC.
DEPT. 112 TOLEDO 12, OHIO**

NEW MINIATURE RUSTPROOF IDENTIFICATION TUBE

"Positive Identification"—100 & Over Worthwhile Uses to identify Dogs, Tackle Boxes, Gun Cases, Golf Bags, Brief Cases, Luggage, Etc. Send 25c Today for 1—Special 5 for \$1.00. Write now to:

CHARLES A. KRAUT, 2048 N. St. Louis Ave., Dept. C6, Chicago 47, Ill.

**NOW! SAW and BROACH on your own
DRILL PRESS with the K-M ATTACHMENT**

It's easy to convert your drill press for hacksawing, jigsawing, broaching and filing with the new K-M Attachment. Can be installed in less than four minutes—fits any bench drill press—10-day money back guarantee. Send check or money order to:

**KUSNERY MANUFACTURING CO.
327 East Maxlow Hazel Park, Michigan**



When PRAYER FAILS

The prayers of the most worthy people often fail. Why? The unworthy often have the greatest health, success, riches and happiness. The best, smartest, and most industrious people often have only pain, poverty and sorrow. Why? Thirty years ago, in Forbidden Tibet, behind the highest mountains in the world, a young Englishman found the answers to these questions. His eyes were opened by the strangest mystic he met during his twenty-one years of travels in the Far East. Sick then, he regained health. Poor then, he acquired wealth and worldwide professional honors. He wants to tell the whole world what he learned, and offers to send a 9,000-word treatise, **FREE**, to everyone who asks promptly. It is a first step to the **POWER** that **KNOWLEDGE** gives. There is no obligation. Write for **YOUR FREE COPY** today.

**INSTITUTE OF MENTALPHYSICS, Dept. X-261
213 South Hobart Blvd., Los Angeles 4, Calif.**

HERE IT IS!! 50-^{Power} MICROSCOPE

Just what you have been waiting for! All-Aluminum heavy-gauge rigid construction—crackle finish—THE TOY WITH SCIENTIFIC UTILITY that is ideal for hobbyist—student—educator—and home workshop! Shipped complete with 2 slides and your own Instruction Manual—ORDER YOURS NOW and SEE A NEW WORLD RIGHT BEFORE YOUR EYES!

PRICE \$1.98
9c Postage extra

Money refunded if not completely satisfied. We gladly ship C.O.D.—15c extra postage

SUNNYSIDE MAIL MART
P. O. Box 55 Sunnyside Station, L. I. City 4, N. Y.

Cabin PLAN BOOK

BUILD YOUR OWN QUICKLY, EASILY

39-Exteriors with Floor Plans—
48-Suggested Floor Plans—
Low-costcabins—Modernhones

Floor plans and lumber lists for a build-your-own \$500 cabin and \$2500 2-bedroom cottage. Information on pre-fabricated houses.

Fireplace construction. Built-in furniture. 3 pages—Rowboat construction information—docks and floats.
Copyright '45 W.P.Co.

WOODBECK PUBLISHING CO.
214 Winchester Place, Grand Rapids, Mich.

Fun and HEALTH for You!

COMB-A-TRIM
THE NEW QUICK TRIMMER

Something New! Trim your hair without any experience. It's easy! The excess hair comes off smoothly and easily by just pulling trimmer through hair like an ordinary comb. Also removes hair from legs—armpits. Save on hair-cut bills. Trim your own hair or the whole family's. Send 59c and your Comb-A-Trim will be sent at once.

59c

5 Extra Blades (Year's Supply) 25c

SPECIAL OFFER
Send \$1.00 for 2 Comb-A-Trims and save 18c. **2 for \$1**

COMB-A-TRIM CO.
1734 Carew Tower Dept. J-7 Cincinnati, O.

Utica Tools

Pliers for Every Need

ASK YOUR DEALER

UTICA DROP FORGE & TOOL CORPORATION
UTICA 4, NEW YORK

★ FOOT ★ SUFFERERS

••Wear••
AIRFLOW ARCH-EZURS

CHANGE TO ANY SHOE
PILLOW SOFT
CUSHION ARCH-BUILDING
AIRFLOW ARCH-EZUR

Archives are easily adjusted to the peculiarities of each individual foot.

AIR-FLOW ARCH-EZURS are non-metallic, soft and flexible. No elastic or hard construction! They have proved their worth by giving cushion comfort to thousands of grateful men and women who wear them and are recommending them to their friends for fallen arches, pains in the feet and legs, burning callouses, and tired, aching feet. Airflow Arch-Ezurs are not a bulky, clumsy apparatus, but a light, airy support to wear in the shoe at all times with ease and comfort—they combine the latest features for foot sufferers' individual needs. They fit into any regular shoe. ALL SIZES including widths. Write factory direct; save time and money. We pay postage if money accompanies order.

C. H. STEMMONS MFG. CO.
300 E. 51st St., Dept. 15 Kansas City 2, Mo.

NOW CHANITE SELF-WELDING FLUX—REPAIRS all ELECTRIC HEATING ELEMENTS. So simple anyone can make repairs in your broken or burnt-out electrical appliances—irons, toasters, stoves & etc. Guaranteed nothing like it. From our mines to your appliances. \$1.00 per package. \$7.50 per doz. Stick form 25c. \$2.00 per doz.

CHANITE SALES COMPANY, 914 South Main, Fort Worth 4, Texas

New! Complete! RADIO CATALOG

READY NOW! Send For Your FREE Copy!

Radio sets...radio kits (including 19 Popular Mechanics Kits)...radio parts...electronic equipment...amplifiers...complete, standard lines of post-war designed equipment and supplies; pages and pages of what you've been waiting for...in the new Concord Catalog, ready now! Rush coupon for your copy...sent FREE!

CONCORD RADIO CORP.

LAFAYETTE RADIO CORPORATION
CHICAGO 7, ILL. 901 W. Jackson Blvd. • 265 Peachtree St. ATLANTA 3, GA.

CONCORD RADIO CORPORATION, Dept. PS-66
901 W. Jackson Blvd., Chicago 7, Ill.
Rush FREE copy of new, complete Concord Catalog.

Name.....
Address.....
City..... State.....

Famous Barron DRILL PRESS Accessories . . .

Multi-Purpose WOOD PLANER. \$7.50

Fits ANY drill press. Planes, panels, rabbets, routs, tenons, beads, grooves. Machined and balanced. Hi-Speed tool steel cutter knives. Thousands now in use. 10 Day Money Back Guarantee.

Rotary Surface SANDER \$5.95

Fits chuck of drill press. Unexcelled for smooth, even surface sanding of woods and plastics. Original in design and a great labor saver. Complete with 20 sanding discs. 10 Day Money Back Guarantee.

Spiral Flute ROUTER BITS

Special radial shaped flutes for faster, smoother, easier routing, grooving, carving, round-end mortising. Extra long cutting flutes for deeper work. Available in individual sizes. Complete set of 6 sizes . . . \$8.50

Auxiliary Drill Press TABLE \$8.85

Hard Alcoa aluminum 234 sq. inch table. Fits on standard drill press table to give greater working area. Precision ground. Heavily ribbed. With Barron steel fence. A "must" for every drill press.

Write for FREE Catalog

BARRON TOOL CO., INC.

370 Architects Bldg.

Detroit 1, Mich.

BARRON PRECISION WORK SHOP TOOLS

BREATH TAKING BEAUTIES! IN FULL COLOR FOR ART STUDY



World's Finest Viewer

Thrilling, colorful transparencies of beautiful Hollywood Models. . . so real. . . so lovely they'll take your breath away.

See for Yourself 2 Full Color 35mm Slides ONLY \$1.00

HOLLYWOOD PROFESSIONAL VIEWER

Life-like, crystal clear magnification comparable to theatre screen projection. For 35 mm. slides, strip film and 8 or 16 mm. movie film. ★ Special Combination Offer—Two exquisite transparencies of lovely Hollywood Models and sensational Hollywood Professional Viewer — BOTH FOR ONLY \$3.50

Studio Guild, Dept. 5, Box 830, Hollywood 28, Calif.

□ Semi Special Combination Offer for only \$3.50 □ Film enclosed \$

□ Send 2 full color art Model slides for only \$1.00 □ Send C.O.D.

■ IF MONEY ORDER OR CHECK IS ENCLOSED WITH ORDER, WE WILL PAY POSTAGE

Special Combination Offer 2 Art Model Slides and Hollywood Professional Viewer \$3.50

a BETTER Triple-Action DRIPLESS OIL

IN 4 oz. "DROP" OR "STREAM" OILER 25¢



For Maximum Rust Protection AMERICAN DRIPLESS OIL introduces a new high-exceeds U. S. Army requirements. Flows and penetrates quickly — then converts to a long wearing, rust proofing film that "stays put" and lubricates perfectly from — 20°F. to + 200°F. Truly a better oil for home, workshop, sports kits, office — on finest guns and mechanisms, bearings, tools, appliances, etc. At Hardware, 5 & 10c, Sporting Good Stores.

AMERICAN GREASE STICK CO. MUSKEGON, MICH.

276 POPULAR SCIENCE

SPONGE-AWAY



Checks Scratching

You give your scratching dog quick comfort when you sponge him with (or dip him in) Sponge-Away solution. It allays itching; kills any fleas, lice, ticks. Also promotes healing, regrowth of hair. Don't let your pet scratch himself into a worse condition or continue suffering. Get 25c bottle (makes 2 quarts) from pet, drug or department store today.

A PULVEX QUALITY DOG PRODUCT



Send for our Catalog of TOOLS & EQUIPMENT for DEVELOPMENT WORK WATCHMAKERS TOOLS...

CATALOGUE

of Precision Tools, Equipment for Development Work, for the making of New Worlds. — When requesting catalog, state nature of your business.

"Mail Orders Only"

HENRY PAULSON & CO. CHICAGO 3, U.S.A.

SPEE-DOWL

REMARKABLE HOME WORKSHOP DOWELMAKER Make your own perfect, burnished dowels, arrows, etc. in any length on your lathe or drill press. Sizes 3, 3.4, 4, 5, 6, 7, and 8 1/16ths. Send check or Money Order for \$1 each, any four sizes \$3 or complete set of seven \$5 postpaid. Satisfaction guaranteed. SPEE-DOWL 34 MALI NORTH PLAINFIELD, N. J.

SIGN MEN EARN WELL

Tremendous demand always for glass and electrical sign men. Post war expansion assures growing need for more sign men. Only small investment required to start own business. Write today for full FREE particulars. SIGN SERVICE, 5944 Newark, Dept. S-102, Chicago 31, Ill.

