

March

BROADCAST
WRNY
STATION

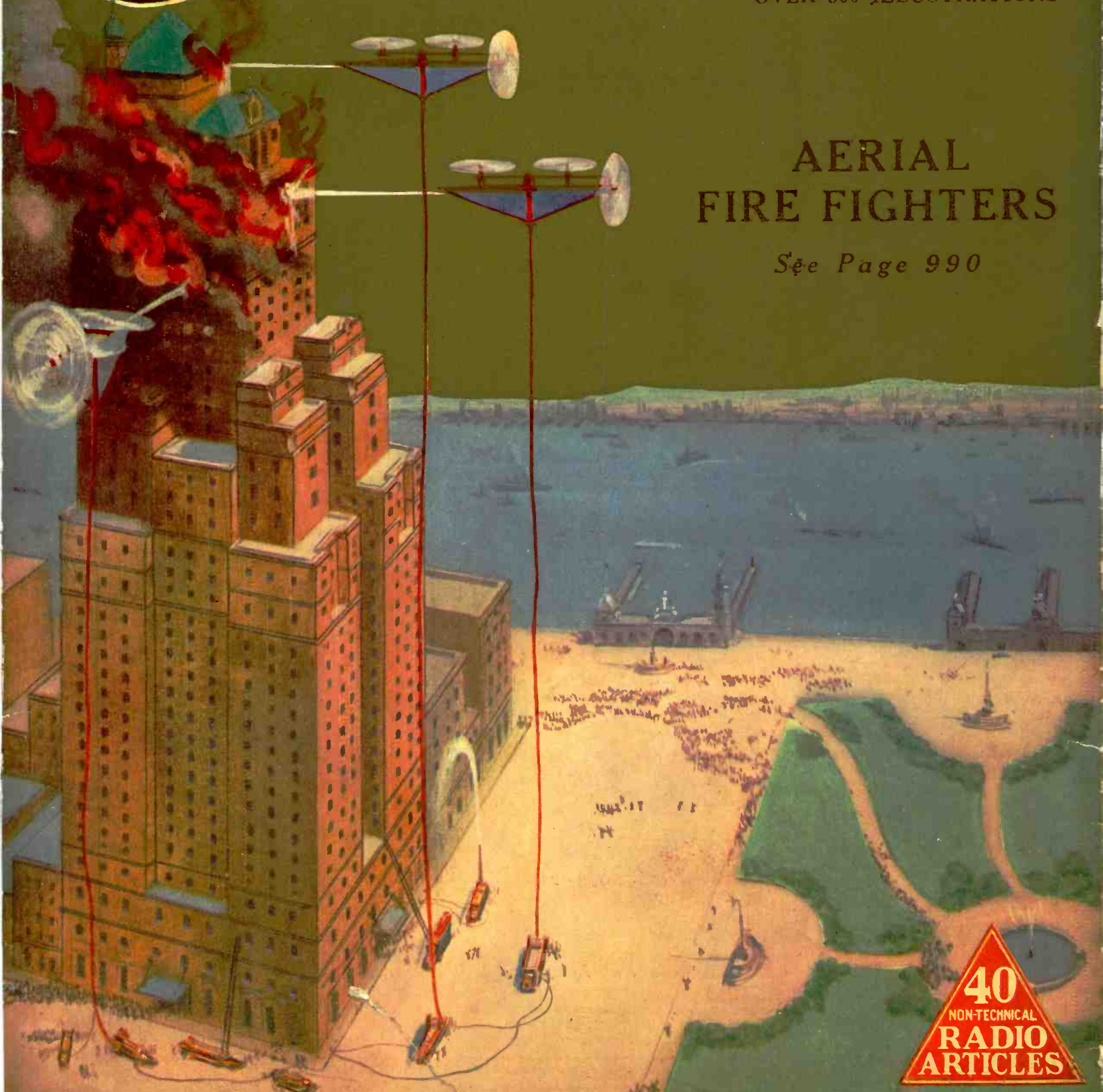
25 Cents

Science and Invention

OVER 300 ILLUSTRATIONS

AERIAL
FIRE FIGHTERS

See Page 990



40
NON-TECHNICAL
RADIO
ARTICLES

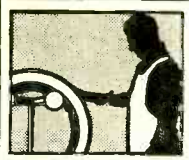
EXPERIMENTER PUBLISHING COMPANY, NEW YORK, PUBLISHERS OF
 RADIO NEWS - SCIENCE & INVENTION - RADIO LISTENERS' GUIDE - AMAZING STORIES - MONEY MAKING - RADIO INTERNACIONAL

BIG PROFITS *in* a New Business!

Six Steps in Nestlerizing



Compound No. 1



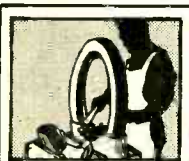
Tar ching



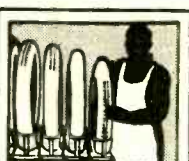
compound No. 2



Rerubbing



Clamping



Curing

The above illustrations show how the Patented Nestler Rubber Fusing Process is performed.

Even if you are now making "good money", you can greatly increase your income in a new all-year-round business of your own where you will be steadily building larger and larger future profits—limited only by your efforts. Already hundreds of Nestler Operators, throughout the world, are helping motorists CUT TIRE EXPENSE IN HALF. This remarkable saving is now made possible by the famous Nestler Rubber Fusing Process. In other words, this Process adds 75% more mileage to tires usually thrown away.

PAY OUT OF YOUR PROFITS

A new liberal time payment arrangement allows Nestler Operators to pay out of their profits for the Nestler Patented Equipment. Many of these men are surprised to find how easy it is to pay out of their earnings, since demand for Nestlerized tires is keen and their profits are limited only by their own endeavors.

NESTLER RUBBER FUSING PROCESS

EASILY LEARNED

Note the illustrations at the left. Only six major operations are required in Nestlerizing. With the Nestler Manual our operators all over the world have learned in a few days to perform expertly this famous money-saving Process. Every detail of shop practise is explained clearly and simply in this book. Moreover, any additional assistance required is promptly extended by our expert tire men.

BEGIN AT ONCE

Since your territory is amply protected it is not necessary to go to the expense of first opening a store on a prominent thoroughfare. You can begin, if you like, in your own home or garage. Many successful Nestler Operators are doing just this and move to better locations as business expands.

Send for this
FREE BOOK



TERRITORIAL RIGHTS

Each Nestler service station is fully protected against competition in its territory. If you write at once, you will doubtless obtain the choicest location you desire.

Write Today!

NESTLER RUBBER FUSING COMPANY, Inc.
Dept. SA-3

245 West 55th Street, New York City

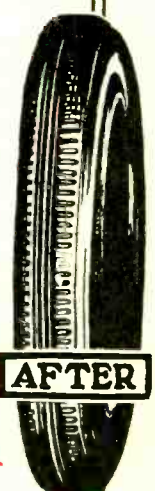
RESERVE TERRITORIES NOW!

"New Tires for OLD"

Men Wanted!

Each mail is bringing inquiries from foresighted men who are interested in starting in this profitable new business. Tire servicing, under the Nestler Process, is a NEW BRANCH of the profitable Automobile Industry.

If you are contemplating a money-making business of your own, write today for full information. We urge you not to delay.



A Perfect Fusion of New Rubber is achieved at last!

The average car owner throws away two tires every year. Over 45,000,000 tires are junked every 12 months. Consider the profits to be made by a Nestler Operator in your community. No method can compare with Nestlerizing—because new rubber IS FUSED PERFECTLY TO THE OLD TREAD, thus saving the good rubber. No stripping, buffing, cementing or drying. Much material and time are saved and the Nestler operator's profits are consequently larger.

GET THE FACTS NOW!

Write immediately for "THE NESTLER PLAN". This interesting illustrated booklet fully describes this new business. With this booklet will be included a Statement of Facts, telling of the success of our Nestler Operators located not only in this country but throughout the world. In a short time, the NESTLER RUBBER FUSING PROCESS has been universally accepted as the last word in tire servicing methods.

O.C. MILLER
Director of
Extension
Work



3 Drafting Lessons Actually FREE!

to Prove You Can Learn at Home in Spare Time!

We have invented a new, simplified way to teach Drafting—the first real improvement in Drafting home-instruction in history. We want you to see it, try it—without one penny of cost or obligation. We want to show you how we get away from the copying methods used in the past. See how we make you think, solve problems, do actual drafting room jobs from the first lesson!

**I WILL MAKE
this Contract
with You—**

Draftsmen Wanted! \$60 to \$125 a Week!



AMERICAN SCHOOL
—the Million Dollar
Educational Institution.



When you enroll for our home-training in Drafting, we agree to give you:

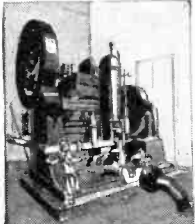
1. Complete Drafting training, by the new Practice-Method.
2. Professional Drafting Outfit, as illustrated.
3. We will help you get a good Drafting position at a substantial increase in pay.
4. Or we'll refund every cent of your money.

O.C. Miller
Director Extension Work

The American School, a million dollar No-Profit Educational Institution now offers men a double service—training for a specific job, then finding the job. For one small price, on terms of only \$5 a month, you are now assured of definite benefits, both in position and salary. Write for complete information—today!

**FREE
Job Service!**

The American School now offers its students and graduates, without cost, the services of an efficient Employment Department keeping in constant touch with employes of Draftsmen all over the United States. We have placed hundreds of men in good big-pay Drafting positions. We've made this training so complete, so practical, so easy to master, that our students are bound to make good. And, so, because the demand for real Draftsmen continues to exceed the supply, and because this training actually prepares men for good Drafting positions, we back it with a Free Employment Service.



No machine can be built until the Draftsman first builds it on paper. My training prepares you for this work.



Never has the world seen anything like the building boom of today. This has created enormous demand for real Draftsmen.

**WIN SUCCESS
THRU DRAFTING**

Drafting is easy, fascinating work. Short hours. Big pay. And the Draftsman is always in line for promotion for executive positions. This training is complete. It includes high-school subjects. (If you need them) and all the Engineering and M-a-t-h-e-matics Drafting Experts require.



70,000 fine jobs advertised last year. Get ready to fill one. Get out of the rut. Make something of yourself. Plan your future in Drafting. Even if you have only common schooling, even if you know nothing of Drafting, we guarantee to make you a real Draftsman or to refund your money! Special surprise offer right now to the first 500 men who answer this ad—reduced price, easy terms. Coupon brings complete information.

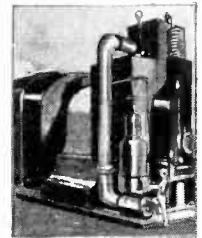
A new, rapid, simplified training
Copying drafting lessons prepares you to be only a "tracer." This new "Job-Method" gives you actual drafting-room jobs in a new one-step-at-a-time way. With pictures which you can understand almost without reading the "lessons." And that is why the American School-trained Draftsmen can qualify for a good job at big pay when they graduate.

5 BIG-PAY Branches

The big money in Drafting goes to men who specialize in Machine Design, or Electrical Drafting, or Architectural Drafting, or Structural, or Automotive. It is not enough merely to know general Drafting practice. You must know how to calculate and design and plan original work. You need many Engineering subjects to fill the kind of a Drafting position that pays \$60 to \$125 a week. The American School now includes this specialized training in its Drafting course.

Coupon Brings 3 Lessons FREE!

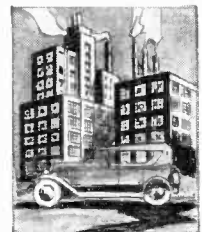
Get them. Test your own ability to learn Drafting and get ready for a fine job and big pay. Coupon also brings surprise offer, and complete information about your opportunities for success in Drafting. Mail It Today!



Electricity needs Draftsmen who know Electrical principles as well as general Drafting practice. I give you this training.



The demand for Draftsmen who specialize in concrete and structural steel work is enormous. Many big-pay positions open.



Every great Auto factory employs Draftsmen who specialize in Automotive work—men who design bodies, plan engines, etc.

3 Drafting Lessons Actually FREE!

O. C. MILLER, Director of Extension Work

AMERICAN SCHOOL

Dept. D-326, Drexel Ave. & 58th St., Chicago.

Rush 3 Free Drafting Lessons, Job and Raise offer, complete information, money-back guarantee, etc., to prove I can become a real Draftsman at home in spare time.

Name
Street No.
City State.....

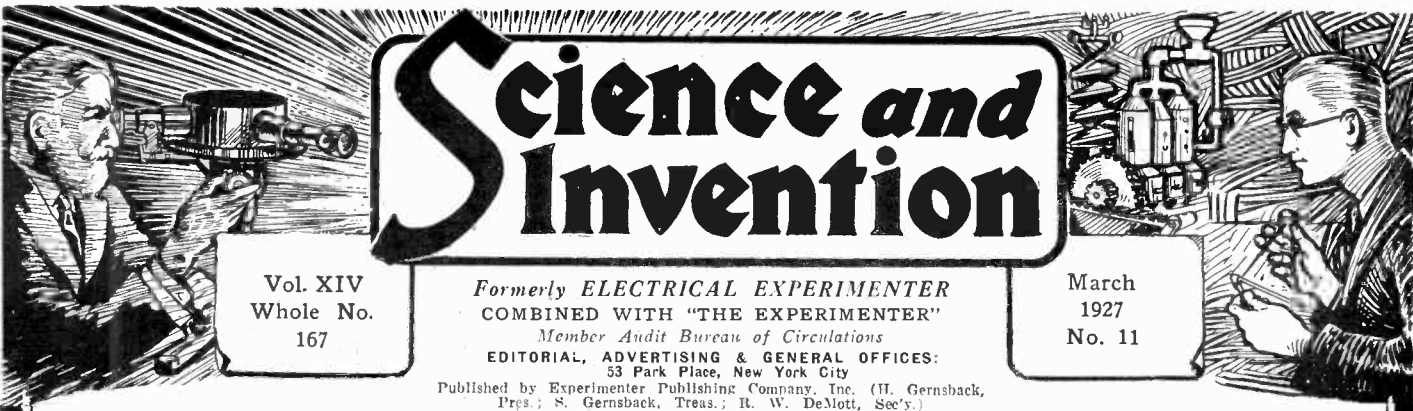
**Costly Drafting
Outfit Given!**

Fine, imported instruments like these help you learn Drafting quickly and easily. These standard quality, full size instruments, board, table, triangles, T square, ink, protractor, etc., given to every student without extra cost.

O. C. MILLER,
Director
EXTENSION WORK

AMERICAN SCHOOL

Dept. D-326
Drexel Ave. & 58th St.
CHICAGO



Science and Invention

Vol. XIV
Whole No.
167

Formerly **ELECTRICAL EXPERIMENTER**
COMBINED WITH "THE EXPERIMENTER"

March
1927
No. 11

Member Audit Bureau of Circulations
EDITORIAL, ADVERTISING & GENERAL OFFICES:
53 Park Place, New York City
Published by Experimenter Publishing Company, Inc. (H. Gernsback,
Pres.; S. Gernsback, Treas.; R. W. DeMott, Sec'y.)
Publishers of **SCIENCE & INVENTION, RADIO NEWS, RADIO
INTERNACIONAL, RADIO REVIEW, AMAZING
STORIES and MONEY MAKING**

EDITORIAL STAFF

- HUGO GERNSBACK, *Editor-in-Chief.*
H. WINFIELD SECOR, *Managing Editor.*
T. O'CONNOR SLOANE, Ph.D., *Associate Editor.*
JOSEPH H. KRAUS, *Field Editor.*
JAMES FRANCIS CLEMENGER, *Radio Editor.*
S. GERNSBACK, *Wrinkles Editor.*
K. H. JOY, *Art Director*

CONTRIBUTING EDITORS

- Astronomy—**
Dr. Donald H. Menzel, Ph.D.
Prof. W. J. Luyten, Harvard College
Observatory.
- Entomology and Allied Subjects—**
Dr. Ernest Bade, Ph.D.
- Physics—**
Dr. Harold F. Richards, Ph.D.
Ernest K. Chapin, M.A.
Dr. Donald H. Menzel, Ph.D.
- Automotive Subjects—**
George A. Luers
- Chemistry—**
Raymond B. Wailes,
Dr. Ernest Bade, Ph.D.
- Radio—**
A. P. Peck.
Herbert Hayden.
- Magic and Psychic Phenomena—**
Joseph Dunninger.
Joseph F. Rinn.
Edward Merlin.
- Foreign Correspondents—**
Dr. Alfred Gradenwitz, Germany.
Dr. H. Becher, Germany.
C. A. Oldroyd, England.
S. Leonard Bastin, England.
Count A. N. Mirzoeff, France.
Hubert Slouka, Czecho-Slovakia.
P. C. van Petegem, Holland.
Richard Neumann, Austria.