PSORIASIS RID YOUR SKIN

of ugly, scaly lesions. Expose affected parts of body without shame. Let Derm-K bring you satisfying relief. Not an ointment. Stainless. Easily applied. Also excellent for DRY ECZEMA. SEND NO MONEY. Rush name and address for amazing facts and Special NO RISK OFFER. It costs nothing to find out what Derm-K can do for you. Send postal today. Carter-Howell Laboratory, 457 Schenectady Ave., Dept. M-17, Brooklyn 3, N. Y.

WRITE FOR SPECIAL NO RISK OFFER

Say You Saw It In POPULAR SCIENCE

What a Toy - what a GIFT!

for ONLY \$1

MICKEY MOUSE VIEWER and No. 1 Film Strip

MICKEY MOUSE VIEWER and thrilling, laugh-a-second full-color film strips — condensed versions of famous WALT DISNEY features. These are actual scenes from WALT DISNEY films.

□ Please send me GIFT PACKAGE for only \$3.95.

□ Please send me MICKEY MOUSE VIEWER and No. 1 film strip for only \$1.00.

□ Please send me Individual Film Strips checked by number for only 25c each. Remittance enclosed for \$.

SEE YOUR DEALER FIRST

CRAFTSMEN'S GUILD

Dept. PS-6, 6916 Romaine St., Hollywood 38, Calif.

GIFT SET \$3.95 MICKEY MOUSE VIEWER and 13 Film Strips

FILM STRIP FEATURES:

1. BRAVE LITTLE TAILOR
2. THREE LITTLE PIGS
3. THE PRACTICAL PIG
4. CHICKEN LITTLE
5. TORTOISE AND HARE
6. THE UGLY DUCKLING
7. GRASSHOPPER AND ANTS
8. THE PIED PIPER
9. THE GOLDEN TOUCH
10. LITTLE HAWAIIA
11. THE POINTER
12. DONALD'S VACATION
13. GOOD TIME FOR A DIME

INDIVIDUAL FILM STRIPS PRICE 25c EA.

Start Today! LEARN SPANISH AT HOME *The Quick Easy Way!*



LOOK! HERE'S WHAT YOU GET! Three 10-In. Records! 12 Lessons! 40-Page Guide Book of Instructions... Handsome Durable 3-Pocket Album!



NOW! Learn to read, write, speak Spanish the new, quick easy way. Costs only a fraction as much as other courses. Only 3 records. Only 3 easy steps to each lesson. Written by an American for Americans. So easy to understand that anyone can learn quickly. Big asset in business and social life. Simple as A.B.C. No extras to buy. Money back if not completely satisfied. Supply of records limited. Rush handy coupon today.

Start now! Send for this Quick Record Course today! Written by Frank Henius, world famous linguist! Dramatically new! Amazingly simple! Almost miraculous!

\$6.04

Tax Included

ORDER DIRECT—TODAY—PROMPT SHIPMENT

UTILITY STORES

117 South Wabash Avenue, Dept FF-32, Chicago 3, Illinois
 Enclosed find \$_____ for which ship at once QUICK SPANISH RECORD COURSE at \$6.04 for Complete Course.
 Name _____ (Please Print)
 St. or R.F.D. _____
 City _____ Zone _____ State _____
 (Established 1906)



LOCATES TROUBLE INSTANTLY IN ALL ELECTRICAL DEVICES

HANLAN APPLIANCE TESTER

In this single unit are combined all the necessary tests for examining every appliance. Checks thermostats under actual working conditions. Tells instant it opens or closes. Controls the heat on soldering irons. Prevents over-heating. Tests continuity, open circuits, etc. Checks automatic irons, vacuum cleaners, motors, shavers, bulbs, appliances with 3-way switches, etc. Great time effort and money saver! ONLY \$10.95 COMPLETE.

Pat. Pend.

FREE with each Tester. New, Complete Practical Course in electrical appliance repairing. WRITE FOR CIRCULAR. HANLAN CO., 1419-B, West Jefferson, Los Angeles 7, Calif.

A BAKKEL-ROLL OF FUN IN EVERY FLIGHT!

FLIGHT

An exciting posttime for 2, 3, 4, 5 or 6 players



FLIGHT—A NEW GAME OF THE AIRLINES...

New, exciting, and fascinating, the game of "Flight" brings the thrill of the airlines into every home. "Flight" is the first, practical all-American game of aviation to be introduced on the market. "Flight" combines the factors of aviation with individual skill to produce one of the fastest moving, most exciting games ever to be invented. Teen agers find excitement in playing for total points while adult groups may use chips to make this game the fastest medium of exchange of any game played. Send for your game today. Introduce it to your friends. Ideal for gifts or prizes.

\$7.00 POSTPAID

Agents Wanted—Write for details

MARSH SMITH GAMES
 P.O. Box 3453 Terminal Annex • Los Angeles 54, Cal.

MOVIE NEWSREELS BRINGS YOU 8mm & 16mm MOVIES IN COLOR



A variety of breath-taking MOVIE NEWSREELS are now available in gorgeous, colorful Kodachrome. New 8mm and 16mm subjects include:

- "SCREEN TESTS" featuring Hollywood's most beautiful and talented Pin-Up beauties. See these stars of tomorrow as they model the latest alluring Swim Suits.
- "DIVING EXHIBITIONS," Olympic Champion, Queen of The Springboard, does her stuff for the slow-motion color camera. ALSO MANY OTHER FASCINATING REELS.

SEND ONLY **25c** For Illustrated catalog and **SAMPLE FILM STRIP IN COLOR**

MOVIE NEWSREELS, DEPT. PS6 Check Here
 Box 2631, Hollywood 28, California 8mm 16mm

Enclosed find 25c (coin or stamps). Rush latest MOVIE NEWSREELS Catalog and SAMPLE FILM STRIP IN COLOR.

NAME _____
 ADDRESS _____
 CITY _____ ZONE _____ STATE _____

MAIL NOW

EVERYTHING YOU WANT TO KNOW ABOUT RADIO IN THIS "2-VOLUME REFERENCE LIBRARY"!

A MOUNTAIN OF RADIO MATERIAL IN THESE TWO GIANT BOOKS!

Only
\$2.98
For both

Let these two great books show you how to build and repair all types of radios, FM receivers, portables, radio-phonographs, shortwave sets, high fidelity amplifiers, wireless record players and recorders! No matter what you want to know, you can find it in a jiffy in these two wonder volumes—for they take you from basic soldering and splicing to building big radio-phonograph combinations!

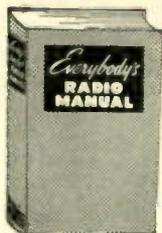
Together these 2 books complete your home library! "Everybody's Radio Manual" gives you vital fundamentals, teaches you how to "trouble-shoot", read blue-prints, stop interference, improve old receivers. "Radio For the Millions" brings you complete wiring diagrams and step-by-step instructions for building 78 radios, phonographs, recorders!

YOURS AT A BARGAIN PRICE!

Two mammoth books like these, crammed with hundreds of pictures, diagrams, tables, codes, definitions and plans should sell for at least \$3.00 *apiece*—but you can have *both* for the bargain price of only \$2.98! Why, the money saved on your first repair job more than pays for the books!

READ THEM 7 DAYS FREE!

Order this great set at once before it's sold out! Send no money now—just fill in and mail coupon below. Pay postman only \$2.98 plus a few cents postage, when he delivers your books. (Or you can order either book alone if you wish). Let these giant books *prove for themselves* what wonders they can do for you! You take no risk. If after 1 week's *free trial* you aren't delighted, return books for full refund.



EVERYBODY'S RADIO MANUAL

256 PAGES!
10 BIG CHAPTERS!
216 PICTURES!
75 WIRING DIAGRAMS!

Only \$1.49 in DeLuxe binding

This clear-cut, simply written manual is jam-packed with step-by-step instructions for building and repairing all types of radios! It shows how to solder, cut and drill; how to read radio wiring diagrams, check circuits, make testing instruments, measure capacities, identify high voltages, calculate resistances, and locate open circuits. Read the big chapter on improving old radios, wiring battery sets for AC current, adding phonograph attachments, and adapting sets for short wave reception. You'll find complete plans for building 11 sets including an AC-DC short wave receiver, a simple wireless record player, and a 3-way portable! It's just *bursting* with short-cuts, pictures, diagrams. Order now while stocks are still available!

HERE'S WHAT YOU GET IN THIS "2-VOLUME REFERENCE LIBRARY":

448 PAGES—PLANS FOR 89 SETS
864 PICTURES—150 DIAGRAMS
HUNDREDS OF HOME RADIO REPAIRS



RADIO FOR THE MILLIONS

648 PICTURES
192 GIANT PAGES
78 COMPLETE PLANS

Only \$1.98 in DeLuxe binding

Complete instructions for building:

Unique FM receiver	Cabinet ideas
Twin-bed radio	Vest-pocket receiver
World's smallest portable radio phonograph	Book-end radio
Two-way radio station	2-tube receiver
Remote control unit	Camper's radio
Pocket receiver	Compact all-wave set
1-tube short-wave set	Suitcase phonograph
Kitchen radio	Dressing table radio
Low-cost home recorder	Bicycle radio
All-purpose portable	"Audio" telegraph
Television antennae	Weekender's radio
Around-world receiver	Library table radio
	AND 55 MORE!

MAIL COUPON TODAY!

POPULAR SCIENCE PUBLISHING CO.,
353 Fourth Ave., New York 10, N. Y., Dept 66

Send me the following book(s) checked:

Everybody's Radio Manual, \$1.49 } or \$2.98
 Radio For the Millions, \$1.98 } for both

I will pay postman \$1.49 for *Everybody's Radio Manual* or \$1.98 for *Radio For the Millions*—or \$2.98 for BOTH (plus postage). If not delighted, I may return books within 7 days for full refund.

NAME _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

Check here if you send payment with order, and we will pay all shipping costs. Same return privilege.

SEE THESE BOOKS AT OUR EXPENSE!

50 BEAUTIFUL BIRD PICTURES

By John James Audubon. Size 8 3/4 x 12
Life-like in natural colors and surroundings.

Make beautiful lamp shades, distinctive screens, scrap baskets, cocktail trays, etc. Also ideal for home designing, framing, walls, etc. Money refunded if not completely satisfied.

\$4.95

Special bargains in "Learn for fun and profit" books.

postpaid PER SET "Picture Framing" by Edward Landen—hundreds of detailed illustrations showing modern methods for making and finishing picture frames—\$2.75 postpaid. "How I Make Woodcuts and Wood Engravings" by Hans Mueller former Professor at Leipzig Academy of Graphic Arts. Over 100 detailed illustrations—\$2.75 postpaid. "Anatomy for Artists" by Reginald Marsh, world famous artist and teacher—445 illustrations—\$3.75 postpaid

BRDWN & DELHI, DEPT. PS-70, 5th AVE., NEW YORK 11, N. Y.

MINIATURE ENGINES

Gasoline—Steam
Air—Locomotive

THE WORLD'S MOST FASCINATING HOBBY

Build them yourself — In your own shop

With your own tools

Send 10 cents for my illustrated catalogue listing the world's largest selection of miniature engine castings and drawings.

WAYNE MILLER

Suite 202
Engineering Bldg., Chicago 6, U.S.A.

WOODWORKERS ... Get this

CONSTANTINE MASTER MANUAL
Get the Most Fun From Your Hobby
Indispensable to woodworkers. Newest, biggest edition, more pages, more color, helpful how-to-do-it articles, pre-war and new items, more bargains. Send 25c today and we will include

FREE! FULL YRS. SUBSCRIPTION
to Chips and Chats, published bi-monthly. Keeps you up-to-date on everything in woodworking, offers big money-saving bargains. Send now.

ALBERT CONSTANTINE & SON, Inc.
793 E 135th Street, New York 54, N. Y.



METALLIZE BABY SHOES

Learn this easy, money making business from nationally recognized consultant. Small investment; perpetual market. For free details write Joseph B. Kushner, B.S. Ch.E. Metal finishing Consultant, Stroudsburg, Pennsylvania, R.D. 3H.

FREE COLLECTORS RARITY Hitler's GENERAL STAFF IDENTIFICATION PATCH

COLLECT RARE MILITARY
SHOULDER PATCHES

Start a collection now of hard-to-get, famous U.S. and foreign military shoulder patches. Take your pick of Army, Navy, Marine, Air Force, German, Jap, RAF and other foreign insignia. In bright colors and fascinating designs. Send \$1.00 for Famous Group of 20 patches plus free catalog illustrating hundreds of patches, and get free the famous patch illustrated. You may if you choose send only 10c for big catalog and price list.

THE PATCH KING, Dept. 206

P.O. Box 101, Madison Square Station, New York 10, N. Y.



Here's a Rare Bargain!

12 CUTTERS

ASSORTED
GROUND FROM THE SOLID—
FROM HARDENED HI-SPEED STEEL

ONLY
\$4.95

These are the Famous
YEOMANS

burring tools—hi-speed
milling cutters and rotary
files—new and recuts

Great for die makers, mechanics, repair men—for routing, deburring, grinding. Used in drill presses, electric hand drills, flexible shafts and grinders. They are worth from \$1.60 to \$4.50 each at original list price. Money back guarantee. Immediate shipment subject to prior sale and quantity now on hand. Going fast—order today and insure delivery. Send check or money order to
Department J6

105
ASSORTED
ONLY
\$4.10

Long—useful life
—each cutter can
be resharpened
30 to 40 times.

A-Y MANUFACTURING CO.

2710 BAY STREET • SAGINAW, MICHIGAN

SICKNESS or ACCIDENT can't rob me of my savings

I'VE A FAMILY MUTUAL
HOSPITALIZATION POLICY

Costs
only **3¢** A DAY • EACH ADULT
1 1/2¢ A DAY • EACH CHILD



Benefits begin the day you enter a hospital
FOR SICKNESS or ACCIDENT
Hospital Expenses paid, up to \$540.00
(beginning with the first day)

FOR ACCIDENT
Doctor Expense paid, up to \$135.00
Loss of Wages reimbursed up to \$300.00
Loss of Life by Accident \$1000.00

WAR COVERAGE AND EXTRA BENEFITS
Childbirth Expense paid, up to \$75.00

Sickness or accident can easily wipe out, in a few weeks, savings it may have taken years to accumulate. Don't let this happen to you. With a Family Mutual Hospitalization policy you'll be able to pay your hospital bills. In case of accident, you'll be reimbursed for your doctor expenses and for loss of time from work. You may choose any hospital in the United States and your own family doctor may attend you. Benefits applying to children are 50% of those paid adults.

MAIL COUPON TODAY—No Agent Will Bother You

FAMILY MUTUAL LIFE INSURANCE CO., WILMINGTON 99, DEL.

Family Mutual Life Insurance Co. PS-11
601 Shipley St., Wilmington 99, Del.

Please send me, without obligation, complete information on your Economical Hospitalization Plan.

NAME _____
ADDRESS _____
CITY _____ STATE _____

JUNE
1946 279

Make Your Own RUBBER MOLDS

Amazing New Method!....

Now, an amazing new method to make your own flexible rubber molds to recast sculptured models or subjects. Duplicate singly or in quantity, expensive original subjects at amazing low cost. Reproduce statuettes, plaques or any other models—any surface—with this new liquid rubber material. Hundreds of other uses.

PROFITABLE HOBBY! Start this fascinating hobby that can lead to beginning of your own business. For only a few cents each, make hundreds of castings to resell at big profit prices. Easy to start. Big list of subjects you can reproduce. **SEND NO MONEY!**

Just your name and address for **BIG INTRODUCTORY KIT** containing 14 different items; everything you need to work with including famous Indian model. Pay postman only \$1.49 plus C.O.D. postage. Money back if not satisfied. Or save C.O.D. by sending \$1.49 with order and we pay postage. Write for **FREE CATALOGUE!**

RUBBER-FOR-MOLDS • 521 W. Monroe, Dept. 48-H • Chicago 6, Ill.



Combination Siphon and Bottle Stopper For Parties, Camping, Home, Barbecues



Serv-Rite Mixer Dispenser

\$1.00

Fits any standard bottle. Retains carbonation. No need to remove post-paid bottle cap. Sensational pocket-size mixer dispenser that fits any standard carbonated water bottle... Ideal for highballs, ice-cream sodas, etc. Simply hook Serv-Rite clamp under bottle cap. Push plunger down hard to pierce bottle top. Shake bottle to generate carbonation; then invert bottle and contents are expelled with force comparable to a soda fountain or bar dispenser. Write today enclosing remittance.

Hollywood Home Accessories, Inc. 1235 West Sixth St., Dept. PS-6, Los Angeles 14, Calif.

NEW EASY WAY TO TIGHTEN CLOTHES LINE



Now—tighten clothes line automatically, without pulling and tugging. Simply turn the lever on Draw-Tite. Keeps line tight despite heaviest wash. Easily attached in yard or basement. Fully guaranteed. Also tightens electric fence wire, tennis nets, anchors boats to pier.

AGENTS! Women buy on 10 second demonstration. Nothing like it in stores. Low price. Get agents' deal. **CHICAGO HOUSEWARES CO.**, 1003 E. 75th, Dept. PS-648, Chicago, Ill.

DDT 10% powder with 5% pyrethrum added for quick, sure Kill. Packaged in miracle Endell pump gun. Send \$1.00 or pay postman COD plus postage. We include half pound can grade A Tire Talc, essential when mounting or changing synthetic tubes. Agents write for proposition.

CHEMICAL PROCESSING CO.
20 So. 15th St., Philadelphia 2, Penna.

SELL BIBLE SOUVENIR

METAL COINS, LORD'S PRAYER, ONE SIDE; JOHN 3:16 on THE OTHER—Quick Easy Sales—Very attractive pocket piece. Quantity Price \$8.00 per 100; \$27.50 per 500; \$50.00 per thousand. Don't Wait... Order Today. Sample Order 15 Coins with Display Card. \$1 Postpaid. **LOUIS LEVITE**, 21 E. Van Buren St., Dept. PS-6, Chicago 5.

SILVER DOLLAR SIZE

RADIO TRAINER
Learn the theory and practical side of radio by building this simplified battery tube set. Experimental model teaches you to design larger radios, not just assemble them. Sensitive circuit brings in distant as well as local stations. Covers broadcast and short wave bands. Compact and portable. Can be used on camping trips and on farms without electricity. All parts furnished including Tube, Batteries, Double Earphones, Aerial and Ground Wire and Easy-to-follow Illustrated Instructions. Complete, postpaid, only \$9.95. Or send \$1.00—shipped C.O.D. for balance plus postage. Money-back guarantee. Order today!
B. G. FLEMING MFG. CO.
Dept. 6-B, 906 Main St., Cincinnati 2, O.

FIREWORKS 'America's Best'

SEND FOR 1946 **FREE CATALOG** Postcard will SAVE YOU MANY DOLLARS

BALTIMORE FIREWORKS CO. INC.
336 North CHARLES ST.
BALTIMORE, 1 MARYLAND

Hobby Room to Upstairs.. Basement to Attic!

TWO-WAY INTERCOM SYSTEM
Now Priced Within YOUR Reach
Saves endless steps. Clear reception to 1000 ft. Beautiful steel cabinet; 3-tubes; send-receive but. \$19.95
C.O.D.
VINCE ANDERSON COMPANY
20 Ross Ave. Fort Mitchell, Ky.

Say You Saw It In Popular Science

Easy to Move, Service, Store Outboard Motors with HANDY-ANDY Motor Support and Dolly

Strongly built of tubular steel, yet lightweight. Rolls easily... cannot tip. Large roller prevents sinking into ground. Removable drip pan helps keep floors clean. Send check or money order. Prompt delivery. Satisfaction guaranteed.

Junior (Up to 16) \$15 H. P. Capacity
Senior (Over 16) \$25 H. P. Capacity

PEARSON, INC., 2842 West Grand Blvd., Detroit 2, Mich.

AMAZING MONEY SAVING OFFER \$995 Plus Fed. Tax

Beautiful Swiss Watch FOR WATCH AND BAND

AND MATCHED

Stainless Expansion Band

No need now to pay high jewelry store prices—instead, you can save money and have a beautiful Swiss Watch and Stainless Expansion Band—Flexible From Tip to Tip—complete—ready for your wrist for only \$9.95, plus Fed. Tax. Think of it! Watch is a good time piece, has smart, white face, black numerals, and black hands. And the Band is a beauty. Highly durable for long wear service.

SEND NO MONEY— Just pay only \$9.95, plus 10% Fed. Tax and postage C.O.D. Or enclose \$10.95 (tax included) for postpaid delivery. Return in 5 days for refund if not delighted.

KENT JEWELERS, 105 N. Clark St., Dept. PS-6, Chicago 2, Ill.

Now A DYNAMIC HEAVY DUTY INDUSTRIAL WELDER

FOR ONLY
\$23.50
COMPLETE...

IDEAL FOR AUTO - HOME APPLIANCE AND FARM REPAIRS
DESIGNED TO DO HIGH GRADE WELDING INEXPENSIVELY—Maintenance Men; Farmers; Mechanics; Machine Shops; Foundries; Auto, General Repair and Job Welding Shops; all using the DYNAMIC find it so indispensable and useful that they cannot afford to be without it. If inexperienced, you can easily learn to do a variety of high grade welding jobs by following the practical, simplified operating and welding instructions furnished. Once you see a DYNAMIC in operation, you won't want to be without it. Its simplicity will amaze you. In a year the DYNAMIC only costs you about 6¢ a day. Helmet, rods, cables, holder and operating instructions, etc., furnished.