IN APRIL ISSUE

- The Sun and Its Neighbors**
The first of a new series of popularly written astronomy articles by Prof. W. J. Luyten of Harvard College Observatory.
- Protective Coloring in Insect Life**
How Nature has provided insects with clever camouflage will be described by Herbert C. McKay, A.R.P.S.
- Interviewing Inventors**
A popular article combining human interest and sidelights on the inventive genius of some of our greatest inventors written by a man who has interviewed them.
- Tonsils and Sinuses**
Are your tonsils and sinuses healthy? Methods now used for diagnosing them when diseased will be illustrated and described.
- Home Mechanics!**
Full details will appear in the next issue for building a home telephone table and stool.

CONTENTS OF THIS NUMBER

Editorial.....	985	Solving Metropolitan Traffic Conges- tion.....	1002
By Hugo Gernsback		By Hugo Gernsback, Member American Physical Society	
How New York Edison Station Watches Smoke and Weather..	986	Into the Fourth Dimension—Seventh Installment.....	1004
Marvels of Interplanetary Space..	987	By Ray Cummings	
Television by New French System..	988	Our Spiritualistic Investigations, No. 8 of a Series.....	1006
By Lucien Fournier		By "Dunninger"	
Trade-Marking Walnuts.....	989	Monthly Matchcraft Prize Contest— \$100.00 in Prizes.....	1007
A Power-House on Wheels.....	989	Is the Earth Slowing Down?.....	1008
Fighting Flames From the Air....	990	By Prof. Donald H. Menzel, Lick Observatory, Mt. Hamil- ton, Calif.	
By Joseph H. Kraus		The Astrology Humbug.....	1009
Gas Masks Used by Railroad Crews.	991	By Joseph H. Kraus	
The World's Furnace.....	992	Science Makes Women More Beau- tiful.....	1010
Playing on Three Violin Strings at Once.....	992	By Rhys G. Thackwell	
The Month's Scientific News Illus- trated.....	993	Science in Toyland.....	1011
By George Wall		Further Awards in "Board Con- test".....	1012
Hints on Home Heating.....	994	Wirecraft—\$3,000.00 in Prizes.....	1013
By H. Winfield Secor		The Month's New Devices.....	1014
Why a Cat Always Lands On Its Feet.....	995	The Home Scientific.....	1015
Corrosion-Proof Aluminum At Last.	996	Home Mechanics—A Book Trough End Table.....	1016
By Dr. Alfred Gradenwitz		By William M. Butterfield	
Propagation of Tree Cuttings In a Sterile Liquid.....	997	"Magic"—Monthly Department....	1017
By Count A. N. Mirzoeff		By Dunninger	
Magician Escapes From Cauldron of Water.....	998	Model Department—Cup Winner...1018	
Synthetic Sausage Skins.....	999	Motor Hints.....	1020
By D. B. McRae		By George A. Luers	
Storms To Order For the Movies...1000		Everyday Chemistry.....	1021
By Edwin Schallert		By Raymond B. Wailes	
To Explore the Ocean Depths In Steel Tank.....	1001		

HOW TO SUBSCRIBE FOR "SCIENCE AND INVENTION." Send your name, address and remittance to Experimenter Publishing Co., 53 Park Place, New York City. Checks and money orders should be made payable to Experimenter Publishing Co., Inc. Mention the name of the magazine you are ordering inasmuch as we also publish RADIO NEWS, RADIO INTERNACIONAL, AMAZING

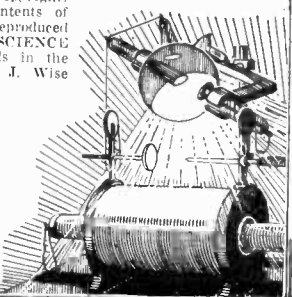
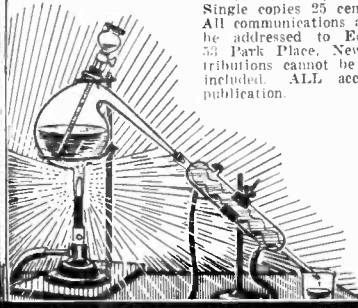
STORIES, RADIO REVIEW AND MONEY MAKING. Subscriptions may be made in combination with the other publications just mentioned at special reduced club rates. Send postal for club rate card. Subscriptions start with the current issue unless otherwise ordered. ON EXPIRATION of your subscription we enclose a renewal blank in our last number to you, and

notify you by mail. Then unless we receive your order and remittance for a renewal, delivery of the magazine is stopped. CHANGE OF ADDRESS: Notify us as far in advance as possible, giving your old address as well as the new one to which future magazines are to go. It takes several weeks to make an address change on our records.

SCIENCE AND INVENTION is published on the 10th of each month. There are 12 numbers per year. Subscription price is \$2.50 a year in U. S. and possessions. Canada and foreign countries \$3.00 a year. U. S. Coin as well as U. S. stamps accepted (no foreign coin or stamps). Single copies 25 cents each. All communications and contributions to this journal should be addressed to Editor, SCIENCE AND INVENTION, 53 Park Place, New York City, N. Y. Unaccepted contributions cannot be returned unless full postage has been included. ALL accepted contributions are paid for on publication.

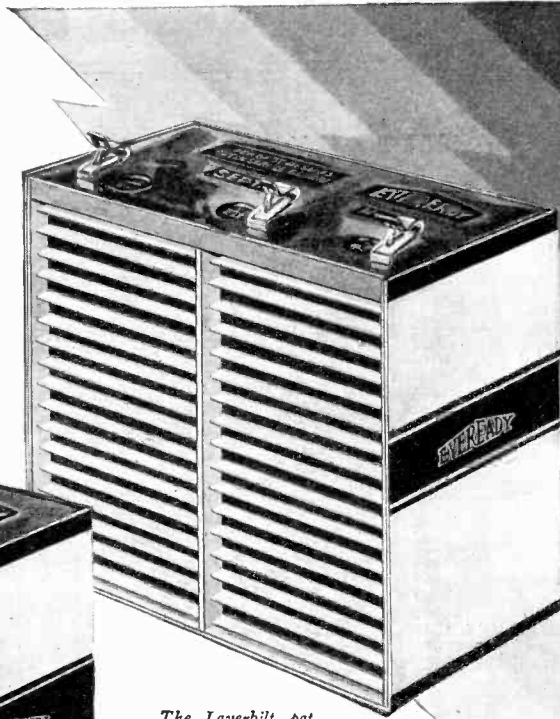
SCIENCE AND INVENTION, Monthly. Entered as second class matter May 10, 1924, at the Post Office at New York, N. Y., under the act of March 3, 1879. Additional entry at Long Island City, N. Y., and San Francisco, Calif. Title Registered at the Patent Office, Copyright, 1927, by E. P. Co., Inc., New York. The Contents of this Magazine are copyrighted and must not be reproduced without giving full credit to the publication. SCIENCE AND INVENTION is for sale at all newsstands in the United States and Canada. European Agents, S. J. Wise Et Cie, 40, Place Verte, Antwerp, Belgium.

ADVERTISING REPRESENTATIVES
FINUCAN & McCLURE, 720 Cass Street, Chicago, Ill.
DAVIES, DILLON & KELLY, 15 West 10th St., Kansas City, Mo.
T. F. MAGRANE, Park Square Bldg., Boston, Mass.
HARRY E. HYDE, 518 Drexel Building, Philadelphia, Pa.
A. J. NORRIS HILL CO., 5 Third St., San Francisco, Calif.
412 West 6th St., Los Angeles, Calif.



NEW!

Eveready Layerbilt
"B" Battery No.
486, the Heavy-
Duty battery that
should be specified
for all loud-speaker
sets.



The Layerbilt pat-
ented construction
revealed. Each layer
is an electrical cell,
making automatic
contact with its
neighbors, and fill-
ing all available
space inside the bat-
tery case.

DIFFERENT!

For greatest economy all loud speaker sets require the new Eveready Layerbilt "B" Batteries

IT WILL pay you, in convenience and reliability as well as in dollars and cents saved, to use this remarkable battery.

The reason for the Eveready Layerbilt's surprising performance lies in its exclusive, patented construction. No other battery is like it. It is built in flat layers of current-producing elements, making practically a solid block. The layers make connection with each other automatically, and occupy all available space inside the battery case. Layer-building packs more active materials in a given area, and makes those materials produce more electricity.

Every loud-speaker set should use Heavy-Duty batteries, for they alone offer economy on modern receivers. When you buy new "B" batteries, be sure to get the Heavy-Duty size, and remember that the Eveready Layerbilt has proved to be the longest lasting, most economical of all Heavy-Duty batteries.

Our laboratories are continually testing batteries, and in all our tests we have yet to find a battery that is equal to the new improved and radically different Eveready Layerbilt "B" Battery No. 486. The development and perfecting of this remarkable

battery is an outstanding battery-building achievement. It is the result of many years' experience plus the facilities and resources of the pioneer manufacturers of all dry cell batteries.

NATIONAL CARBON CO., INC.
New York San Francisco
Unit of Union Carbide and Carbon Corporation

Tuesday night is Eveready Hour Night
—9 P. M., Eastern Standard Time, through
the following stations:

WEAF—New York	WTAM—Cleveland
WJAR—Providence	WWJ—Detroit
WEEL—Boston	WGN—Chicago
WTAG—Worcester	WOC—Davenport
WFI—Philadelphia	WCCO—Minneapolis
WGR—Buffalo	WLS—St. Paul
WCAE—Pittsburgh	KSD—St. Louis
WSAI—Cincinnati	WRC—Washington
	WGY—Schenectady

INDEX TO ADVERTISERS

INDEX TO ADVERTISERS

Page	Page	Page	Page
A	D	Mc	R
Acme Pants Matchers.....1062	D. E. Lightning Products Corp..1069	Lacey & Lacey.....1050	Plymouth Rock Squab Co.....1068
Allied Merke.....1047	Douglas, Lyle.....1068	Lancaster & Allwine.....1050	Polochek, Z. H.....1052
American Correspondence School of Law.....1062	E	Le Pages Craft League.....1055	Polk, R. L.....1056
American School of Aviation.....1067	Eaton, Raymond A.....1068	Loftis Bros.....1054	Porter Chemical Co.....1067
American School of Correspondence.....977	Elto Outboard Motor Co.....1066	M	Practical Mechanic.....1067
American School of Music.....1062	Engineers Service Co.....1065	McCarrie School of Mechanical Dentistry.....1064	Press Guild.....1071
American School of Photography.....1052	Esgee Watch Co.....1070	McGraw-Hill Book Co.....1057	
American Telephone & Telegraph Co.....1059	Evans, Victor J.....1053	M	
Anita Co.....1062	F	Maxson, F. P.....1061	R
Artcraft Studios.....1068	Fawcett Publications, Inc.....982	Metal Arts Co., Inc.....1069	Radio Ass'n of America.....1067
Audel & Co.....Inside Back Cover	Fenco Cone Co.....1070	Miller, Monroe.....1052	Radio Specialty Co.....1049
Aviator's Preparatory Institute..1054	First Hawaiian Conservatory of Music.....1042	Miniature Ship Models.....1045	Ragsdale, Hillyer W.....1056
	Fisher, Adam, Mfg. Co.....1052	Modern Magic Co.....1069	Randolph & Co.....1050
B	Forest De, Jimmy.....1066	Motion Picture Operators' School.....1067	Ross Gould Co.....1044
Baby Calculator Sales Co.....1065	Franklin Institute.....1041	Munn & Co.....1052	Russell Fraser Wire Co.....1058
Balda Art Service.....1069	Furness Bermuda Line.....1070	N	S
Barawick Co.....1062	G	National Carbon Co.....979	School of Engineering...1060, 1063
Bathe Mfg. Co.....1062	Gilson Slide Rule Co.....1068	National Radio Institute.....984	Scientific Apparatus Corp.....1054
Bell Perfume Co.....1044	Givens Chemical Co.....1063	Nestler Rubber Fusing Co.....Inside Front Cover	Sherms.....1060
Blanche Auto Device Co.....1054	H	New Method Manufacturing Co.....1064	Shipman Ward Mfg. Co.....1066
Blandin, Ernest W.....1068	Hanson, Vic Co.....1056	New York Electrical School...1042	Spors, F., & Co.....1044
Bliss Electrical School.....1064	Harden & Lavin.....1064	New York Institute of Photography.....1066	Standard Radio Co.....1063
Bogue Institute for Stammerers.1064	Hobart Bros.....1044	Northwestern School of Taxidermy.....1069	Strongfort, Lionel.....1065
Both, Meyer Co.....1042	Home Magazine.....1063	O	Strout, E. A. Realty Agy., Inc.1056
Bremer-Tully Mfg. Co.....1061	I	O'Brien, Clarence A.....1051	T
Buescher Band Instrument Co.....1058	Ideal Aeroplane & Supply Co...1067	Ogilvie Publishing Co., 1046, 1056, 1067	Tarbell System.....1046
Bureau of Inventive Science.....1052	Inkograph Co.....Back Cover	Olson & Enzinger.....1048	Titus.....1060
Burns School of Wrestling.....1069	International Correspondence Schools...1048, 1052, 1064, 1068	Owen, Richard B.....1050	U
C	International Encyclopedia.....1066	Ozment, C. J.....1060	University of Applied Science..1069
Carlton Mills.....1066	J	P	V
Chemical Institute.....983	Johnson, Smith Co.....1043	Page Davis School of Advertising.....1064	Von Boeckman, Paul.....1070
Chicago Painting School.....1053	K	Parker, C. L.....1052	W
Chicago Solder Co.....1071	Karol, B. & Sons.....1058	Parks Ball Bearing Machine Co.....1060	Waco Tool Co.....1044
Clarkson, David B.....1068	Kelsey Co.....1063	Plapao Co.....1069	Wagner, Geo.....1058
Clock Co.....1068	Kyograph Photo System.....1069		Washington School of Art.....1056
Coleman, Watson B.....1052	L		Washington School of Cartooning.....1048
Complex Oscillator Corp.....1059	La Fontaine.....1065		Washington Show Card School.1062
Conn, C. G., Ltd.....1061	LaSalle Extension University...1064, 1068		Western Airplane Corp.....1062
Connors Detective Agy.....1066	Laboratory Materials Co.....1064		Witte Engine Works.....1058
Consrad Co., 1074, 1074, 1075, 1078			World Battery Co.....1060, 1065
Coyne Electrical School.....981			X Y Z
			Young Typewriter Co.....1062

SCIENCE and INVENTION READERS' BUREAU

TEAR ALONG THIS LINE

Time and Postage Saver

IN every issue of SCIENCE AND INVENTION you undoubtedly see numerous articles advertised about which you would like to have further information. To sit down and write an individual letter to each of these respective concerns, regarding the article on which you desire information, would be quite a task. As a special service to our readers, we will write the letters for you, thus saving your time and money. Just write the names of the products about which you want

information, and to avoid error the addresses of the manufacturers, on the coupon below and mail it to us. If the advertiser requires any money or stamps to be sent to pay the mailing charges on his catalog or descriptive literature, please be sure to enclose the correct amount with the coupon. We will transmit to the various advertisers your request for information on their products. This service will appear regularly every month on this same page in SCIENCE AND INVENTION.

TO: READERS' SERVICE BUREAU,
EXPERIMENTER PUBLISHING CO., Inc., 53 Park Place, New York, N. Y.

S. & I. 3-'27


FROM WRITE YOUR NAME and ADDRESS HERE:

NAME

ADDRESS

CITY, STATE

Gentlemen: Please advise the firms listed below that I would like to receive detailed information on their product as advertised in the issue of SCIENCE AND INVENTION.

 This form should not be used for technical questions.