AVAILABLE NOW WITHOUT PRIORITIES!

WRITE TODAY FOR PARTICULARS
Get details on our 10 day trial offer

SAVES YOU VALUABLE TIME AND MONEY!

This portable DYNAMIC WELDER—easily carried to the job—can be operated from any convenient, properly wired 110 volt, 60 cycle line. Can also be supplied for 220 volt, 60 cycle operation and for other voltages and cycles at slight additional cost. Works on IRON, STEEL, BRASS, BRONZE, AND OTHER METALS—has 8 metallic and carbon arc welding heat stages—does work you would think only possible with larger more expensive machine.

Member Chicago Association of Commerce

DYNAMIC WELDER CO. • 13 East 23rd St., GG Chicago 16, Ill.



O'BRIEN HYDRAULIC JACK

ALL PURPOSE - BUMPER JACK

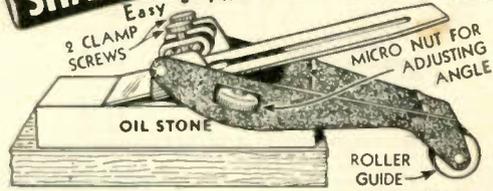
Powerful, safe, hydraulic jack makes your car a feather-weight. Instantly adjustable bumper hook. Car raises quickly with easy finger-tip strokes. Broad, solid steel base gives firm support to the multiple reinforced column. Lifts tremendous loads 17 1/4 inches. Built for cars, farm machinery and tractors—garages, industrial plants. Leak proof. Practically a lifetime accessory. Fully guaranteed.

If your dealer cannot supply, mail check or money order for \$13.50 and we will ship your O'Brien Jack immediately.

AUTO PRODUCTS CO.
6349 N. Clark Street, Chicago 26, Ill.

SHARPER CUTTING EDGES

Easy • Accurate • Quick



It's easy to hone keen cutting edges on your chisels and plane blades. Precision adjustment for ANY ANGLE of bevel. Roller glide makes every stroke uniform across oil stone. Light, strong—Ideal for home craftsmen, hobbyists, carpenters, cabinet makers.

Check or money order
\$2.95

POST PAID
McLAREN INDUSTRIES, INC., Box 606, TROY, N. Y.



"The Book They're Talking About"
Contains over 350 illustrations, charts and notes.

ART ANATOMY OF THE HUMAN FIGURE

For the amateur and professional artist and sculptor. Giving detailed study of every part of the body. Male and Female. Posed and in Action.

\$1.00

MAJOR BOOK CO. (Dept 10-A) 241 East Broadway, New York 2, N. Y.

CARDED JOKE TRICKS

8 Bloody Jokes, 8 Beer Tricks, 6 Hot Cigarette, 6 Hot Picks, 6 Invisible Ink, 34 in all on display card retail for \$3.40. Your price 89¢ per card. 65¢ in 100 lots. Any assortment in bulk \$2.75 per gross. Terms cash with order. Write for catalog of complete line. Certified Products Co., Dept. 60, Louisville, Ky.

PLASTIC HOBBYCRAFT KIT

Kit contains 2 lbs. PLEXIGLAS and LUCITE sheets and strips, dye, cement, sandpaper, buffing compound and fabricating instructions. Send \$3.00 money order to

HOME CRAFTSMAN PLASTICS, 1950 W. Ogden Ave., Chicago 12, Ill.



MIDGET CRYSTAL RADIO

Boys, here is just the crystal radio you will want to build. Kit includes accurately made parts, simple instructions and drawing. It is enclosed in a dustproof cabinet. No tubes or batteries needed! Ask your hobby dealer or order direct. Kit \$2.25 Headphones \$1.95 Postpaid
Hobby Specialties Co., 904 S. 104th St., Milwaukee 14, Wis.

Say You Saw
It In Popular Science

MONEY-MAKING SIDE LINE!



PLASTIC WALLET INSERTS

Agents! Salesmen! Big Profits!

These dozen inserts sell easily for 50¢ to \$1 each. You make at least \$4 for yourself. Assortment has 4, 5, and 6 envelope books. Heavy plastic covers. Strong wire spiral binding. Identification card in each insert. FREE set-up display with first order. Excellent money-making sideline. Easy to carry. MONEY-BACK GUARANTEE on inserts you don't sell. Rush \$1.50 for trial dozen. Big market waiting!
EDMASTERS CO., Dept. PS6, 190 Berry St., Brooklyn 11, N. Y.

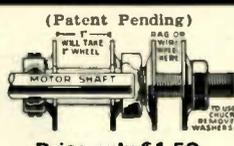
IMMEDIATE DELIVERY!
\$1.50
DOZEN ASSORTMENT

SUPER DRILL GRINDER SUPER ARBOR SUPER HACKSAW



Sharpens round shank drills from 3/32" to 1 1/16" in diameter, up to 11" long. Grinds old drills like new in 4 different point angles, using hand or power grinding wheels. Money-back guarantee.

Price only \$2.95



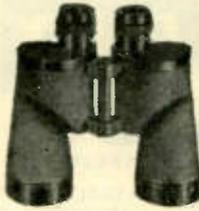
(Patent Pending)

Price only \$1.50

And Flat Die File Holder Tool with 100 uses. Holds broken hack saw blades, Ideal for close-quarter work. Good knife or scraper. Only 95¢.



At Dealers or Postpaid
Crandall Mfg. Co. 1512 W. Stinson, Dept. FB-6 Los Angeles 44, Calif.



BINOCULARS TELESCOPES MICROSCOPES WAR SURPLUS LENSES

At A Small Fraction Of Cost

Assemble your own high quality optical instruments with these war surplus lenses and prisms which are far superior in quality to those found in the usual commercial instruments. Simple instructions come with each set. The sets marked "near-perfect" are considered perfect by usual commercial standards. The sets marked "seconds" have minor edge chips which are guaranteed not to interfere with their performance.

Navy 7 x 50 binocular lenses and prisms. Each set makes a 7 x 50 monocular. Two sets are required for a binocular. The complete binocular sells for \$162.00
Price per monocular set of lenses and prisms: **\$9.00**

PERFECT	\$9.00
NEAR-PERFECT	\$5.25
SECONDS	\$2.75



Complete optics for 40 power spotting and observation telescope. Objective lens over 2 inches diameter. Overall length of telescope when in use only 16 inches. All erecting lenses and eyepiece lenses, as well as the objective are achromatic making this an unusually fine instrument.

PERFECT	\$9.75
NEAR-PERFECT	\$5.75
SECONDS	\$3.25

Complete optics for making an adjustable achromatic microscope. magnification 100 to 500 power. Includes four achromatic doublets:

PERFECT	\$5.95
NEAR-PERFECT	\$3.95
SECONDS	\$2.25

LENS ASSORTMENTS FOR EXPERIMENTERS

Twenty assorted lenses ranging from powerful short-focus microscope objectives to large magnifiers, some with edge chips or minor defects, but all usable—excellent for making all types of optical instruments. **\$1.50**

Deluxe Assortment—includes forty large and small plain lenses, achromatic lenses, and prisms. Worth many times the price. **\$4.95**

WE PAY THE POSTAGE PROMPT SHIPMENT GUARANTEED
BROWNSCOPE CO., Dept. 6P, 24 West 45th St., N.Y. 19, N.Y.

REPAIR KIT AVAILABLE



Entire kit sent postpaid for only \$4.00 plus 18c postage.

Contains a complete assortment of terminals, pins, porcelain insulators, mica, etc. that will fit most flat irons and appliances. Practically every part necessary in the ordinary repairing of flat irons in one handy kit. Additional supplies obtainable so that your kit can be replenished.

Christy Supply Co. 2835 N. Central Ave. Dept. K-151, Chicago 34, Ill.

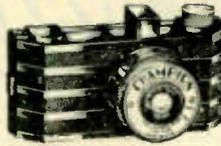
BUILD YOUR OWN

RADIO or RECORD PLAYER with these

"Easy to Build Kits"

- | | |
|---|--|
| <p>1—Crystal Radio Kit—Complete, including Trimm De Luxe headphones, headband, cord, one special coil, one walnut finished base wired and drilled, 4 cellophane envelopes containing all necessary parts to make a complete working crystal radio. \$2.97</p> <p>Your Cost</p> <p>2—One Tube Special—All the necessary parts to build a one tube AC/DC or battery operated radio—includes tube and cabinet. \$9.95</p> <p>Your Cost</p> | <p>3—Record Player Kit—Complete—Includes—
—110V 60 cy. AC motor and turntable
—Large P.M. Dynamic speaker and output transformer
—AC/DC—tube amplifier, complete with tubes
—Curved lightweight pickup with rest
—Beautifully styled—leatherette covered case
—Special low price—\$32.50 only
Shipped Anywhere
10% Deposit With Order</p> |
|---|--|

NIAGARA RADIO SUPPLY CORP.
160 GREENWICH ST., NEW YORK 6, NEW YORK



CAMERAS

Amazing MONEY SAVING Offer
Gives You This NEW 1946 "THE CHAMPION" Model with Latest Features.

COLOR *Candid* CAMERA **\$3.50** ONLY—

- Guaranteed for Life-Time Service!
- Fixed focus! Exposure automatically correct at all times.
- QUICK-Action, level view finder! Just aim and snap!
- Takes full NATURAL-Color pictures indoors or outdoors!
- Takes 16 black-and-whites on ordinary 8-exposure roll!
- New film track brings entire picture to sharp focus. \$10.00 Value.

Agents Wanted. C.O.D. Orders Send \$1.00 Deposit
FREE If you order today 1 year's subscription to Philadelphia Home Mail Order Monthly. Please Make All Checks Payable to J. Morris.

J.D. MORRIS CO. P.O. BOX 2434
PHILADELPHIA 47, PENNA.

CAMPING EQUIPMENT

- PUP TENTS, Used, Good Condition. \$2.98
- SET OF 2 POLARIS and STAKES. .95
- 3 PC. CANTEEN SET, New Aluminum, Cup, Cover, Canteen. \$1.89
- HAMMOCKS, New, Navy Style, Clews and Ropes. \$3.89



Add 30c postage on above items. Check or Money Order. No C.O.D.'s. Money Back Guarantee. Send for Free Catalogue.

LEAHAN CO., Box 111, Dept. PS 646,
Brooklyn 1, New York

ARTISCOPE

Copy ANY object or view you see with an ARTISCOPE. What you see appears on your drawing paper in full color. Simply trace and color what you see. Anyone, old or young will use the ARTISCOPE. Adjustable. Invaluable for teachers and students. Children amuse themselves for days on end with the ARTISCOPE. It's easy and it's fun!



If your dealer can't supply, order direct, giving his name. Money back guarantee. \$4.05 U.S. cash, check, or m.o. Add 2 1/2% Sales Tax for Calif. We pay postage. No COD or Foreign.

DEPT. 10F ARTISCOPE, NO. HOLLYWOOD, CALIF.

REFRIGERATION



Service Manual. Learn all about it at home. Your big opportunity! Covers domestic and commercial systems. Construction, operation, installation, adjustment, testing, trouble shooting, replacement, repair, etc. Also refrigeration applied to air conditioning. 300 pages, fully illustrated, clearly written.

Only \$2.25 postpaid. Money back guarantee.
MODERN TECHNICAL BOOK CO.
Dept. M55 55 West 42nd St. New York 18.

DON'T LOOK

Tired from pushing that old lawnmower. Try this new easy method of sharpening your mower the factory way. No more filing by hand, but sharpen as you cut. Money back guarantee. Complete kit of materials and instructions sent postpaid for only \$1. Send Money order or dollar bill to: STEIN MFG. Co., 123 S. Magnolia St., Ocala, Fla.

Say You Saw
It In Popular Science



SENDING—RECEIVING—SPEED

Learn to send and receive Radio Code with greater speed. Stop nervous tension. Have confidence. Be proficient. Same system used by radiotelegraph specialists. Thousands of operators need it. Rush name for FREE book.

CANDLER SYSTEM CO.
Dept. 6-C, Box 928, Denver 1, Colo., U. S. A.

FLEXIBLE SHAFT

53½" MULTI-PURPOSE
RUGGEDLY CONSTRUCTED
Sealed Against Dust & Dirt
LIMITED QUANTITY

—AS PICTURED—

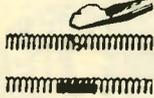
\$575

Only Post Paid

Can be used with motor up to 1½ HP., or in a Chuck up to 3½" capacity. Speed range—1725 RPM to 3600 RPM. Shaft size—3/8" diameter, 24 threads per inch. Can be bent or looped to radius of 6" for working in hard-to-get-at places. Outer covering of Oil-resistant Neoprene. Useful for Buffing, Grinding, Drilling, Polishing, Rotary Filing and Transmission of Power. ORDER NOW DEALERS INVITED.

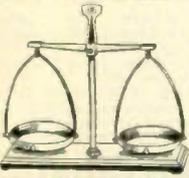
ELECTRIC TRADING CO. 313 CANAL ST. NEW YORK 13, N.Y.
Fans & Blowers for Every Industrial, Commercial & Domestic use. Fan & Blower Motors & Kits. Electric Tools, Compressors & Spray Equipment in stock.

REPAIR YOUR OWN ELECTRIC APPLIANCES WITH NEW AMAZING NICHROCITE



Simply overlap ends, apply Nichrocite paste and turn on the current—a perfect weld results. Used by big utility companies and repair shops. Just the thing for that broken or burned out heating element in your electric iron, stove, toaster or heater. Does the job in a jiffy. Trial order, \$1; 4 ozs. \$2.50; 1 lb. \$8.00.

Handy for Home or Industrial Use
ARMSTRONG ELECTRIC COMPANY, Box 861-PS, Minneapolis, Minn.



HANDY BALANCE FOR ALL PURPOSES
Photographic, Chemical Work, Etc. The ideal all-round scale for general laboratory work, neatly designed, accurate construction. Mounted on 4 x 11 base. The pans are of polished metal, 3½" diameter with 7½" beam. Balance measures 9 x 11". Furnished with 5 metric or avoirdupois weights. \$5.00
STANDARD SCIENCE SUPPLY CO.
1232 N. Paulina Street, Chicago 22

SECRETS OF LOCKSMITHING



ONLY \$1.00. Now available to all, in handy, pocket sized book. Written by experienced lock experts. Contains practical, simple instructions on Key Duplicating, Fitting, Lock Repairing, Changing Combinations, Master Keying, Lock Opening, and many others. Hundreds of illustrations. Teaches locksmithing easily, quickly, at home. Costs only \$1.00. Send your \$1.00 today, on positive satisfaction or money back guarantee.

REPAIR SHOP SERVICE Box 264-B Skokie, Illinois

Say You Saw
It In Popular Science

WELD ANYTHING ANYWHERE ANYTIME

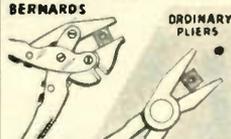
ALL PURPOSE ARC WELDER
9 Models . . . 32 Volt D.C., 110 to 440 A.C.

* A complete workshop in itself! Weld, cut, braze or solder any type metal; iron, castings, aluminum, steel, bronze . . . in any gauge or weight, with equal ease. Compact, complete, as sturdy as the Rockies. Formed steel and cast aluminum case, welded steel base, 4" cast wheels. Built with voltage control. Better on R.E.A. lines. Completely equipped. No instructions needed. Sold throughout the world. Several dealer territories open. Write:

FORNEY MFG. CO.
FORT COLLINS 3, COLORADO

TRY THIS WITH

YOUR PLIERS



BERNARDS work like a wrench. Parallel jaws fit snug on nut.



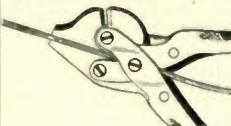
Cutters on outside of head. Easily cuts baling wire.



Compound leverage doubles gripping power. 6½" size cuts 8-penny nail.



Breaks glass perfectly. Jaws close flat against glass.



Ideal for handling wire, because of open throat.

BERNARDS belong in every household. Get them today at your hardware store.

Catalogue of pliers, nippers, cutters, punches, pruners and hedge clippers on request.

WM. SCHOLLHORN CO.
"Quality Tools Since 1870"
New Haven 9, Conn.

SHEET METAL PROJECTS

OLD SNIPS' BEST SELLERS

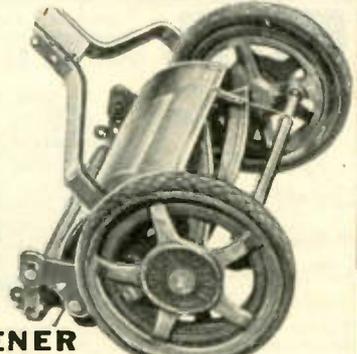


- 34" x 44" Blueprints
 - ±103 Colonial Post-Top Lamp. Hinged door for re-lamping. Makes beautiful copper project... \$1.00
 - ±427 Plate Glider & Box Truss Bridges. Inverted deck type. HQ Scale with conversion table... \$1.00
 - ±865 Fishing Tackle Box. 3 trays, sinker bin, sand-spike, hook-holder, reel compartment... \$1.00
 - ±951 Executive's Desk Lamp. Modern fluorescent, built-in picture frame for 8 1/2" diameter... \$1.00
- DRAFTSMEN ASSOCIATES**
3300-3 Aldine St. Philadelphia 36, Pa.

It's Safe
Quick
Simple
Efficient

NEW

**KUT-RITE
LAWN
MOWER
SHARPENER**



Grinding wheel principles applied. Actually self sharpening. Takes only 3 minutes—costs less than one professional sharpening, and equally as good.

14 inch only \$1.25 F.O.B.
16 inch only \$1.35 F.O.B.
18 inch only \$1.50 F.O.B.

Postage for mailing twenty cents.

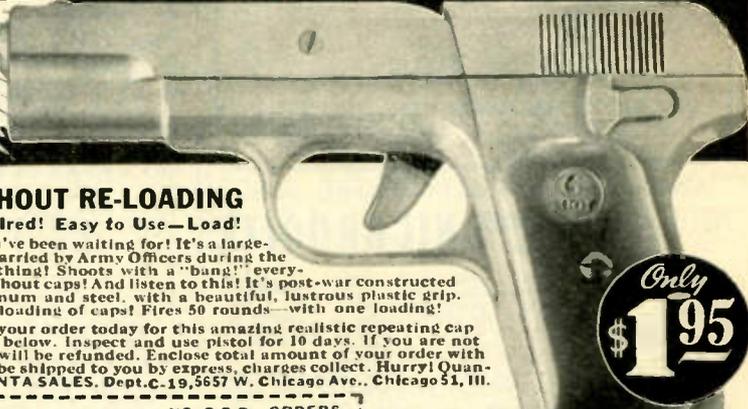
Send Check or Money Order
ACCURATE SHARPENER MFG. CO.
2230-A N. Hubbard Street Dept. P.5, 6 Milwaukee 12, Wis.

BUSINESS OPPORTUNITY
offered—small investment earn big money—Order yours today. Dealers and agents wanted.

THE IDEAL TOY FOR BOYS!

CAP PISTOL

"ARMY OFFICERS" .45 REPEATING AUTOMATIC



Only
\$1.95

FIRES 50 ROUNDS WITHOUT RE-LOADING

Barrel Actually Smokes When Fired! Easy to Use—Load!

Boy-oh-Boy! This is the cap pistol you've been waiting for! It's a large-size model of the Colt .45 Automatic carried by Army Officers during the war. Feels and handles like the real thing! Shoots with a "bang!" every time you pull the trigger...with or without caps! And listen to this! It's post-war constructed inside and out of long-lasting aluminum and steel, with a beautiful, lustrous plastic grip. Pistol "breaks" open for easy inside loading of caps! Fires 50 rounds—with one loading!

MONEY-BACK GUARANTEE! Rush your order today for this amazing realistic repeating cap pistol and ammunition. Use coupon below. Inspect and use pistol for 10 days. If you are not delighted, return it and your money will be refunded. Enclose total amount of your order with coupon. Pistol and ammunition will be shipped to you by express, charges collect. Hurry! Quantity limited! Rush your order now! **SANTA SALES, Dept. C-19, 5657 W. Chicago Ave., Chicago 51, Ill.**

SANTA SALES, 5657 W. Chicago Ave.
Dept. C-19, Chicago 51, Ill.

NO C.O.D. ORDERS

Please rush... "Army Officers" .45 Automatic Repeating Cap Pistols at \$1.95 each. Boxes of 250 ROUNDS of CAPS at 15c each, or Boxes of 1750 ROUNDS of CAPS at \$1.00 each. I enclose full amount of order. Please ship express, charges collect. If I am not delighted with pistol, I can return it in 10 days and get my money back.

Name

Address

City State

ORDER AMMUNITION

Box of 250 Rounds of Caps . 15c
Box of 1750 Rounds of Caps \$1.00

Have more fun with your repeating cap pistol! Keep a good supply of roll caps on hand.