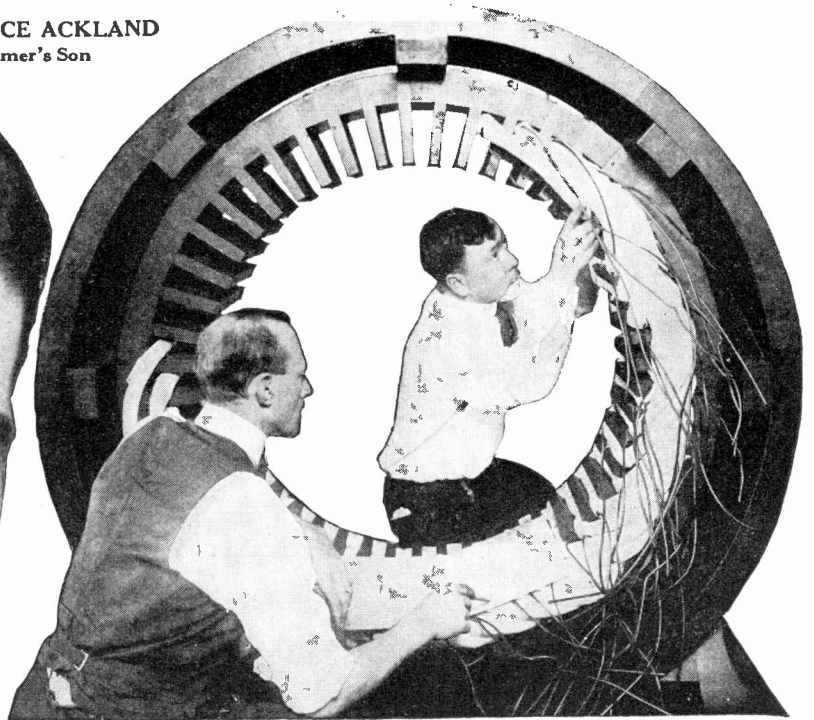
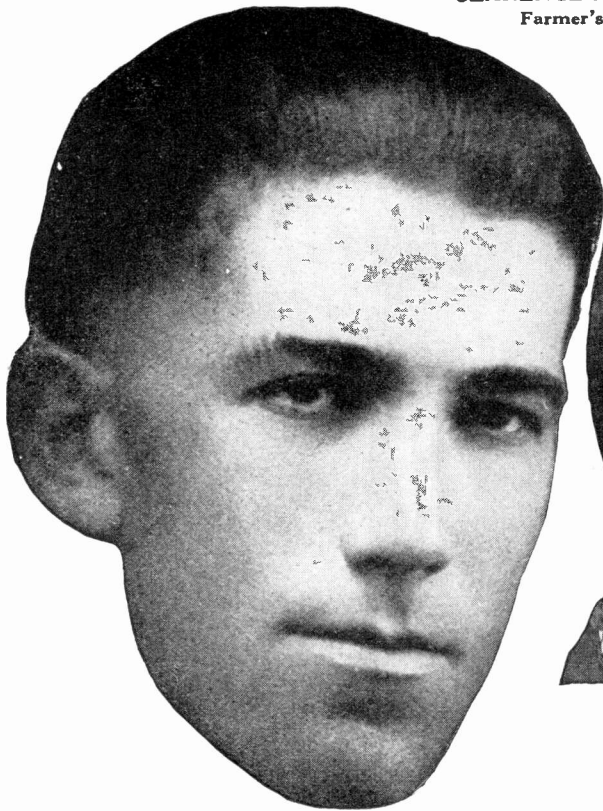
NAME	ADDRESS (Street—City—State)	List here specific article on which you wish literature.	If Catalogue of complete line is wanted check in this column.
.....
.....
.....

Check here if you are a dealer

Your Dealer's Name

Address

CLARENCE ACKLAND
Farmer's Son



I Learned ELECTRICITY Without Books or Lessons In 90 Days

"Today I am making more money than ever before in my life. Many days I have made as high as \$75 clear." That's what Clarence Ackland, farmer's son, does in Wt. Brooklyn, Ill., in just evenings and spare time. Coyne electrical training has brought steady jobs, big money, and spectacular success to thousands. No matter what your age, schooling, experience or job is now, investigate the amazing opportunities open to you.

SEE HOW QUICK YOU CAN EARN \$60 TO \$200 A WEEK

Ninety days—a mighty short time! But in those brief 12 weeks, Coyne training can make you a master of electricity. We couldn't begin to do it with books, or printed lessons. We couldn't hope to do it by correspondence.

We bring you to Chicago, with free railroad fare, we assist you to a part-time job, and we train you . . . in the great shops of Coyne . . . on real dynamos, generators, power plants, autos, engines, batteries, house-wiring, etc.—the greatest outlay of electrical apparatus ever assembled.

NOT By Correspondence

Here—and nowhere else in the world—can you get such training. Here, we give you years of actual experience in 90 days. Here, we can teach you far more than an ordinary electrician ever knows.

A Job? Don't worry about a job. Coyne training settles the job question forever. 60,000 additional electric-

ians are needed every year. Our employment bureau secures dozens of positions every week! We give you free employment service for life and back you for life thru our well organized graduate department.

And Pay? Boys not old enough to vote step into steady jobs paying \$50 and \$60 a week.

And Future? Coyne men have thousands of opportunities to make \$5,000 to \$10,000 a year.

**Free R. R. Fare—Free Radio and Auto Electrical Courses—
If You Enroll Now**

Coyne is your one great chance to get into electricity. You don't need a speck of experience. You don't need high school education. R. R. fare to Chicago is free when you enroll. And we help you to part-time work while training. We

H. C. LEWIS, Pres.

COYNE

ELECTRICAL SCHOOL

Dept. 37-83 1300 W. Harrison St., Chicago
28th Year—Founded, 1899

have removed every obstacle. And right now I am including FREE Automotive Electricity and Radio courses.

If you really want more money . . . if you want a real future for yourself or your family, this is your hour of opportunity. You can find out everything absolutely free. Simply mail coupon for the big, free Coyne Book of 150 photographs . . . facts . . . jobs . . . salaries . . . opportunities. This step does not obligate you. So act at once.



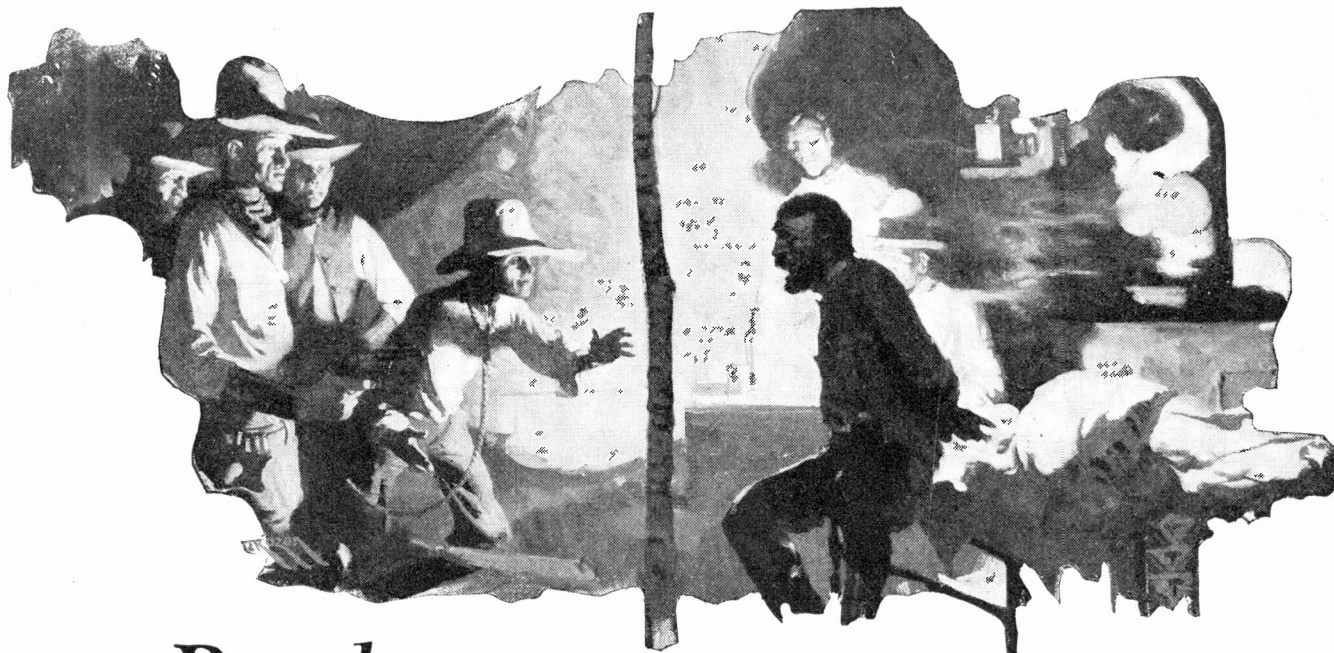
Send for This
Free Book
of Amazing
Opportunities

Mr. H. C. Lewis, Pres.,
Coyne Electrical School, Dept. 37-83,
1300 W. Harrison St., Chicago.

Dear Mr. Lewis:
Without obligation, send me your big free catalog and all details. I understand I will not be bothered by any salesman.

Name
Address
City State.....

For Romance and Adventure —



Read

Scene from "The Poddie," by Walt Coburn, famous cowboy author—one of the many tales of the romantic West in the March issue of TRIPLE-X Magazine, now on sale.

MARCH

PRICE
25c

Fawcett's
Triple-X
 Western-Adventure
 MAGAZINE

OUT
 TODAY

IN NO OTHER ADVENTURE MAGAZINE WILL YOU FIND SO MANY FAMOUS AUTHORS!

Here's what you'll read in the March TRIPLE-X:

"Liaison"—ARTHUR GUY EMPEY
Another great war story by the author of "Over the Top."

"The Voodoo Ship"—CAPTAIN DINGLE
High romance and adventure at sea.

"White Pigeon"—J. ALLAN DUNN
Four men fight for a pretty girl in the China Seas.

"The Poddie"—WALT COBURN
Cow-country novel by famous cowboy writer.

"Behind Grim Hills"—L. PAUL
Rousing tale of the far North.

AND MANY OTHER BIG STORIES

Fawcett's Publications, Inc.,
 Robbinsdale, Minn.

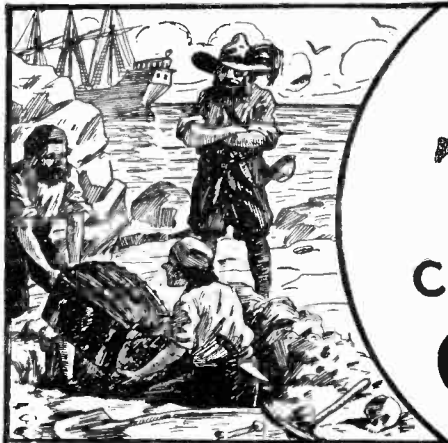
Enclosed find \$1 (in check or money order) for which please enter my name as a subscriber to your special five months offer. Or enclosed find 25c for which please send me one copy of the March issue of TRIPLE-X.

Name.....

Address.....

City.....

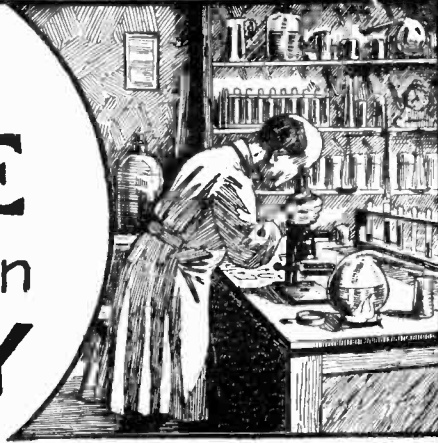
State.....



BURIED TREASURE

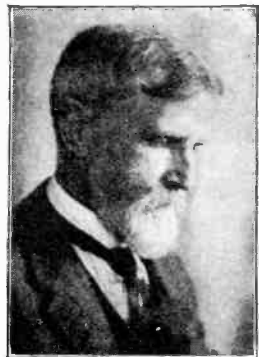
can still be found in

CHEMISTRY



Good Chemists Command High Salaries

and you can make yourself independent for life by unearthing one of chemistry's yet undiscovered secrets.



T. O'CONOR SLOANE,
A.B., A.M., LL.D., Ph.D.
Noted Instructor, Lecturer and Author. Formerly Treasurer American Chemical Society and a practical chemist with many well known achievements to his credit. Not only has Dr. Sloane taught chemistry for years but he was for many years engaged in commercial chemistry work.

Do you remember how the tales of pirate gold used to fire your imagination and make you want to sail the uncharted seas in search of treasure and adventure? And then you would regret that such things were no longer done. But that is a mistake. They *are* done—today and everyday—not on desert islands, but in the chemical laboratories throughout your own country. Quietly, systematically, the chemist works. His work is difficult, but more adventurous than the blood-curdling deeds of the Spanish Main. Instead of meeting an early and violent death on some forgotten shore, he gathers wealth and honor through his invaluable contributions to humanity. Alfred Nobel, the Swedish chemist who invented dynamite, made so many millions that the income alone from his bequests provides five \$40,000 prizes every year for the advancement of science and peace. C. M. Hall, the chemist who discovered how to manufacture aluminum made millions through this discovery. F. G. Cottrell, who devised a valuable process for recovering the waste from flue gases, James Gayley, who showed how to save enormous losses in steel manufacture, L. H. Baekeland, who invented Bakelite—these are only a few of the men to whom fortunes have come through their chemical achievements.

What Some of Our Students Say of This Course:

I have not written since I received the big set. I can still say that it far exceeded my anticipations. Since I have been studying with your school I have been appointed chemist for the Seranton Coal Co. testing all the coal and ash by proximate analysis. The lessons are helping me wonderfully, and the interesting way in which they are written makes me wait patiently for each lesson.—MORLAIS COUZENS.

I wish to express my appreciation of your prompt reply to my letter and to the recommendation to the General Electric Co. I intend to start the student engineering course at the works. This is somewhat along electrical lines, but the fact that I had a recommendation from a reliable school no doubt had considerable influence in helping me to secure the job.—H. VAN BENTHUYSEN.

So far I've been more than pleased with your course and am still doing nicely. I hope to be your honor graduate this year.—J. M. NORKUS, JR.

I find your course excellent and your instruction, truly, the clearest and best assembled I have ever taken, and yours is the fifth one I've studied.—JAMES J. KELLY.

From the time I was having Chemistry it has never been thus explained to me as it is now. I am recommending you highly to my friends, and urging them to become members of such an organization.—CHARLES BENJAMIN.

I shall always recommend your school to my friends and let them know how simple your lessons are.—C. J. AMDAHL.

I am more than pleased. You dig right in from the start. I am going to get somewhere with this course. I am so glad that I found you.—A. A. CAMERON.

I use your lessons constantly as I find it more thorough than most text books I can secure.—WM. H. THIBBS.

Thanking you for your lessons, which I find not only clear and concise, but wonderfully interesting. I am—ROBT. H. TRAYLOR.

I received employment in the Consolidated Gas. Co. I appreciate very much the good service of the school when a recommendation was asked for.—JOS. DECKER.



Experimental Equipment Furnished to Every Student

We give to every student without additional charge this chemical equipment, including forty-nine pieces of laboratory apparatus and supplies, and forty different chemicals and reagents. These comprise the apparatus and chemicals used for the experimental work of the course. The fitted heavy wooden box serves not only as a case for the outfit but also as a useful laboratory accessory for performing countless experiments.

CHEMICAL INSTITUTE OF NEW YORK, Inc.

Home Extension Division 3
66-R—WEST BROADWAY NEW YORK CITY

Now Is the Time to Study Chemistry

Not only are there boundless opportunities for amassing wealth in Chemistry, but the profession affords congenial employment at good salaries to hundreds of thousands who merely follow out its present applications. These applications are innumerable, touching intimately every business and every product in the world. The work of the chemist can hardly be called work at all. It is the keenest and most enjoyable kind of pleasure. The days in a chemical laboratory are filled with thrilling and delightful experimentation, with the alluring prospect of a discovery that may spell Fortune always at hand to spur your enthusiasm.