CAPS NOT SOLD WITHOUT GUN
Order blank for additional supplies of caps included with your shipment.

RACER HIGHLY POLISHED CAST ALUMINUM



8½ inches long. Heavy single unbreakable casting. Free running rubber wheels. Can't rust. Trim, sleek lines. Looks like models selling up to \$12.00. Every youngster wants one!

SEND \$2.98
DEALER INQUIRIES INVITED.

Barton Industrial Products Corp., Dept. PS-6- P.O. Box 43, Chicago 17, Ill.

PRESTO! ANYONE CAN MASTER GLAZE

LEAVES HARD GLOSS-LIKE FINISH
EASY TO APPLY
PROTECTS THE SURFACE
NO SMEAR OR STREAKS AS WITH WAX
LASTS SIX MONTHS TO A YEAR



SEALS THE PORES OF THE SURFACE
WILL NOT FINGER-MARK
EASY TO KEEP CLEAN
ONLY FILM AS WITH POLISH
SAVES YOU MONEY

Car Owners! Meet Master Glaze—the sensationally different luster for new and used cars! Not a wax—not an oil polish—not a paint!—nothing that "smears" over the surface.

MASTER GLAZE is a unique discovery—a creamy liquid—quick and easy to apply! Gives a hard, glass-like surface. Even gasoline cannot dull it! Lasts six months to a year! Amazing luster—beautiful, sparkling clean and brilliant! Doesn't finger-mark—doesn't smear! A match box full glazes an entire car. Seals the pores—protects! **NOTHING LIKE IT!**

FREE SAMPLE

Just send your name and address to

MASTER GLAZE CO., 7720-553 W. Harwood Ave., Milwaukee, Wis.

SAVE MONEY ON GASOLINE

FITS ALL CARS Now you can get up to 30% extra gasoline mileage with a Vacu-matic on your car. Quicker pick-up, smoother running, added power saves money every day. Guaranteed.



Automatic Supercharge Principle
Vacu-matic is entirely different! Operates on the Supercharge principle. Saves gas. Automatically provides a better gas mixture. Guaranteed to give up to 30% extra gas mileage, more power and better performance.

SALESMEN WANTED

Big profits. Every Car a Prospect. Send name and address for FREE PARTICULARS and how you get yours for introducing.

Vacu-matic Co., 7617-1278 W. State St., Wauwatosa 13, Wis.

Floyd Clymer's Popular MOTOR BOOKS

Send for FREE Motor Book Catalog

INDIANAPOLIS "500" RACE HISTORY BOOK

Just out! 2000 Illustrations; 320 large pages; complete detailed data on every race held on Speedway since 1900. Foreign and U.S. cars and drivers shown. Enjoy for 10c a race year after year history. Complete book \$3.50; with De Luxe red Fabric-bound binding, \$5.00. Postpaid.



MOTOR RACING WITH MERCEDES-BENZ

Sensational book of Grand Prix Racing. 176 pages, includes 93 finest action photos. Famous speedways, cars described. See and read about Caracciola, Rosenmeyer, Seaman, Ruesch, Mays, Nuvolari, Fagioli, Lang, others. Photos Mercedes-Benz, Auto-Union, Alfa Romeo, Bugatti, Maserati, others. Graphic, thrilling race incidents. Postpaid \$2.00! De Luxe clothbound \$3.00. Power & Speed \$2.50. Speed—How to Obtain It \$1.50. All books postpaid. See our ad under Autos, Classified section. Fill check or M.O. to this ad—mail now to

CLYMER, Dept. B6, 2125 W. Pico, Los Angeles 6, Calif.

You can Easily Install this
UNDERGROUND SPRINKLING SYSTEM



with
AQUASpray
 PATENT PENDING

SPRINKLER HEADS
 DEPENDABLE • PERMANENT
 SPRAY ADJUSTABLE TO 1/2 FOR SIDES
 1/4 FOR CORNERS

Self-draining spray heads fit standard 1/2" pipe installed 3" below lawn surface.

For greener lawns—finer vegetables—less work. See your hardware dealer or write us for full information

Cost Complete, as Low as **\$35.00**

THE AQUA-SPRAY CO.
 439 EAST FORT STREET • DETROIT 26, MICHIGAN



**BE YOUR OWN BOSS!
 MAKE MORE MONEY**

\$1.00 VALUE
25¢
 68 PAGES
 40,000 WORDS

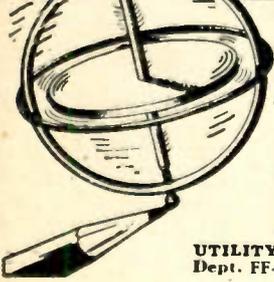
In "CASH IN" you now get THE real money-makers—dozens of profitable tested mail order plans, confidential business secrets, dozens of practical tested formulas, successful tested schemes—actual experience of men who have started on a shoestring—with less than \$10 capital.

25c a copy postpaid. Send U.S. stamps, money order, or coin.
MONEY BACK GUARANTEE
 NATIONAL PLANS COMPANY
 P. O. Box 26S, Station N, New York 23, N. Y.

48 PLANS \$1.00 • FREE 75¢ MARTIN HOUSE PLAN
 Toys, ash trays, games, garden gnomes, wall shelves, Dutch boys and girls, animals, etc. Many other new and interesting projects. Fine selection available. Make protect any size you desire. Plus FREE 75c 17 family Martin house plan. Send only \$1.00 to JACKSON STUDIOS 5440 N. Shoreland Ave., Milwaukee 11, Wis.

Beautiful Modern **SIGN LETTERS**
 Signs anywhere, quickly, easily... Write for money making-sewing plan... Samples
PINNACLE SIGN LETTERS, Mound City, Ill.

**THE REVOLVING SENSATION
 A TRUE BALANCED
 GYROSCOPE**



That Spins Like the Earth Itself!
 ● Balances on a pencil point! Now Only
 ● Spins across a string! **\$1**
 ● A truly scientific toy! Postage extra
 Both young and old will find great excitement and pleasure in this truly great toy. Order several now for Christmas. They make wonderful gifts.

**UTILITY STORES, 117 S. Wabash
 Dept. FF-30 Chicago 3, Illinois**

Free!
 This handy Vest Pocket Guide for Welders. Reference material, tables.
 I'm also interested in...
 HOBART Arc Welders
 Arc Welding School
 "Build Your Own"
 A.C. Electric Welder
 Please check and mail today
HOBART BROTHERS CO., BOX P-66 TROY, OHIO

Name _____
 Address _____



Get big profits quickly with this HOBART welder

HOBART Portable Electric
 Thinking about starting a job welding shop? You'll make no mistake, for arc welding is one of the most profitable businesses today. It's easy to start, and most everyone brings the work to you. With Hobart, you'll find that welding is simplified, and perfect welds are produced faster. The Portable Electric, on left, is ideal for all-around shop work.

HOBART "Build Your Own" Generator
 If you would like to build your own Gasoline Drive Arc Welder, and save hundreds of dollars over a complete factory built unit, you'll find it easy with the Hobart Generator. By adding reconditioned auto motor and chassis, you'll have an arc welder that lets you go right out to the most profitable jobs.

HOBART A.C.
 The Hobart A. C. Transformer Type Arc Welder is perfect for all light duty welding. Operates on single phase from regular 220 volt power lines. Recommended especially for auto repair welding work. Exclusive Hobart features simplify operation—assure longer life. Remember—Hobart is "One of the World's Largest Builders of Arc Welders"

HOBART BROS. CO., Box P-66 TROY, OHIO
Attend the HOBART SCHOOL of ARC WELDING and learn the trade in short, intensive course. Individual attention, low cost. Enroll, G. I. Bill.

TO: *Reader*
FROM: *Editor*

PS Men *get around*

THE Editor's Easy Chair at *Popular Science Monthly* is a varied seat. It may be a lounge chair in a new air liner or the hard, cold metal "bucket" of a military transport, a Pullman bedroom or standing room in a day coach on an early train. Sometimes it is a swivel chair in the editorial offices. But since PSM's kind of journalism calls for getting within touching distance of ideas, our editors never let their office chairs get too warm.

This see-for-yourself policy goes for the men at the top of the masthead as well as for us who are reporter-editors. I speak with some feeling, having just returned from a 16-day trip with Editor Perry Githens that has left me with my tongue down on my necktie. I went along for the ride, I thought, but soon found I had to work my passage. Because Githens is the kind of person who wants more of everything. He wants to meet more people, see more things. That big,



SAN FRANCISCO . . . with *Chronicle's* Paul C. Smith.

gray sponge behind his spectacles is always thirsty for more information and experience.

With Andrew R. Boone, PSM's Western Editor, we looked and listened from San Diego to Los Angeles. Then Githens and I went on to San Francisco and Seattle. Gith-

ens walked miles through the Coast's huge aircraft factories. He talked with company heads and engineers about the future of aviation and supersonic planes. He discussed scientific education with some of the world's most distinguished scientists and teachers at California Institute of Technology. He hoisted his not inconsiderable bulk into the cockpit of the Army's new Northrop Flying



SEATTLE . . . with Boeing's Pilot Ernie Code.

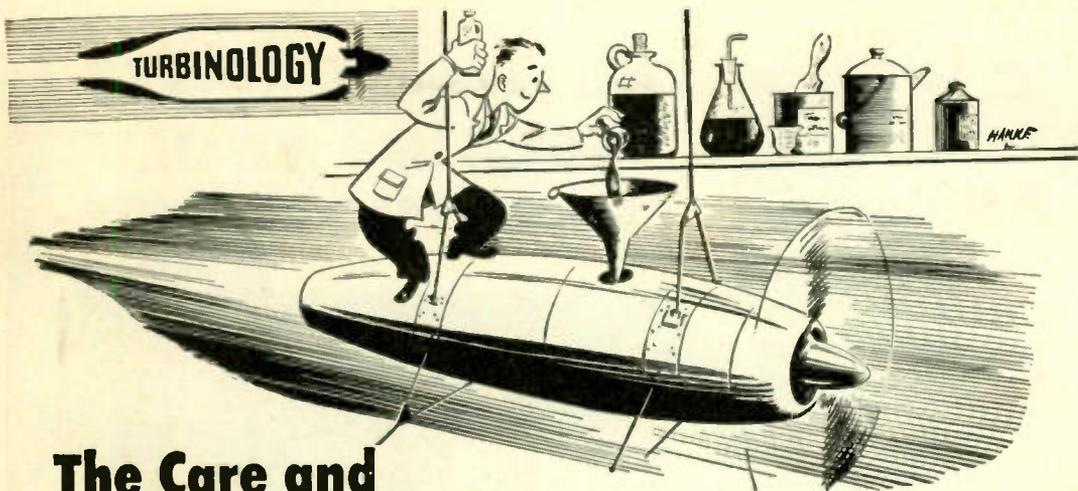
Wing bomber you saw described in our May issue. He was like that hungry dog in a butcher shop as we went through the Douglas plant and the Lockheed research laboratories. He was properly awed in the frightening twilight inside the world's biggest wind tunnel at the Ames Laboratory of the National Advisory Committee for Aeronautics at Moffett Field, south of San Francisco. He was properly appreciative, having dabbled in movies himself, when we visited the Columbia lot where William Wellman, an old schoolmate, was shooting the story of the Montgomery brothers, glider pioneers, while DC-3s noised overhead. In San Francisco, he lunched with *Chronicle* Editor Paul C. Smith in his house on Telegraph Hill, then spent a day on foot soaking up the sights and sounds of that city.