You Can Learn at Home

To qualify for this remarkable calling requires elaborate specialized training. Formerly it was necessary to attend a university for several years to acquire that training, but thanks to our highly perfected and thorough system of instruction, you can now stay at home, keep your position, and let us educate you in Chemistry during your spare time. Even with only common schooling you can take our course and equip yourself for immediate practical work in a chemical laboratory. Dr. Sloane gives every one of his students the same careful, personal supervision that made him celebrated throughout his long career as a college professor. Your instruction from the very beginning is made interesting and practical, and we supply you with apparatus and chemicals for performing the fascinating analyses and experimental work that plays such a large part in our method of teaching, and you are awarded the Institute's official diploma after you have satisfactorily completed the course.

Easy Monthly Payments

You don't have to have even the small price of the course to start. You can pay for it in small monthly amounts—so small that you won't feel them. The cost of our course is very low, and includes everything, even the chemistry outfit—there are no extras to buy with our course. Our plan of monthly payments places a chemical education within the reach of everyone. Write us and let us explain our plan in full—give us the opportunity of showing you how you can qualify for a highly trained technical position without even giving up your present employment.

Special 30 Day Offer

Besides furnishing the student with his Experimental Equipment, we are making an additional special offer for a short while only. You owe it to yourself to find out about it. Write today for full information and free Book "Opportunities for Chemists." Send the coupon right now while it is fresh in your mind. Or just write your name and address on a postal and mail it to us. But whatever you do, act today before this offer is withdrawn.

DON'T WAIT—MAIL COUPON NOW!

CHEMICAL INSTITUTE OF NEW YORK
Home Extension Division 3
66-R—West Broadway
New York City

Please send me at once, without any obligation on my part, your free Book "Opportunities for Chemists," and full particulars about the Experimental Equipment given to every student. Also please tell me about your plan of payment and your special 30 day offer.

NAME

ADDRESS

CITY..... STATE.....
S. & I.—March

FREE!



“MEN! Here's the 'dope' you've been looking for”

How TO GET INTO THE RADIO BUSINESS”

J.E.S.

Many Earn \$50 to \$250 a Week in Work That is Almost Romance

If you're earning a penny less than \$50 a week, clip coupon now for FREE BOOK! New book, profusely illustrated, tells all about the Radio Profession, thousands of opportunities—in work that is almost romance! YOU can learn quickly and easily at home, through our tested, improved methods, to take advantage of these great opportunities! Why go along at \$25 or \$35 or \$45 a week, when you can pleasantly and in a short time learn to be a Radio Expert, capable of holding the big pay jobs—many men in Radio now earn \$50 to \$250 a week.

Clip Coupon for Free Book

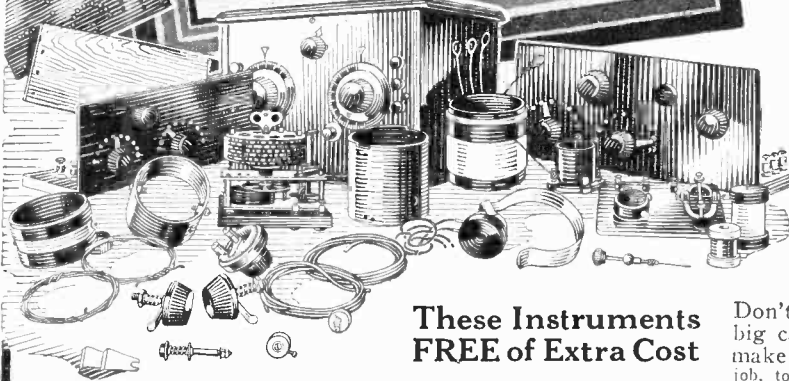
Don't envy the other fellow who's pulling down the big cash. Our proven home-study training methods make it possible for you, too, to get ready for a better job, to earn enough money so you can enjoy the good things of life. Most amazing book ever written on Radio tells how—thousands of interesting facts about this great field, and how we can prepare you, quickly and easily in your spare time at home, to step into a big-pay Radio job. You can do what thousands of others have done through our training. GET THIS NEW FREE BOOK. SEND COUPON TODAY.

J. E. SMITH, President

NATIONAL RADIO INSTITUTE

WASHINGTON, D. C.
Dept. CD-6

These Instruments FREE of Extra Cost



All instruments shown here and others—SIX BIG OUTFITS—sent to all students free of extra cost.

Clip coupon now—find out all about this big unequalled offer while you still have time to take advantage of it. Our training is intensely practical—these instruments help you learn to do the practical work. Receiving sets, from simplest kind to thousand-mile receiver. Many other big features.

My Radio Training Is the Famous “Course that Pays for Itself”

J. E. SMITH
President

Spare time earnings are easy in Radio when you know it the way we teach you. Increase your income almost from the start of your course through practical knowledge we give you. We show you how to hold the job, then our big Free Employment Department helps you get one. Free Book “Rich Rewards in Radio” tells how.

Howard B. Luce of Friedens, Pa., made \$320 in 7 weeks during his spare time. D. H. Sutt of Newport, Ark., writes, “While taking the course I earned in spare time work, approximately \$900.” Earl Wright of Omaha, reports making \$400 in a short time while taking his course—working at Radio in his spare time only. Sylvester Senso, 207 Elm Street, Kaukauna, Wis., made \$500.

And when your training is completed you're ready to step into a real big Radio job like C. C. Glow, Chief Operator of the Great Lakes Radio Telegraph Company; E. W. Novy, Chief Operator of Station WRNY; Edward Stanko, Chief Operator of Station WGR; and hundreds of other N. R. I. Trained men. The National Radio Institute, originators of Radio Home-Study Training, established 1914, today offers you the same opportunity these men had, under a contract that pledges you full satisfaction or money refunded on completing our training. It's your big chance to get into Radio—mail coupon for FREE Book and proof.

Radio Needs Trained Men

NOW! Special Short Time Offer 6 BIG OUTFITS

National Radio Institute, Dept. CD-6 Washington, D. C.

Dear Mr. Smith Without obligating me in any way, send me your FREE BOOK, “Rich Rewards in Radio,” and all information about your practical home-study, Radio Course.

Name.....

Address.....

Town.....

SEND THIS COUPON TODAY

Science and Invention

HUGO GERNSBACK, *Editor-in-Chief*

H. WINFIELD SECOR, *Managing Editor*

DR. T. O'CONNOR SLOANE, Ph.D., *Associate Editor*

Editorial and General Offices, - - - 53 Park Place, New York

"Those Who Refuse to Go Beyond Fact Rarely Get As Far As Fact" - - - HUXLEY

SCIENCE LENGTHENS OUR LIVES

By HUGO GERNSBACK

AS little as twenty generations ago, the average span of life of mankind was about forty years. In those days one did not expect to live longer than forty years, and while there were exceptions, to be sure, the average life-time of the ancient Roman, the ancient Greek, and men of the Middle Ages, was forty years. The greatest progress toward the conservation of human life and the lengthening of the span thereof, was made during the past 100 years. Medicine, which even today is not an exact science, was much less so in comparatively modern times. Some of the crudest, and, to us the most childish, "remedies" were used, even as recently as fifty years ago, and if you see some of our present-day patent medicines you may well ask yourself whether we have gained much knowledge today.

The diseases, however, that put out most lives, such as, for instance, pestilence, cholera, syphilis, and many other extremely contagious diseases, have today been checked to a large extent by sanitation and by a better understanding of the diseases themselves. The microscope possibly has done more to bring about this result than has any other agency. It has enabled our bacteriologists to wage successful war against germ life in general, and it may be said that we are making some satisfactory progress. To be sure, all of the diseases above named, and many more equally disastrous ones, are still with us, but it may also be said that they are now more under control than ever before, and that no country-wide epidemic can gain great headway in these days, except, perhaps, in uncivilized countries or inaccessible districts.

During the comparatively short span of 100 years, thanks to science, human life has been increased from 40 to some 60-odd years. This is really a tremendous increase for such a short time, and the results are due entirely to science. We do not even realize today that millions of our ancestors died annually, of such comparatively simple things as direct infections due to cuts, diseased teeth, and other equally simple causes,—all of which are today not even considered, because we have been taught to take care of such things in their inception, and think no more of them than of brushing off a fly. To be sure, we do not wear ourselves out as much as we did generations ago. We conserve our energies due to better transportation facilities, labor saving devices, etc., and thus we do not have to labor as hard as our grandfathers used to. All of this tends to lengthen our lives a great deal.

But it seems in Nature you can never expect to get anything for nothing. Thus, in lengthening the span of life, we have to pay certain penalties for this immediately, because of the softer and easier mode of living. The common cold and pneumonia, which are making inroads into our health,

were practically unknown even a century ago. We know that they were in existence, but never reached such proportions as these afflictions do now. Some of our medical authorities also think that the curse of the present age, namely cancer, has been brought about directly by the softer living conditions and that new ways must be found to combat this terrifying disease, which so far has baffled science.

"Nerves" is another penalty which we have to pay, due to our present mode of living. General nervousness was not known a century ago, at least in the forms that we see today, and certainly it was not nearly as widespread as in these modern times.

Many other similar parallels could be drawn and the surprising thing is that we do not have more trouble than we actually do. If science were not on the high plane which it has reached already, we probably would run into a lot more mischief than we do.

The thought naturally arises, "How far can the average term of life be lengthened?" Some of our best authorities see no reason why a human being should not attain the age of several hundred years, not as some extraordinary feat, but considered as a fair average. There are, of course, people now living who are 125 years old, but these are, naturally, exceptions. Our medical scientists, however, assert that the goal of 200 years will be reached some day in the future. When we stop to think that the average life-time used to be 40 years and that we now consider the man of 50 years to be in the prime of his life; who knows but that fifty years hence a man in his prime will be 100 or 150 years of age.

It is well known that it takes a life-time to gain valuable experience. Men at the head of great industries frequently are over 60 years of age, and their advice is sought steadily because they have gained most valuable experience during all those years. It would seem, therefore, important to lengthen the span of life indefinitely, and, indeed, present indications are that it can and will be done.

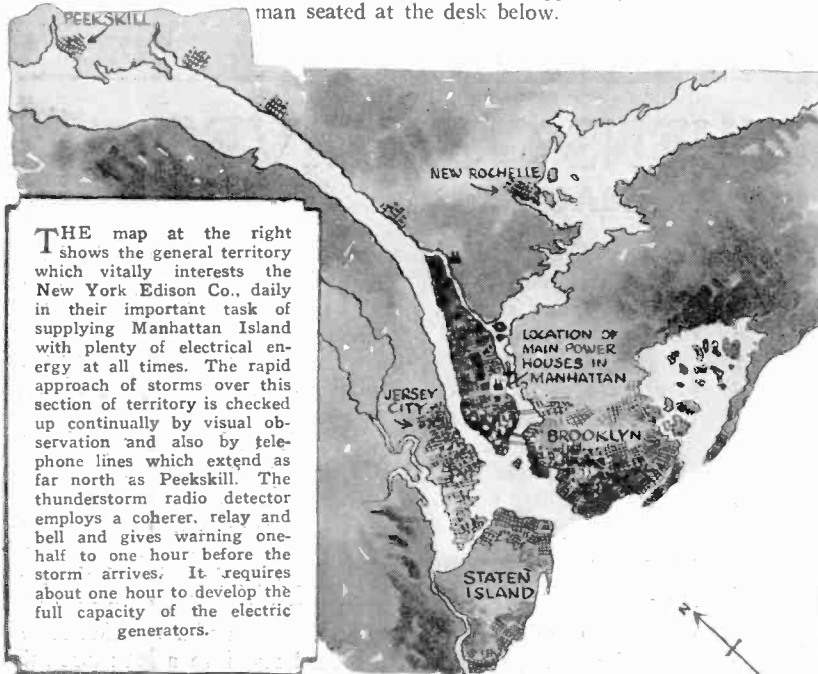
Recent researches have shown conclusively that tissue and cells in the human body need not necessarily decay. Formerly it was thought that there was no way to ward off senility, and that cells were bound to break down, due to old age, which simply means wear and tear. This, however, in the light of modern science, is no longer countenanced. The more complete study of gland-science has convinced many physicists that the human cells can be rejuvenated or replaced continuously, and that such a thing as old age can be warded off for several hundreds of years, at least theoretically. Patients treated with transplanted glands or else with glandular extract, have shown this.

**THE GOLDEN AGE OF
SCIENCE**
is symbolized by the golden cover
OF SCIENCE & INVENTION
LOOK FOR THE GOLD COVER
every month!

Mr. Hugo Gernsback speaks every Monday at 9 P. M. from Station WRNY on various scientific and radio subjects.

How New York Edison Station Watches Smoke and Weather

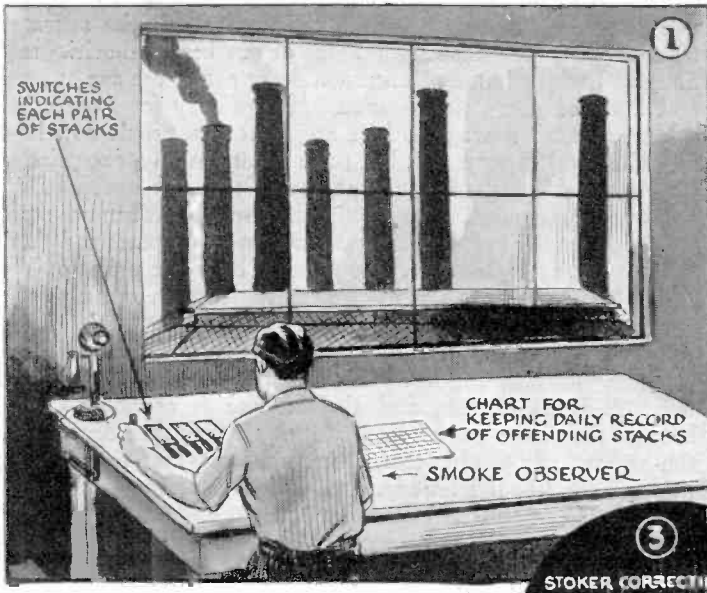
WHEN Thomas A. Edison started the first Central Station many years ago on Pearl Street, New York City, he did not worry whether more or less smoke appeared at the top of the smoke stacks, or whether a thunderstorm was passing over a town or city twenty-five miles or more distant. But today it is an entirely different story. If a thunderstorm or other storm comes over the horizon suddenly, thousands of people in a city like New York will soon turn on their lights. It is the duty, therefore, of one of the central station employees to watch for storm clouds all day long, besides keeping in touch with outlying cities by telephone as to weather conditions. Thunderstorms announce themselves on a special radio apparatus seen beside the man seated at the desk below.



THE map at the right shows the general territory which vitally interests the New York Edison Co., daily in their important task of supplying Manhattan Island with plenty of electrical energy at all times. The rapid approach of storms over this section of territory is checked up continually by visual observation and also by telephone lines which extend as far north as Peekskill. The thunderstorm radio detector employs a coherer, relay and bell and gives warning one-half to one hour before the storm arrives. It requires about one hour to develop the full capacity of the electric generators.

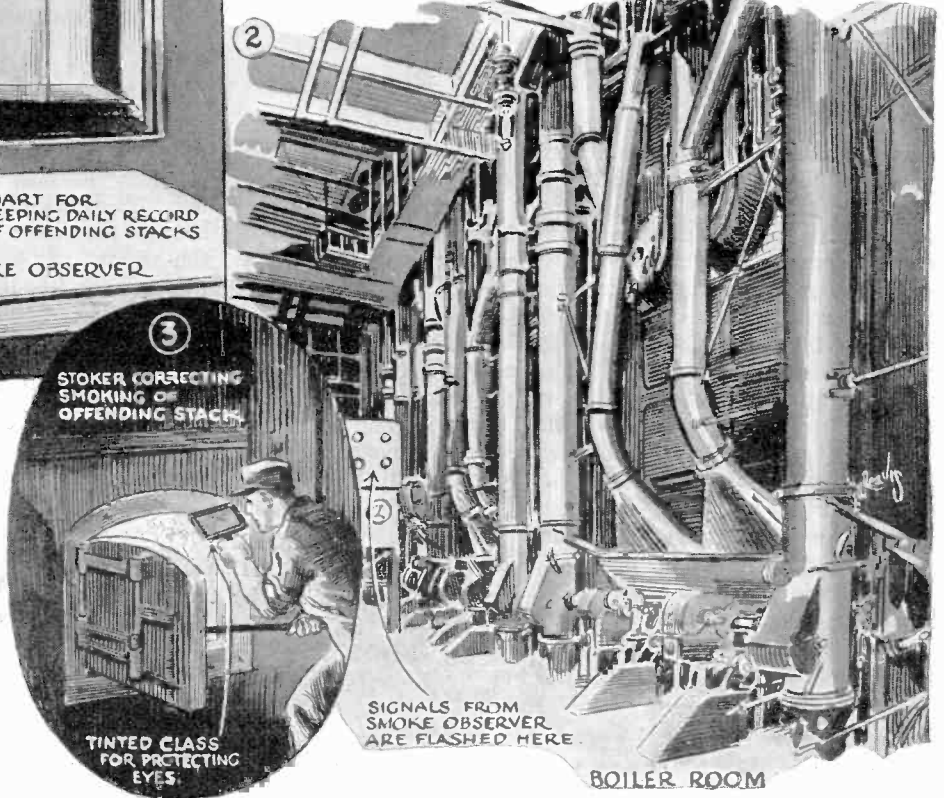
Rôle of the "Smoke Detective"

The picture at 1 shows a new actor in central station operation, known as the "smoke detective." Because smoke means improper firing usually, and also because the city laws do not allow smoke to pour from such stacks, this observer keeps a sharp eye on the New York Edison central station smoke stacks, and immediately flashes a signal to the boiler room when any smoke occurs. The offending boiler is at once taken in hand by the firemen.



AMONG many other interesting new personages one meets in walking about an up-to-date Central Station, such as those operated by the New York Edison Co., we find that the "weather observer" described above and the "smoke detective" are two of the most interesting.

The picture at the immediate right shows one of the firemen inspecting the fire box under an offending boiler through one of the fire box doors. He views the burning coal in the fire box through a tinted glass screen. This boiler may be causing smoke due to the manner in which the coal has piled up. After a smoke-causing disturbance in the fire box, it takes about one minute for the smoke to ascend up and out of the stack.



Marvels of Interplanetary Space



1 Sunrise on the moon would present a magnificent spectacle to the interplanetary traveler. The eternal blackness of the sky would be relieved by the corona of the sun only occasionally seen here. Fig. 1 shows the corona of the rising sun at the horizon of the moon.

The phases of the moon are familiar to us all, but think how wonderful a sight would greet our eyes if we could watch the phases of the earth from the surface of our satellite. The four illustrations at the right show the "new earth," first quarter, "full earth" and last quarter, Figs. 2 to 5, as they would look to an observer stationed at a spot near the edge of the disc of the moon, which is constantly turned toward us. Note particularly the sharply defined shadows on the sides of the lunar peaks, due to the absence of an atmosphere.

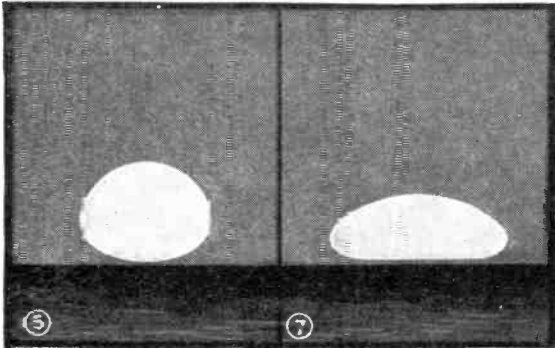
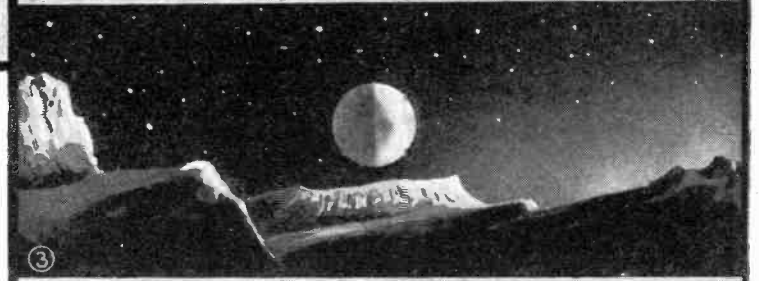
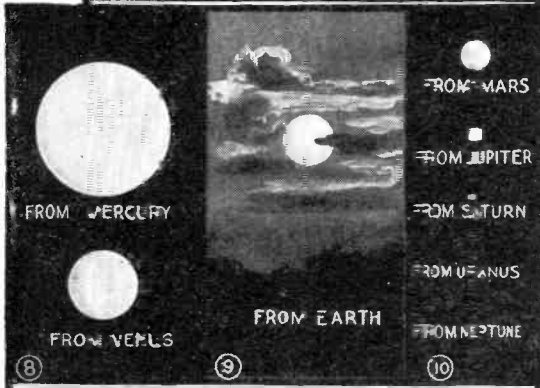
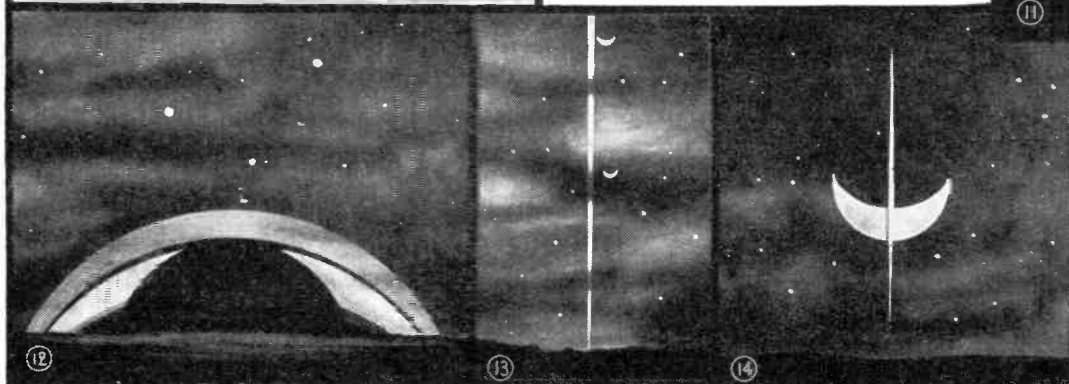


Fig. 6 shows the distortion often noticed at sunset when the sun approaches the horizon. Fig. 7 illustrates the still greater apparent change in shape caused by a dense atmosphere like that of Venus. In Fig. 8, 9 and 10, we note that the difference in the distances of the various planets from the sun causes startling changes in the apparent size of that body. From the farther planets, the sun would appear hardly brighter than many of the other stars.



Four of Jupiter's eight moons. One is nearly as large as Mars, another the size of Mercury, a third as large as our satellite.



12 The rings of Saturn as they would appear from near either of the poles of that planet. The shadow which partially obscures the rings is that of the planet itself, where it cuts off the rays of the sun which contribute to the luminosity of the rings.

13 The Rings, seen from the equator of Saturn, appear like a line of light as in the illustration above. Two of its moons are seen.

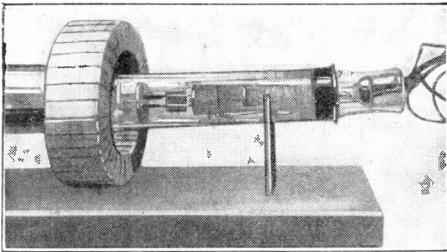
14 Saturn as seen from one of his moons would present a truly inspiring sight. Here is our artist's conception of how Saturn would look from his nearest satellite.

IF you were permitted to ride for an hour on Mohammed's Coffin "suspended midway 'twixt earth and sky," your journey through interplanetary space would reveal wonders unequalled in the experience of earth-bound mortals. Some of the magnificent sights are illustrated in a small way by the drawings on this page, but if the predictions of some of our scientists come true, we may some day be able to witness these wonders at first hand.—*Courtesy La Nature.*

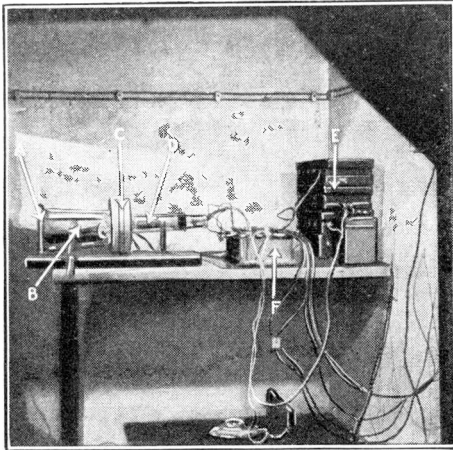
Television by New French System

New Dauvillier System of Instantaneous Projection of Images Seems Promising

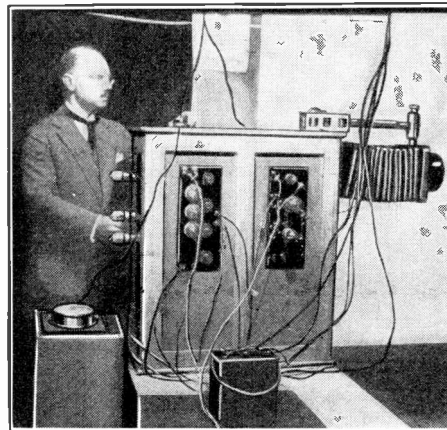
By LUCIEN FOURNIER



Close-up view of the Dauvillier special vacuum tube used to reproduce image by virtue of cathode beam oscillated or controlled by electro-static fields.



Exterior view of the Dauvillier television transmission apparatus and the inventor at its side.



Receiving apparatus: A—fluorescent screen; B—calcium tube for producing a vacuum in the oscillograph; C—concentrating coil; D—cathodic oscillograph; E—plate batteries, 300 volts; F—potentiometer box.

MANY French scientists and those not of the lower ranks have attacked the problem of television, i.e., seeing over a wire or via radio. Our readers are familiar with the Belin-Holweck system. We are going to speak now of the apparatus of Dauvillier, a young scientist, chief of the physical research laboratory for X-rays, founded by M. de Broglie. To explore the image M. Dauvillier utilizes two tuning forks kept in vibration by electricity, and producing induced currents. One of the tuning forks vibrates eight hundred times a second, and the other ten times a second. The induced currents are synchronic, which are conducted by wires to electrostatic fields in the cathodic oscillograph receiver which is a Braun tube. The author of these investigations proposes a direct solution of the problem of television. He tries to have two correspondents in telephonic communication see each other mutually, and this is why he calls the apparatus the telephot.

The image given by the objective strikes the mirror carried by one of the legs of the tuning fork of eight hundred vibrations per second. It is supported horizontally and the mirror is moved from right to left, and back again at the rate of eight hundred times per second. The image is transmitted in "horizontal vibrations" to a second mirror on the other tuning fork of 10-cycle periodicity. This is so arranged that the legs vibrate up and down. The image reflected by the two mirrors then has a rapid horizontal movement and a much slower vertical movement, as it is received on an opaque screen pierced by a hole. Each of the points which constitute it will pass through this hole and will pass in succession one after the other. Thus the image will be completely explored or traced.

As our diagram shows the point of light passing through the screen as it falls upon a photo-electric cell, familiar to all our readers, and the currents issuing from the photo-electric cell and produced by the ray of light

that the electric tuning fork produced induced currents which became synchronized currents.

These are produced in the coils shown in our diagram respectively of 800 cycles and of ten cycles, and after amplification reach the receiving station by three wires. The Dauvillier system includes then really five line wires.

The receiving station includes a Braun photo-electric tube which operates as follows. The current modulated by the luminous intensity varying for each point of the image passing through the hole in the diaphragm, is received by the grid-filament circuit of the Braun cathodic oscillograph.

It modifies the cathodic emission in exact correspondence with the variations of lumi-

nous intensity received by the transmitting vacuum tube. This is the first point to be noted. As regards the synchronic currents, they act upon the oscillograph by two electrostatic fields (see the diagram), which are simply due to two condensers placed at right angles to each other. These condensers perform the same functions as the coils of the Holweck oscillograph in the Belin apparatus.

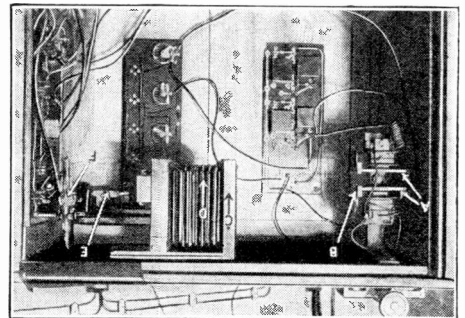
By their action the synchronic currents act upon the cathodic beam causing it to vibrate exactly in the same conditions as due to the image to be transmitted after its reflection on the two mirrors of the electric tuning forks.

The cathodic beam now has to cover all of the fluorescent screen in its path determined by the Braun tube and then the image will appear. It will be seen that the Dauvillier system is very simple. There is no other mechanical part than the two electric tuning forks, which is a considerable advantage. The inventor has told us that he hopes very soon to solve the problem of television by using new special amplifying tubes.

TELEVISION IN DARK ROOM

Members of the British Royal Institution a year ago witnessed the first demonstration in history of television of human faces were recently allowed an opportunity to judge improvements in the process made in the course of twelve months by the inventor, J. L. Baird.

Mr. Baird proved a year ago that it was possible to combine sight and sound, but faces transmitted were under a light of such intense (Continued on page 1066)



A—the two legs of the electric tuning fork of 10 cycles; B—mirror; C—screen; D—governing rheostat; E—the electric tuning fork of 800 cycles; F—photo-electric tube.

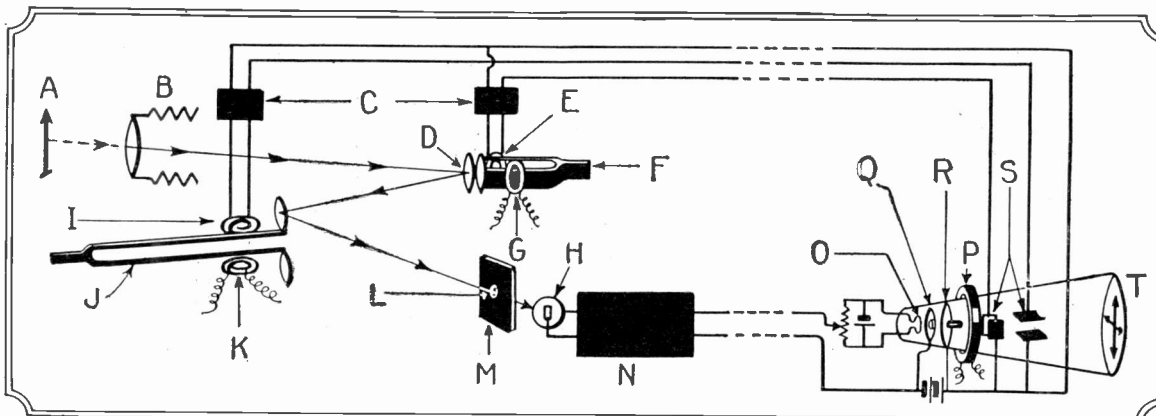
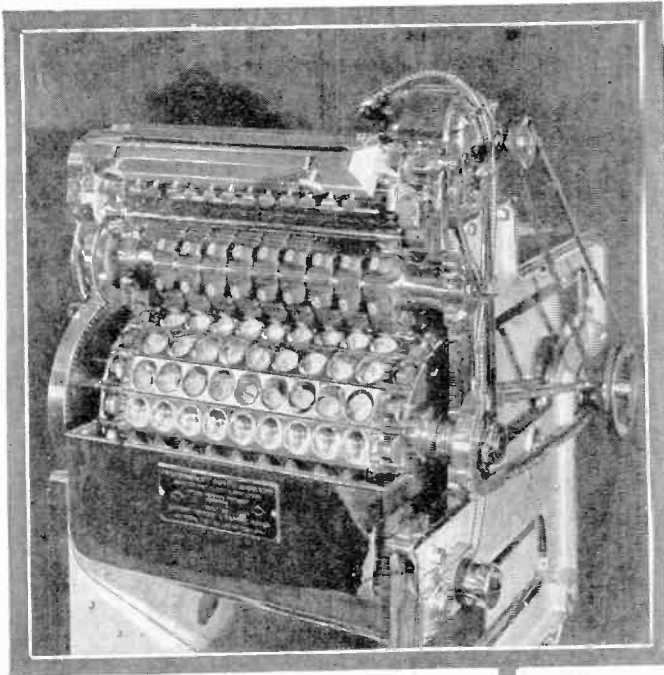


Diagram of the Dauvillier apparatus. A—object; B—objective; C—amplifier; D—mirror; E—coil generating synchronic currents; F—800 cycle tuning fork; G—exciting current; H—photo-electric cell; I—coil generating synchronous currents; J—10 cycle tuning fork; K—exciting current; L—hole determining the point of the image; M—optical screen; N—amplifier; O—filament; P—concentrating coil; Q—grid; R—plate; S—condensers producing electrostatic fields; T—fluorescent screen.