When we got back, I figured we had clocked up some 7,514 miles by air, rail, motor and shoe leather. This gives Githens a total of 16,650 miles for the first four months of the year, which makes him temporary traveling champ of the staff.

Such getting around takes time and money, but Publisher Hammond and Editor Githens don't believe in mailbag-and-scissors editing. They think PSM should make you feel you were there.

Perry Githens

TURBINOLGY

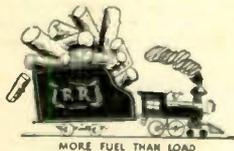


The Care and Feeding of a Turbine

The new propeller turbine of the Wright Aeronautical Corporation is no gourmet with a choosy appetite. It would be possible, though not very practical, to design it to run on either gasoline, kerosene, fuel oil, alcohol, cleaning fluid, or paint remover.

These liquids burn easily. And the main problem in "feeding" a turbine is to give it a free-burning fuel that produces intense heat to expand air and thus put enough pressure on the turbine blades to force them to turn.

If the turbine was for ground use, the cheapest fuel might be selected, fuel oil or crude oil. But in the air, every pound of fuel means one less pound of potential payload. So the fuel with the highest heat value for the lowest weight has to be selected.



Otherwise, planes would be like trains a century ago, when they carried so much firewood there was scant room for passengers.

Years ago, scientists measured the heat necessary to raise the temperature of a pound of water one degree Fahrenheit. They

called this a British thermal unit. It is a very critical measure of fuel value. This is the way three common fuels rate in B.t.u.'s per pound: Dry wood 5,000, Coal 14,000, Gasoline 19,000.



Kerosene and fuel oil have about the same number of B.t.u.'s per pound as gasoline. Uranium has millions per pound but no one knows yet how to pour it into a fuel tank.

Kerosene is a promising turbine fuel. In cold weather, it flows easily, and doesn't "boil" or vaporize at high altitude as gasoline will. Since there is no "knock" problem in a turbine, it doesn't matter that kerosene has an octane rating far below gasoline.

However, gasoline is being used in the experimental models for several reasons. It is plentiful. From long experience with Cyclones, Wright engineers are

skilled in metering gasoline and designing air intakes and combustion chambers to get just the right combination of air and fuel for best heat results. Finally, there is less carbon, a serious problem on the delicately balanced turbine blades.

Yet if you should visit the Wright Aeronautical test cells in the coming months, you might see turbines being tested with gasoline, kerosene, fuel oil, or maybe mixtures of the three.

Eventually, Wright engineers will select one fuel to burn in the production models of the turbines. In line with their long practice of building more power with less weight and less fuel consumption, that fuel will be the one which will permit giant airliners to get the utmost in turbine power and still carry a maximum load in passengers, mail and cargo.



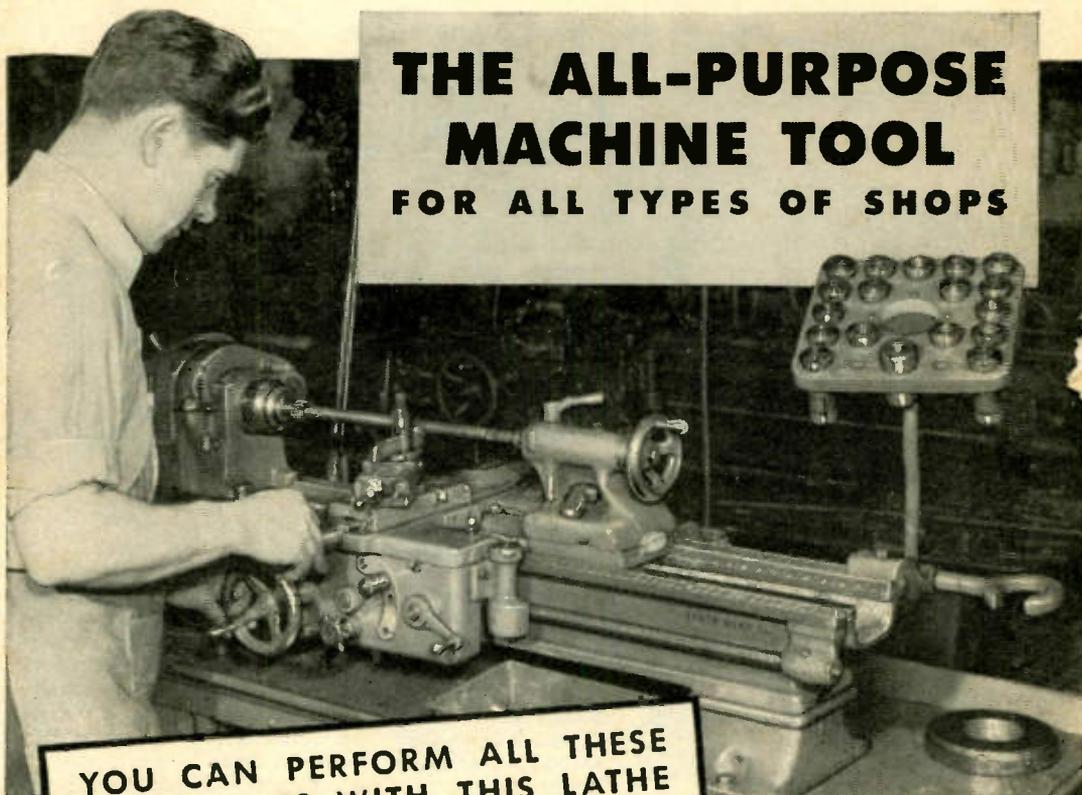
WRIGHT

AIRCRAFT ENGINES

DIVISION OF
CURTISS  WRIGHT
FIRST IN FLIGHT

Wright Aeronautical Corporation • Paterson, New Jersey, U.S.A.

THE ALL-PURPOSE MACHINE TOOL FOR ALL TYPES OF SHOPS

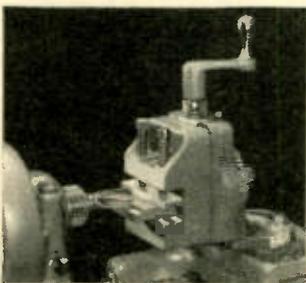


YOU CAN PERFORM ALL THESE OPERATIONS WITH THIS LATHE

On Metals, Alloys, Fibers, Plastics, Compositions, Wood, Other Materials

TURNING • FACING • BORING • DRILLING • REAMING
TAPPING • THREAD CUTTING • MILLING • GRINDING
FILING • POLISHING • HONING • LAPPING • BUFFING

Because they are accurate, versatile and dependable, South Bend Precision Lathes are widely used in every type of large and small metal working industry. The same qualities which make these lathes so valuable to industry, make them the favorites for auto, radio, and appliance repair work, tool and instrument shops, model making, and hundreds of other uses. South Bend Precision Lathes are made with 9", 10", 13", 14½", and 16" swings to meet the great majority of lathe needs. Mention size in which interested when writing for free catalog.



MILLING ATTACHMENT

Mounts on compound rest base. Permits using hand or power feeds for milling and boring. Made for all sizes of South Bend Lathes. Write for Catalog 77.

288 POPULAR SCIENCE

10-INCH LATHE FEATURES

- Fine workmanship by highly skilled machine tool craftsmen
- Superfinished spindle with large, adjustable sleeve bearings
- Belt drive for smooth, silent operation at high speeds
- Back-gear drive for power and low speeds
- Spindle Speeds from 50 r.p.m. to 1357 r.p.m.
- Thread cutting range - 4 to 224 per inch, 48 pitches R.H. or L.H.
- Precision lead screw for thread cutting
- Worm drive and friction clutch for power longitudinal and cross feeds
- Three hand-scraped V-ways and a flat way on bed insure perfect alignment of headstock, saddle and tailstock

HOW TO RUN A LATHE

This valuable book shows you how easy it is to operate a South Bend Lathe, and the wide variety of work that can be done on it. Contains 128 pages, 365 illustrations. Price only 25c postpaid, U. S. coin or stamps.



LATHE BUILDERS SINCE 1906

SOUTH BEND LATHE WORKS

456 E. MADISON STREET • SOUTH BEND 22, INDIANA



THRILL TO THE WONDERS OF

American Wild Life

5 Books
in One—
at the Price
of One!

This Wonderland of Living Things — Startling and Beautiful — Lavishly Illustrated with Hundreds of Photographs — Some in FULL NATURAL COLORS!

327 Pictures
including plates
in FULL COLOR!
778 Pages!

A FEW HOURS—perhaps a few minutes—from your front door, in woods, field, or stream, there is a world of busy life which seldom meets the human eye. Here are unfamiliar four-footed creatures, creatures that swim and fly; here are species of living things whose ways of life are so different from, and again so startlingly similar to, our own human ways.

Multiply such a patch of wild life near your home by the length and breadth of America and you have one of nature's greatest and most varied collections of living wonders on the face of the earth. To witness the daily lives of these wild creatures has been the privilege only of the fortunate few, possessing the time, knowledge and equipment necessary for close observation. Now, however, this fascinating animal world is brought to you within the covers of this brilliantly written, vividly illustrated volume, to be enjoyed comfortably at your leisure.

Brings You the Thrills of Naturalist and Hunter

If you spent years and traveled thousands of miles with camera and gun and traps, you could not record a fraction of the interesting photographs and stories that are contained in "American Wild Life." No one man could accomplish the task. 160 specially qualified writers from all 48 states gathered all available data from the records of regional natural history institutions, government specialists, state naturalist societies, zoological authorities, and every other source of recognized information. From this wealth of material, these 160 writers drew the fascinating stories for "American Wild Life." The result is no mere catalog or encyclopedia of technical data, but a storehouse of enjoyable reading, prepared in popular narrative style, so that not only the mature adult but the growing child as well, will derive the keenest pleasure from it. It will also prove of great enjoyment and usefulness to sportsmen, hunters and anglers.