Trade-Marking Walnuts

SEVEN years ago the Walnut Growers Association advertised that they would pay \$10,000 for a machine which would successfully and economically place their diamond brand on the uneven surface of walnut shells. Nine thousand replies and 150 working models were considered before this machine, developed by Rees and Wilkinson, two Los Angeles inventors, was finally accepted. About 125 of the branding machines have been installed in the association's 45 packing houses, through which pass 95% of the walnuts produced in the United States. This machine brands 2016 walnuts a minute, or a car-load of 30,000 pounds a day, at a cost of 1/20 of a cent per pound. The photos show the machine and the branded walnuts.—Delphia Phillips.



A prize contest announcement brought an ingenious walnut-branding machine to reorganize an industry.

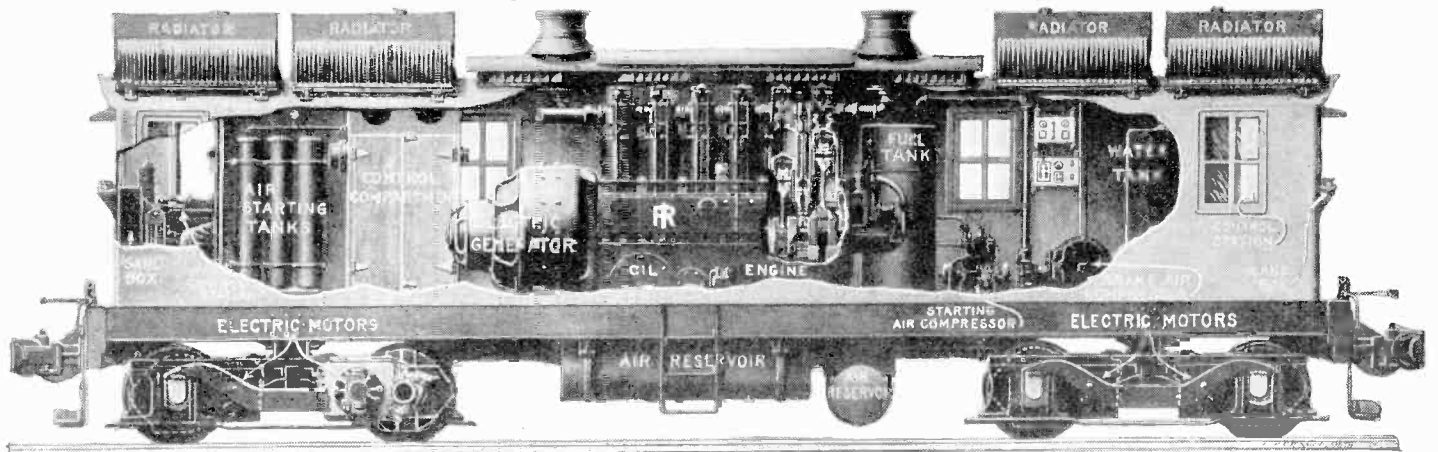
Deadly Blow-Gun



Among other novel trophies gathered in the interior of South America by W. C. Porterfield and presented to the Los Angeles Museum of Arts and Sciences, is this blow-gun used with deadly effect by the Girbaro head-hunters.

A Power-House on Wheels

THE latest type of oil-electric locomotive developed by an American concern is a veritable power-house on wheels. The prime mover is one or more oil engines, direct-connected to a direct-current generator, which supplies electrical energy to traction motors mounted on the trucks. The oil engine is of the vertical, six-cylinder, 4-cycle, single-acting, variable speed type, having direct fuel-oil injection. Cylinders, cylinder heads and combustion chambers are completely water jacketed. Ignition is produced by the heat of compression only. The generator is a six-hundred volt unit. With this type of generator, the control of the locomotive becomes extremely simple; as no rheostats are used in the power circuit, the loss of power during acceleration is reduced to a minimum. The one outstanding virtue of this locomotive is that it is entirely self-contained, and is completely independent of outside sources of power.—Photo Ingersoll-Rand.



The oil-electric locomotive is adapted to the requirements of switching and branch line operation as it is entirely self-contained.

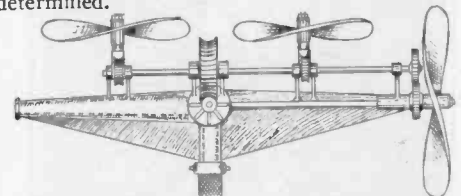
Fighting Flames from the Air

Pressure of a Stream of Water Carries the Hose to a Higher Elevation

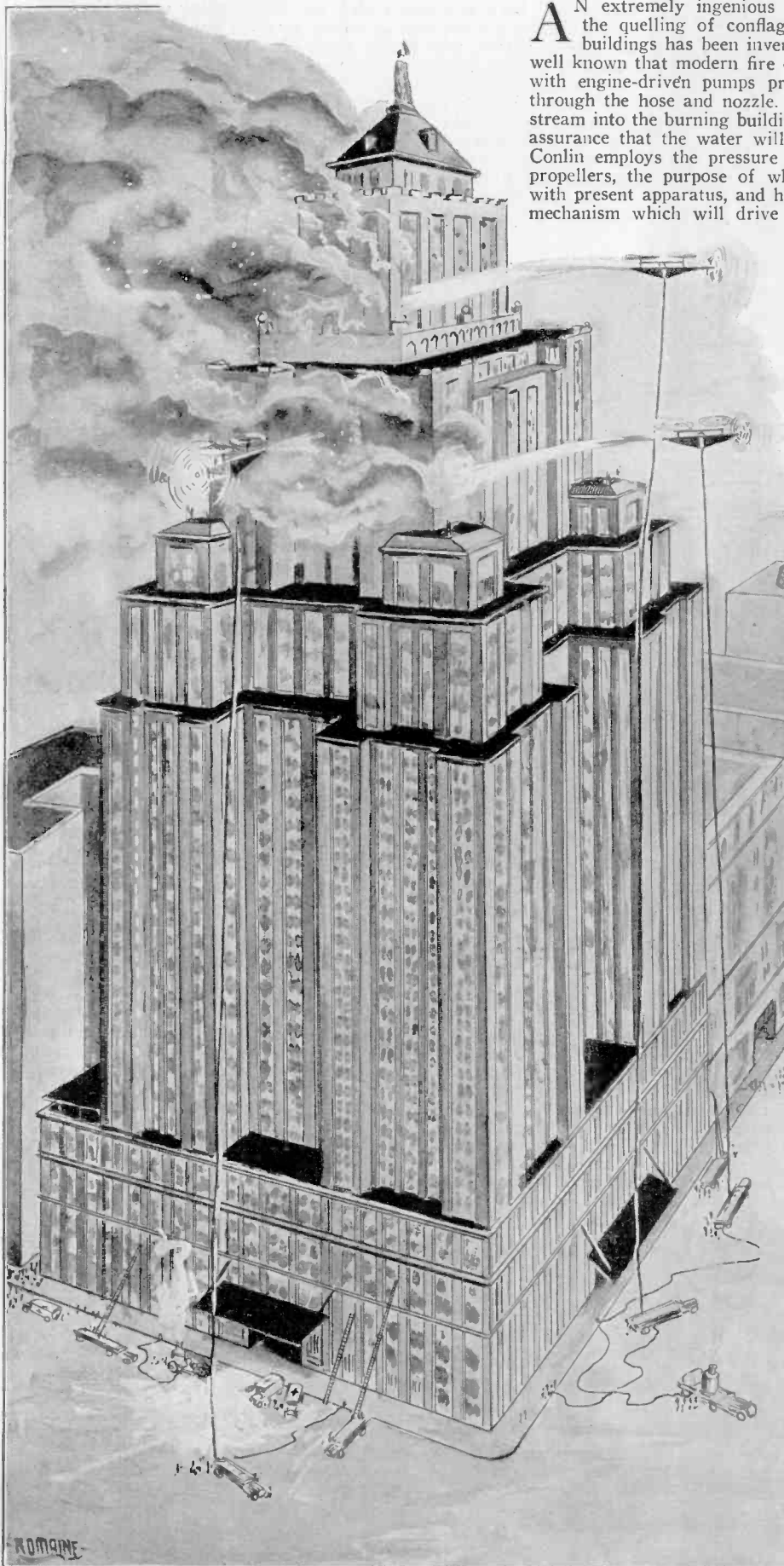
By JOSEPH H. KRAUS

AN extremely ingenious device for fire-fighting particularly adaptable to the quelling of conflagrations occurring in some of the taller modern buildings has been invented by Edward P. Conlin of Girard, Ohio. It is well known that modern fire departments and fire-fighting devices are provided with engine-driven pumps producing a terrific pressure on the water forced through the hose and nozzle. Towers have also been made so as to direct the stream into the burning building with a greater degree of accuracy and with the assurance that the water will more directly reach the base of the flame. Mr. Conlin employs the pressure of the water to operate or energize two lifting propellers, the purpose of which is to carry the hose to heights unattainable with present apparatus, and he also has a propeller mounted at the back of the fire-fighting appliance forward, in order to counteract the repellant action of the water.

Our artist has graphically portrayed how this type of an aerial fire-fighting mechanism could be employed in extinguishing a more or less serious conflagration in one of the modern skyscrapers. The peculiar V-shaped structures provided with the propellers are permitted to rise by their own power to a height greater than the floor level which the water is to reach. Even though the water may not pour out of the nozzle at a high pressure, it becomes evident from this drawing that the floor space could be completely drenched with water and the fire could in this manner be quenched. The question of properly directing the water must of course be taken into consideration. This could be accomplished by the aid of a grip provided with a suitable handle and surrounding the hose at its base. By twisting the hose, the entire mechanism at the top could likewise be made to swerve from side to side. The two web-like strengthening members are for the purpose of making the device more rigid and also assist in preventing oscillation of the appliance. The diagram below is a cross-section through the mechanism. The water coming up through the hose operates a water-wheel, which in turn is secured to a worm gear. The worm functions with another gear communicating with the two lifting propellers and also connecting with the propeller at the back for counteracting the repellant force of the water. The ratio of the gears and the design of the propeller must be experimentally determined.



Cross-section of aerial fire-fighting mechanism.



Above is an artist's conception of how the new aerial fire-fighting mechanisms will look when in operation. These are structures employing two

lifting propellers and a driving propeller and are operated by pressure of water in the hose. They lift the hose to the desired height.

Gas Masks Used by Railroad Crews

A very recent invention of considerable industrial value is represented in the photo below. It is a small size gas mask which is adjusted as shown in the photograph in the right upper photo. Rubber leaves fitted between the teeth support it.



A GREAT need for a small, easily portable gas mask has long been felt in connection with railroad work. One such mask has been developed for use by train crews and yard employes of the Baltimore and Ohio Railroad. The mask consists of a canister which may be easily carried in the pocket, which is filled with an absorbent whose function is to make the gas-laden air breathable. The bottom of this canister is perforated with small holes which permit the air to enter and pass through a filter. Rubber lugs and leaves are gripped by the teeth to prevent gas leakage.



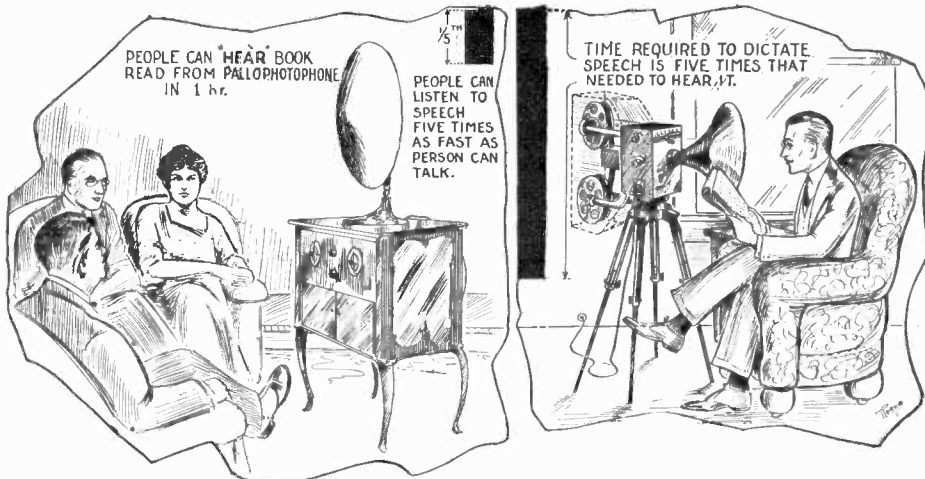
THE bottom of this canister is perforated with small holes above which is a screen to retain the granular charcoal and soda lime absorbent. Less than one-half pint of absorbent is used in each. On top of the absorbent is a piece of toweling to serve as a filter, then a stiff wire screen held rigidly upon the absorbent by springs. A flat-metal collar is soldered to the wall inside half-way up and extends one-quarter inch towards the center. When the canister is placed in the mouth, the rubber leaves fit between the lips and teeth, the lugs are gripped by the teeth, and breath passes in and out by the canister.



At the left, the larger gas masks are extensively employed by train crews which are faced with the necessity of working under conditions where there is a great deal of smoke or gas in the air. At the top, the adjustment of the small canister may be easily seen. A small clamp is placed on the nose to close the nostrils. It will be seen that it is not necessary to hold the canister in the hand. Above, a trackman wearing gas mask at the mouth of the Schenley B. & O. tunnel in smoke after train has passed.

Reading Books At High Speed

DR. W. R. WHITNEY of the General Electric Research Laboratories proposed in an interview, a new use for the highly efficient method of recording recently developed in his laboratory. He suggests an electric book reader. The elementary apparatus for this device already exists; all that is necessary is a proper assembly. First, there is the "pallphotophone," which makes it possible to photograph sounds on a motion picture film by

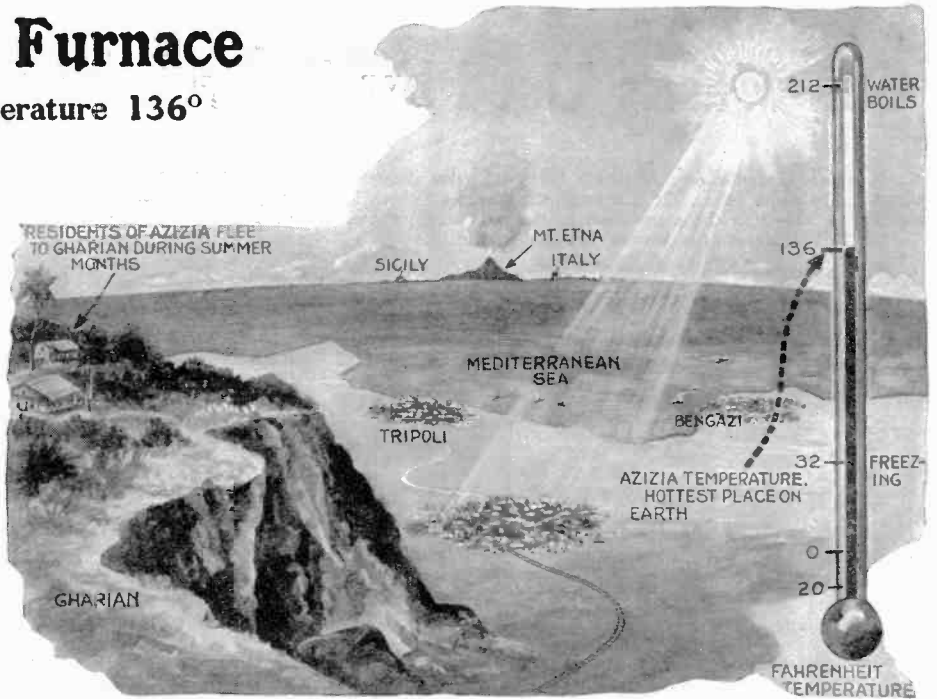


means of a photo electric cell which translates electrical impulses into light rays or light rays into electrical impulses. Then there are numerous loud-speakers which preserve nearly all the natural tones of the voice. It would seem a simple matter to record a long novel on a short stretch of film, and with a projector and loud-speaker, have it read as rapidly as we desire. It is said that we can understand the electric reader at five times the rate of ordinary talking.

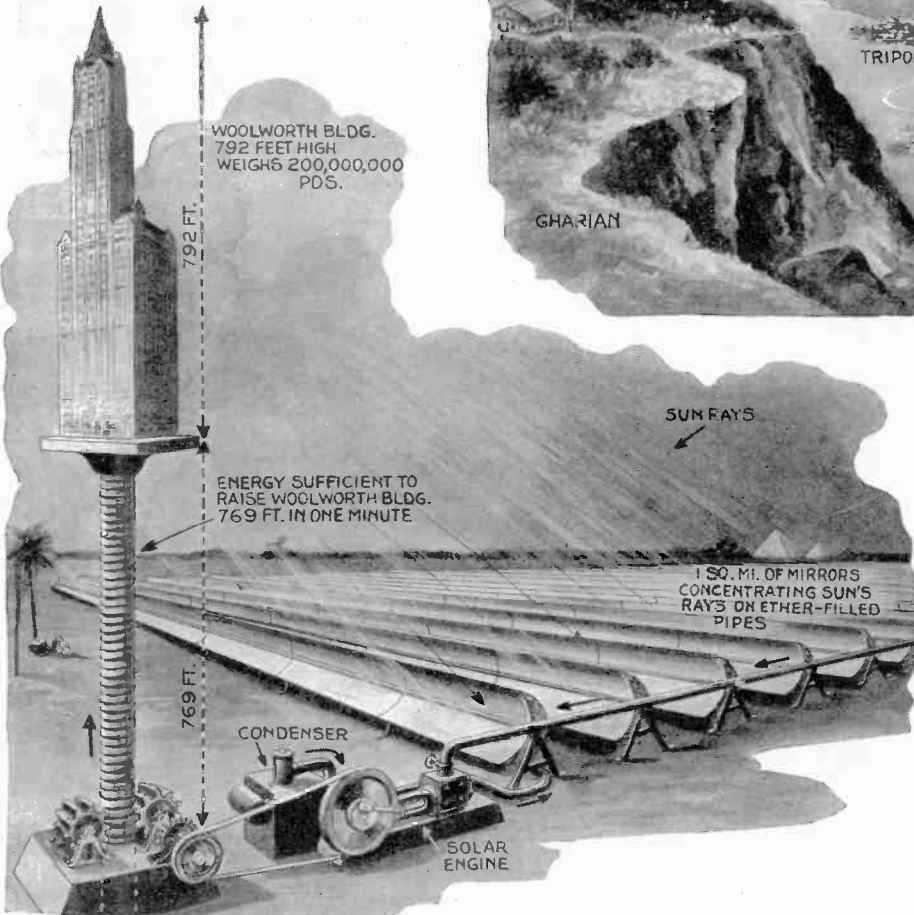
The World's Furnace

Average Annual Temperature 136°

The illustration at the right shows a bird's-eye view of the portion of Northern Africa in the vicinity of Azizia. Azizia, a desert village 25 miles south of the City of Tripoli, has an average annual temperature which is the highest of that of any region on earth. Last year tests indicated an average temperature of 136° Fahrenheit. The inhabitants of Azizia leave their homes for the town of Gharian in a more temperate situation during the hot season.



The amount of energy liberated by the sun's rays falling on 1 square mile of territory in the latitude of Azizia is sufficient—if it were usable—to raise the Woolworth Building nearly its own height every minute of daylight. At the left is our artist's conception of a solar energy engine which might be used to convert the sun's rays into usable heat.

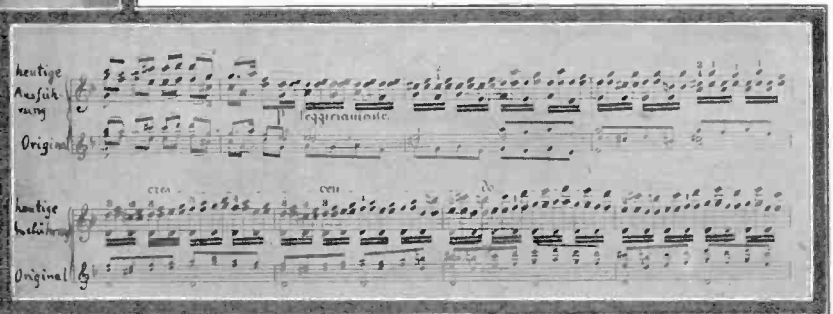


WE used to say that the world's hottest place was Wargla, in the Algerian Sahara (127° Fahrenheit), afterwards it was Death Valley, Calif. (134°), and now we have Azizia, an inland town of Italian Tripoli which boasts a summer temperature of 136.4° Fahrenheit. Azizia is a desert village situated about 25 miles inland from the city of Tripoli on the Mediterranean. A railroad runs between the city of Tripoli and Azizia into the Jebel, a cliff-like escarpment of the Sahara plateau. The top of the Jebel is about 2,000 feet above sea level. Gharian, a town of importance in Roman times, is a refuge for the inhabitants of Azizia, due to its cooler position on the crest of the Jebel. The tremendous energy of the sun's rays constantly falling on Azizia has been estimated at 4,663,500 horsepower.

Playing on Three Violin Strings At Once



A NEW violin bow, the invention of Herman Berkowski of Berlin, enables violin players to strike with the bow more than one string at a time, producing a polyphone effect of rare volume and tone-color. The new bow is so constructed that it permits of relaxing or tightening of the bow hair while playing, and is effectively used in the rendition of compositions of the colorful type typical of the old masters. Below you will see a passage from the score of Bach's *Sonata for Violin, in G Minor*. The lower staff of each line shows the original score as it would be played by a violinist under ordinary conditions. Immediately above is given the score as it would actually be played with Polyphone bow.

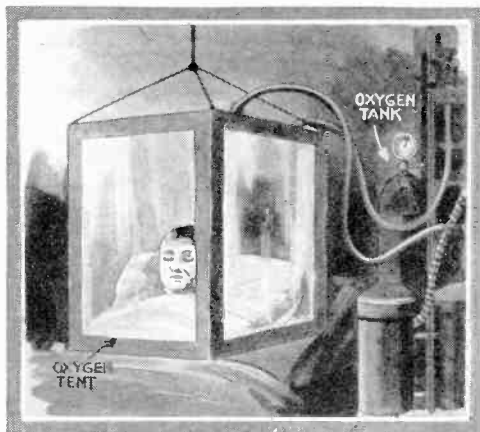


Above at left: The Polyphone bow in use by its inventor. While the artist can play two notes at a time with the usual bow by "Double-stopping," this bow makes it possible to play three notes at a time and to achieve unusual

and beautiful effects. At right: A passage from Bach which illustrates the effect obtainable with this bow. The lower staff illustrates the original score, the upper the final effect as produced with this bow.

The Month's Scientific News Illustrated

By GEORGE WALL



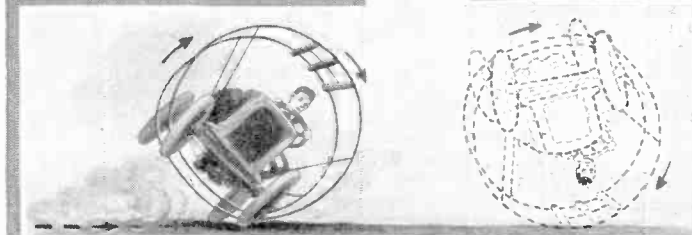
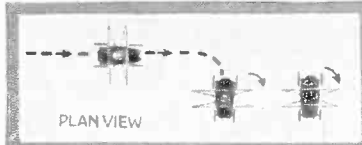
The new Presbyterian Medical Center at 168th St. and Broadway, New York City, will contain some of the latest and most important developments in medical apparatus. The oxygen tent illustrated here, the invention of Dr. Alvan L. Barach, is expected to decrease the number of deaths from pneumonia.



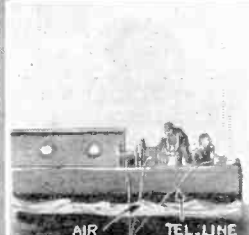
This year is particularly characterized by the number of storms and marine disasters which occurred in all parts of the world. Near Hong Kong, China, the waves during one of these tempests in October dashed over the top of a lighthouse, 140 feet high, disabling the light.



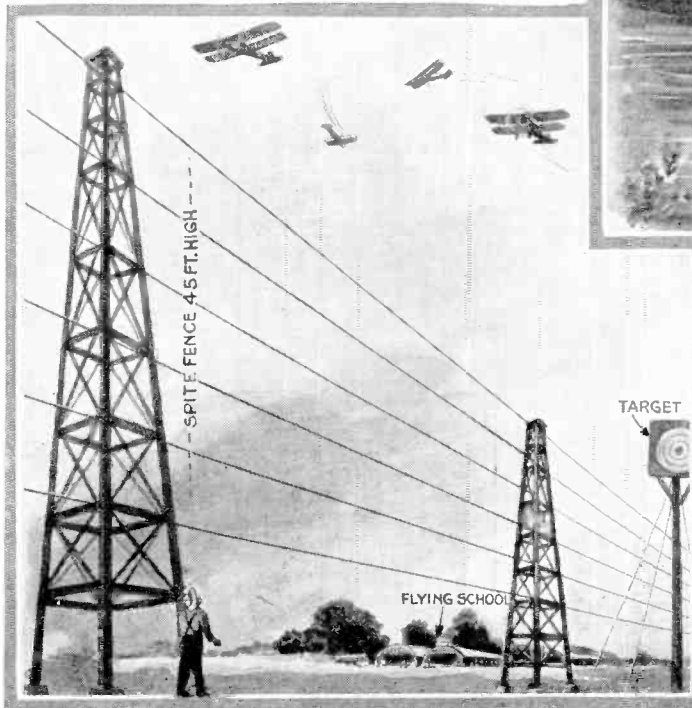
Paris dressmakers, always ingenious, have arrived at the conclusion that the most portly of the fair sex may be convinced of their nymph-like proportions if they are induced to try on the latest styles before a convex mirror.



Looping the loop in automobiles is one of the latest and most thrilling of outdoor sports. It requires a technique of its own, and the car must be of special design to prevent fatal accidents. Andre Mercier does the trick with his Peugeot by the method shown above.

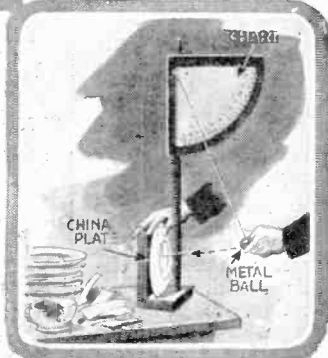


Cylindrical houses are being erected in Germany to solve the housing problem. The houses are of standardized construction, all sections being interchangeable. Standardization makes high-speed erection possible.



Klaas Everts, deep sea diver, took a practice stroll recently across the bottom of the Elizabeth River, between Norfolk and Portsmouth, Va. He claims he is going into training to walk across the English Channel.

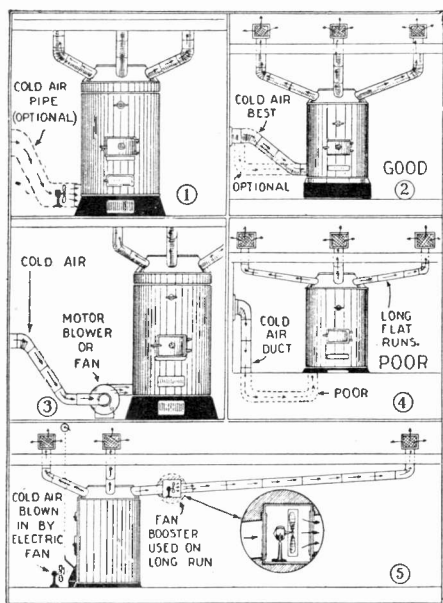
A Lincoln, Neb., aircraft company purchased a farm for use as an experimental test field, but the owner of the farm next door built an elevated rifle range to scare the aviators away from his line, but found this too expensive a proposition. Now he has a 45-foot wire fence on his property line which effectively discourages aviators.



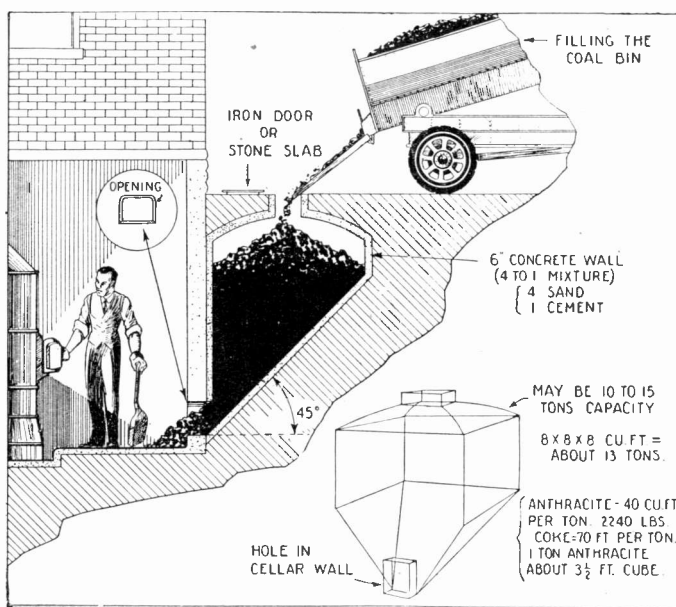
One of the most peculiar jobs at the Bureau of Standards is held by Mr. R. B. Fair. His job consists entirely of breaking china. He uses the apparatus illustrated above to test the resisting power of china dishes purchased for use in the army and navy. The angle through which the metal ball must fall to break the dish under test is used as an index of the power of the china to resist years of careless handling.

Hints On Home Heating

By H. WINFIELD SECOR



Several important points about warm air heating installations are shown above. Cold air may be taken from cellar aided by electric fan when necessary. Warm air pipes should have good upward angle, as at 2; 4 shows poor installation; 3 shows good cold air pipe with optional fan or blower; and 5 shows booster fan to help circulation on long runs. Short runs need to be shut off sometimes until warm air flows freely through long pipe.