327 Photographic Illustrations— 6 Full Page Plates in Natural Colors!

The extraordinary collection of wild life pictures in this volume vies with the text for interest. The 327 pictures show an amazing variety of wild creatures in their natural haunts, their everyday attitudes and ways of living. Here is the art of the photographer in its rarest form; to it has been added the art of modern photo-engraving, which renders every detail of the originals with marvelous fidelity. The crowning feature of the collection is a series of six full-page plates in NATURAL COLOR, which you may well be tempted to remove from the book for framing.

Not the least valuable feature of "AMERICAN WILD LIFE" is its complete index for ready reference, which enables you to find instantly in this book any animal subject in which you are especially interested.

Five Books Bound in One

Originally "AMERICAN WILD LIFE" was planned as a five-volume set of books. However, to keep the cost down within everyone's reach without sacrificing the quality of the illustrations or the printing, it was decided to put all five books within one set of covers. In its final form, the 778 pages are divided into sections resembling five books, each with its own frontispiece, which are represented this way: Volume One: Mammals; Volume Two: Fishes; Volume Three: Reptiles and Amphibians; Volume Four: Land Birds; Volume Five: Water Birds and General Index. See partial list of contents on outside of cover flap.

DO YOU KNOW . . . ?

A PRAIRIE-DOG CITY, its avenues stretching for many miles, constitutes nothing less than a subterranean housing development on a large scale!

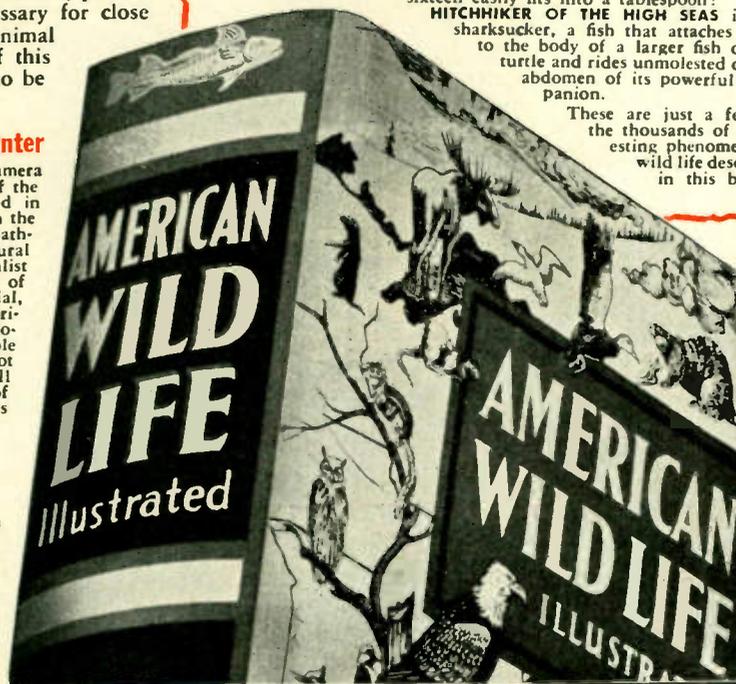
TO RID ITSELF OF FLEAS, the fox, taking a stick in its mouth, slowly submerges in a pool of water. As it sinks, the fleas move upward to drier regions. When only the wood remains above the surface, the fleas desert the sinking fox to take refuge on the raft. Thereupon the fox releases the stick, leaving the fleas to their fate.

THE CLASSIC BELIEF is that the bat becomes entangled in a woman's hair and cannot be removed until every one of the fair victim's locks is clipped to the scalp. Yet there is no actual record of this ever having happened!

THE YOUNG OF THE OPOSSUM are so small at birth that a litter of sixteen easily fits into a tablespoon!

HITCHHIKER OF THE HIGH SEAS is the sharksucker, a fish that attaches itself to the body of a larger fish or sea turtle and rides unmolested on the abdomen of its powerful companion.

These are just a few of the thousands of interesting phenomena of wild life described in this book.



EXAMINE IT 7 DAYS FREE!

"AMERICAN WILD LIFE" must be seen to be fully appreciated. That is why—even if you haven't yet decided to buy it—we want to send you a copy for FREE EXAMINATION. After you have seen it, and wish to keep it, you may pay the low price of only \$3.50, plus a few cents postage, in small monthly payments, if you like. Otherwise return the book to us and you will not be obligated in any way. Cut out and mail the Examination Card at the right today. WM. H. WISE & CO., INC., 50 W. 47th St., New York 19, N. Y.

"Wouldn't sell it for any price unless I could get another like it." —P. J. T., Newton, Iowa.

"Print and paper exceed my expectations. Entertainingly written." —E. C. M., Phoenix, Ariz.

"Perfect for the learning child." —R. H. B., Safety Harbor, Fla.

pay
only

\$3.50
If you decide
to keep it!

(Copyright, by
Wm. H. Wise & Co., Inc.)

CUT OUT AND MAIL THIS CARD for Your FREE EXAMINATION COPY

No Stamp Required—Post Office Will Accept It.

[Good only in U. S.]

WM. H. WISE & CO., INC.
50 West 47th Street,
New York 19, N. Y.

DO NOT WRITE IN BOXES

I wish to examine, without obligation or expense, a copy of AMERICAN WILD LIFE. When it is ready, ship it postage prepaid. After 7 days free examination I will either return the book and owe you nothing; or keep it and send you initial payment of only \$1, and then \$1 a month until the low price of only \$3.50, plus a few cents postage, is paid.

SAVE CHARGES ON 4-LB. SHIPMENT—Mail only \$3.50 with this coupon as full payment and we will pay shipping charges. As stock is limited, cash orders will receive priority in delivery. Some return privilege and refund guarantee.

101

806

NAME.....
(PRINT PLAINLY IN BLOCK LETTERS)

ADDRESS.....
CITY &
ZONE NO.

STATE.....

Check here if you wish to examine beautiful Deluxe Edition in genuine Morocco-Grained Artcraft embossed with hand-tooled design in forest green and bronze. Only \$1 extra. Same terms.

Check this box if you wish to enter your reservation for the companion volume "Wild Life Around the World" to complete this set and to be sent you as soon as it is ready in a month or two. While "American Wild Life" deals with all the living creatures of our country, this second volume covers the fascinating lives of animals, birds, fishes, insects, etc., in all the far jungles, rivers, plains, oceans and skies of the entire earth. Over 640 exciting pages—over 380 thrilling illustrations! Some price and terms.

See Inside of this Cover for Trial Offer on
American Wild Life

In the Partial List of Subjects Below You Get Just a Glimpse of the Wonders in this Superbly Illustrated Book!

MAMMALS

Whales
Dolphins and Porpoises
Armadillo
Mountain Sheep
Mountain Goat
Bison
Pronghorn
Antelope
Caribou
Moose, Deer
Pecary
Hares, Rabbits
Porcupine
Jumping Mouse
Mountain Beaver
Muskrat
Beaver
Pocket Gopher
Woodchuck
Prairie-Dog
Chipmunk
Squirrels
Sea-Lions
Lynx
Ocelot
Jaguar
Cougar
Coyote
Wolf, Fox
Badger
Skunk
Otters
Weasels
Raccoon
Beaver
Bats, Moles
Opossum

BIRDS

Thrushes
Kinglet
Wren Tit
Nuthatches

Wren
Thrushes
Warblers
Shrike
Swallows
Tanager
Starling
Crows
Magpie
Lark, Jay
Fly-catcher
Hummingbird
Swift
Goatsuckers
Woodpeckers
Kingfisher
Roadrunner
Parrot, Owl
Falcons
Eagles, Hawks
Doves
Turkey
Grouse
Quails and Bob-Whites
Cranes, Herons
Spoonbills
Swans
Pelicans
Cormorants
Albatross
Gulls, Geese
Skimmer
Auks, Puffins
Loons

REPTILES

Alligator
Crocodile
Lizards
Racerunners
Skinks
Dwarf Boas
Turtles
Terrapins
Tortoises



PREHISTORIC MONSTER?
NO! It's the Pacific Horned Lizard, or "Toad" and it's quite real and alive!

Sun Turtles
Soft-Shell
Turkey
Turtles

AMPHIBIANS

Narrow-Mouthed Toads
Frogs
Spadefoot Toads
Bell Toad
Siren
Mud Puppy
Lungless Salamanders
Congo Eel
Newts
Mole Salamander
Hellbender

FISHES

Batfish
Sunfish
Porcupinefish
Trunkfish
Filefish and Triggerfish
Sharksucker
Goby

Demoiselle
Sergeonfish
Angelsh
Pilotfish
Snapper
Sea Bass
Black Bass
Perch, Darter
Dolphin
Snailfish, Marlin
and Swordfish
Mackerel, Tuna
and Albacore
Barracuda
Mullet
Seahorse
Codfish
Flyingfish
Pike and Muskellunge
Catfish
Dace, Minnow
Carp, Sucker
Eel
Salmon, Trout
Sharks, Rays
Tarpon, Sturgeon
Goby

FULL INDEXED

"I'll Be Right Over!"

...24 hours a day your doctor is "on duty"...
guarding health... protecting and prolonging life...

● Plays... novels... motion pictures... have been written about the "man in white" and his devotion to duty. But in his daily routine he displays more devotion to the oath he has taken than the most imaginative mind could ever invent. And he asks no special credit. When there's a job to do, he does it.



Read Full Details Inside This Cover—Then Cut Out and Mail Card Below—No Stamp Needed!

According to a recent Nationwide survey:

MORE DOCTORS SMOKE CAMELS THAN ANY OTHER CIGARETTE!

THREE of America's leading independent research organizations asked 113,597 doctors to name the cigarette they themselves preferred to smoke.

The answers came in by the thousands... from doctors in big cities, in small towns... from general physicians, diagnosticians, surgeons, specialists—doctors in every branch of medicine! Results? More doctors named Camel as their smoke than any other cigarette!

Yes, a doctor, too, smokes for pleasure. Full flavor and mildness mean as much to him as they do to any other smoker.



THE "T-ZONE" TEST WILL TELL YOU

The "T-Zone"—T for taste and T for throat—is your own laboratory for any cigarette. For only your taste and your throat can decide which cigarette tastes best to you... and how it agrees with your throat.

CAMELS Costlier Tobaccos

R. J. Reynolds Tobacco Co., Winston-Salem, N. C.

WM. H. WISE & CO., Inc.

50 West 47th Street
NEW YORK 19, N. Y.

4c POSTAGE WILL BE PAID BY

BUSINESS REPLY CARD

No Postage Stamp Necessary if Mailed in the United States

FIRST CLASS
PERMIT NO. 10
(Sec. 510, P.L. & R.)
NEW YORK, N. Y.