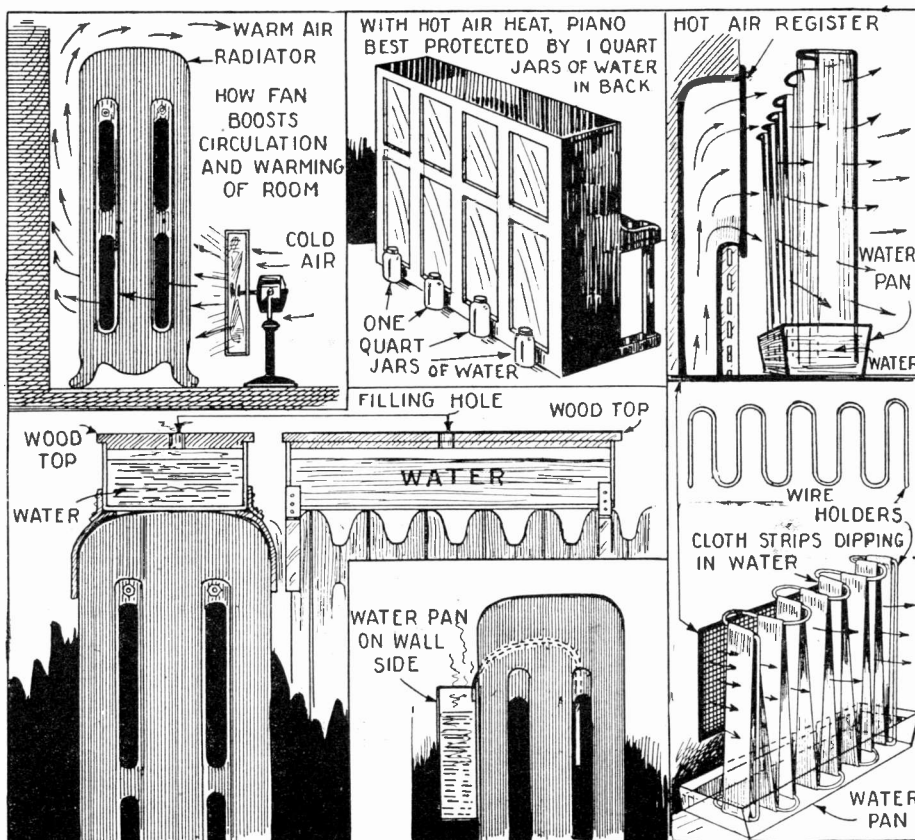
Here is a space saving method for constructing a coal bin of concrete, external to your cellar. The sides are so shaped that the coal will always feed toward the opening in the cellar wall, as becomes apparent.

matter to sink a pit in the center of the floor large enough to accommodate the furnace, and give room to open the ash pit door. This pit may be from one to two feet in depth or more, and in this way the warm air pipes can be carried upward at a goodly angle, not less than thirty degrees whenever possible. Every effort should be made in placing a warm air furnace, so that it is as near as possible to the center of the pipe distributing system. When this is not possible, the registers or dampers on the short pipe line, or at least some of them, will have to be closed temporarily until the long pipe runs start passing the air out of their registers freely, when the short ones, or at least those shut off, may be opened up. A simple way to obviate this trouble is to place a small electric fan in the long run lines to act as a booster. It is advisable also to use a booster fan before the cold air opening of the furnace (or in front of the bottom draught door on steam, hot water or vapor furnaces), especially for use on dull days, when the furnace does not seem to draw well. Speaking of the long

warm air pipe lines, another trick to help improve the circulation, which will obviate cutting the pipe line and placing a fan in a box inserted in the line, as shown in Fig. 5, is to place an electric fan with its back to the register opening on such a long line. The fan thus placed will help to suck the warm air up through the long pipe line and blow it out into the room.

Electric fans find a variety of uses in the winter time, one of which is shown below.

A NUMBER of practical hints of value to home builders and those contemplating changes in their heating system are illustrated in the accompanying pictures. Figs. 1 to 5 in the illustration above show some practical hints for those operating or about to install warm air furnaces. For the small bungalow having three or four rooms on a floor, the pipeless warm air furnace fills the bill quite nicely. There are two types of these furnaces, the first one drawing a supply of cold air through the outer part of the large, single floor register. Personally the writer does not care for this type, as it is liable to cause draughts, but the second type does away with this objection by taking the cold air supply from the cellar. As shown in the drawings above, it is always desirable, if success is to be obtained with warm air heating, to see that the warm air pipes branching out from the top of the furnace have a good upward angle. Where the cellar has a low ceiling it may seem difficult to do this, but it is an apparently easy

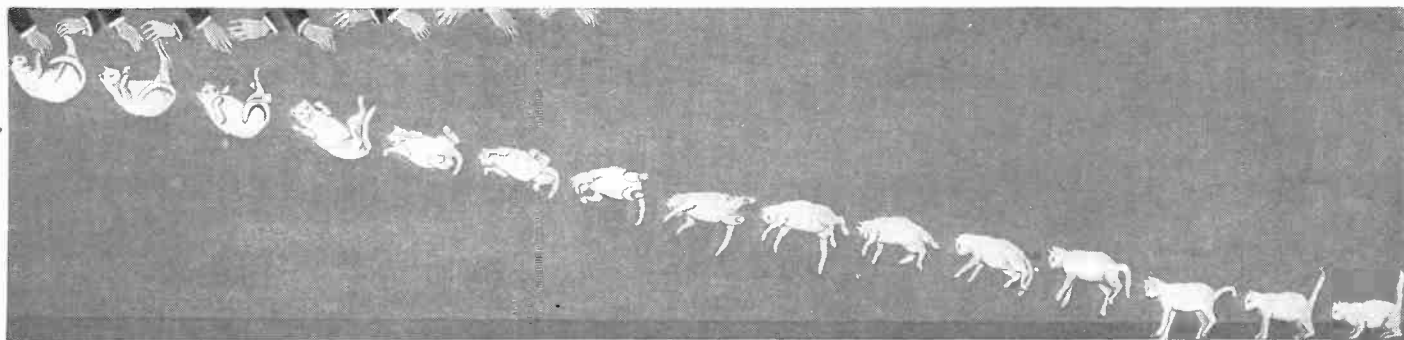


The problem of properly humidifying the air, whether from warm air registers, or from steam or hot water radiators, can be solved by one of the methods illustrated above or a combination of them.

Here the fan is placed so as to blow against the lower part of the steam or hot water radiator, so as to cause a circulation of the air in the room, the air being warmed as it is rapidly blown over the heated radiator.

Several other useful wrinkles for the householder and office worker as well, are shown in the picture below. If you have warm air heating in your home, you should place several fruit jars filled with water, and with the tops open, back of your piano. It cost the writer \$50.00 a few seasons ago, to have the cracks all filled up in the sounding board of his piano by an expert, due to the extreme dryness of the air. Another trick is to place strips of cloth over a wire frame, the cloth dipping into a pan of water, as shown in the picture below; the whole device being placed before a warm air register. Water pans may be purchased on the market suitable (Cont. on page 1065)

Why a Cat Always Lands on Its Feet



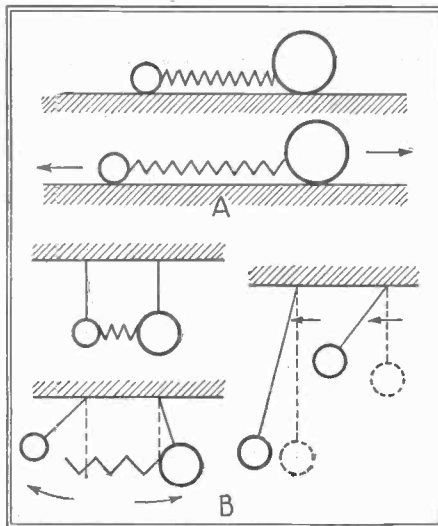
Have you ever noticed that a cat always manages to land on all four feet when it is unlucky enough to fall from even an insignificant height? Probably you have wondered what peculiar contortions the cat went

through to enable it to land safely. The drawing above shows exactly what the cat does at every instant of its drop. The turn may be accomplished even if the fall is only through a distance of two or three feet.

CONSIDER a diver who wants to dive head first from a great height; keeping his body straight, he lets himself fall into the water, giving himself a slight impetus with his feet. The amount of this impulse determines the success of the dive. Too weak, the diver would not turn sufficiently, he falls flat; too strong an impulse, he will turn too far and fall on his back. If in the midst of his descent he realizes that he is not turning sufficiently, he can do nothing but make a bad dive.

Now everybody knows that a cat which falls accidentally from the top of a wall comes down on its feet. There is no mystery about it; it is all due to the formation of the muscular system in its body.

Now we are going to see that it is possible for the cat to perform motions, due to the suppleness and the construction of its body, which are practically impossible in the case of man. They may seem impossible even in the case of the cat, but a review of the following principles will make the idea clear.



Suppose two balls of unequal size rest on a table with a compressed spring between them. When the spring is released, the smaller ball will be driven a greater distance.

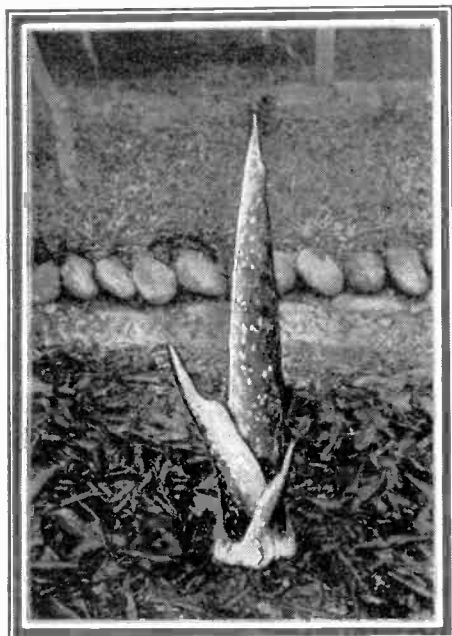
Now hang the two balls by threads of the same length and repeat the experiment with the spring. Again we find the small ball will travel a greater distance when the spring is allowed to act upon it. In such a

A, two balls of unequal weight, before and after the spring has acted. B, pendulums of unequal weight before and after the action of the spring, and the effect of differing rod-lengths.

case physicists speak of the moment of inertia, not of the masses alone. Now suppose balls of equal size are suspended by rods of unequal length. If the rods are struck at the same distance from the suspending point, and with equal force the short pendulum will

(Continued on page 1063)

The Largest Flower in the World



Thirty-two days after planting, the Giant Amorphophalle presented the appearance of a spire 34 inches in height, as in the photograph above.

large bud of the Giant Amorphophalle. Twenty-two days later it was 22 inches high. It continued to grow and on June 24th at midday, the point of the spathe began to unroll itself, and four hours later the flower,



The Giant Amorphophalle blooming in a Java garden, June 24, 1925. The stick is 2 meters long and the flower 6 feet 6 inches in height.



In March, 1926, the Amorphophalle presented the appearance of a small tree about 10 feet tall. The plant blooms but once in its lifetime.

ON the Island of Sumatra, in the Dutch East Indies, some of the most exotic and curious plants are to be found growing wild. It is here that we must look for the largest flower in the world. On the 19th of March, 1925, a scientist planted a

which then had a height of about 6 feet 6 inches, appeared in all its beauty. M. Dakkus, the scientist conducting the experiment, fortunately took the trouble to photograph the Amorphophalle in its whole expansive bloom, so as to preserve for us the fragile beauty of this rare and transient bloom.

CORROSION-PROOF ALUMINUM AT LAST

By DR. ALFRED GRADENWITZ



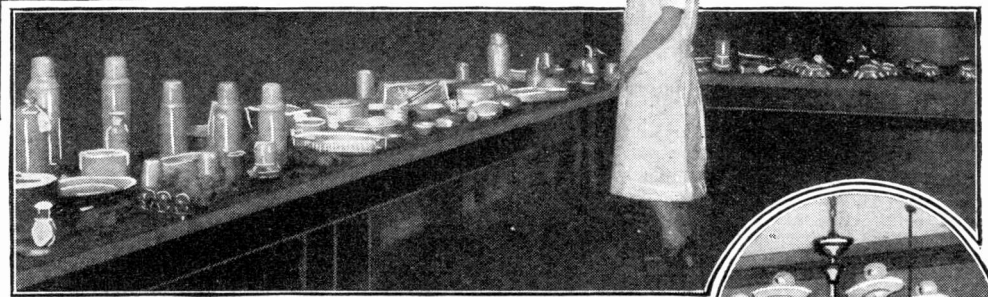
Photograph above shows Bohumil Jirotko, the inventor of a remarkable new method of coating aluminum and duralumin with a heatproof color finish. This coating is available in many colors and will stand extreme bending.

One fact which greatly simplifies operation is that the article to be coated need not by any means be cleaned before its being immersed into the chemical solution.

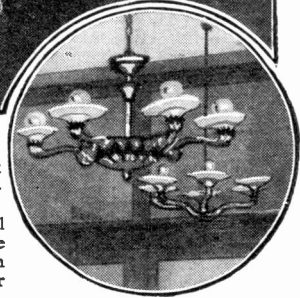
Some of the first baths used by the inventor contained, on the one hand,

sired will it be found advisable to reinforce the chemical coating by an additional surface layer applied by galvanic means, which, of course, will cling much more firmly to underlying chemical coating, than if it had been produced direct on the aluminum surface.

The chemical bath is contained in a vat of suitable dimension



Above we see a great number of samples of the new coated aluminum treated by the new method devised by Bohumil Jirotko. One of the beautiful finishes is an opalescent Mother-of-Pearl effect. A number of aluminum ware concerns have been licensed to use this recent discovery in applied science.



One of the novel applications of the new aluminum coating is for chandeliers.

ALUMINUM, which of late years has been so widely used for so many different purposes, could find an even much larger field of application if its principal drawback, viz. its susceptibility to atmospheric agents, could be overcome. In fact, a short exposure to air generally suffices to spoil the pleasing appearance of the metal, which is a particularly unwelcome feature in connection with kitchen utensils made of that metal, while a few months' service in the case of automobile bodies, airplane wings, etc., made of aluminum or duralumin, one of its alloys, often results in such serious corrosion as to jeopardize their mechanical strength.

It has, therefore, long been thought that articles made of aluminum or an aluminum alloy should be coated with some heavy metal such as copper, tin or zinc, to protect it against corrosion and make it more durable and the use of suitable electrolytic baths has been advocated in this connection, but apart from the necessity of a thorough cleaning previous to the application of the electric current, such a process is expensive and complicated and does not always secure a firmly adhering surface coating.

Far better results are obtained with a trifling outlay by means of a simple chemical process devised by Bohumil Jirotko, which at the same time affords a most welcome means of varying and decorating at will the surface of any aluminum object. Several hundreds of different baths have so far been prepared and tested; many colors and hues, as well as any surface finish, both matte and polished, uniform or opalescent, are obtainable at slight cost.

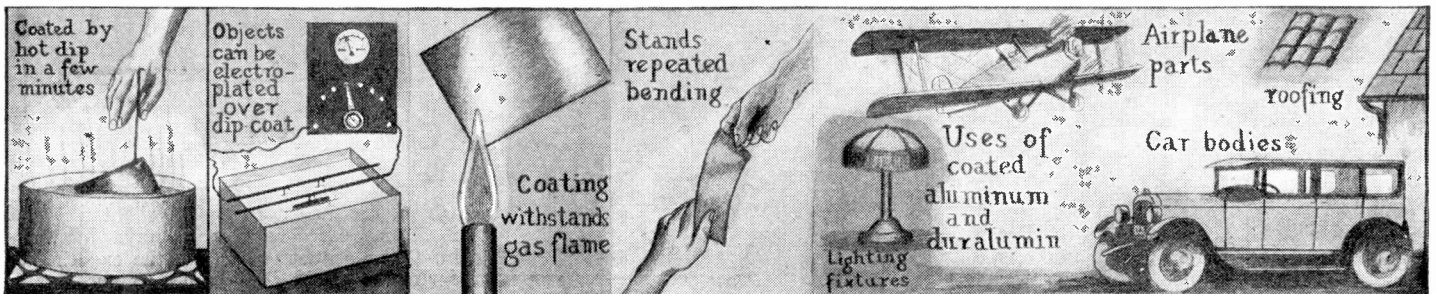
potassium carbonate (possibly with the addition of sodium carbonate) and, on the other, some salt of copper, nickel, cobalt, zinc, manganese, iron, chromium, lead, bismuth, tin, silver, gold or some other metal electro-negative to aluminum and which was to constitute the coating. Compounds soluble in water and liberating oxygen, in particular some chromate, may be added to the bath, and bicarbonates of alkali metals can be used side by side with the carbonates. A mixed deposit of chromium and silver is obtained by means of a solution containing in one litre of water, 10 grams of chromium sulphate, 2 grams of silver nitrate, 10 grams of potassium carbonate, 3.3 grams of sodium bicarbonate and 3.3 grams of potassium bicarbonate. While this bath is used in connection with soft aluminum, a solution containing three times as much of each constituent has been found preferable in the case of duralumin. The coatings thus obtained can be made brighter by an addition of about 10-20% of glycerine.

While the long list of solutions used in the various cases cannot here be enumerated, it may be said that no poisonous compounds, such as cyanides, and no expensive salts, such as those of ammonia, are used. The process is altogether independent of the application of any electric current, the action being purely chemical, and only when a particularly thick and resisting coating is de-

which comprises heating coils for raising the solution to a suitable temperature. While the chemical action is, of course, accelerated by a rise in temperature (up to a point close to boiling), the best effects are in certain cases obtained by a bath kept at room or moderately high temperature. A few minutes (sometimes even less) is the time generally required to secure a satisfactory coating covering the whole surface of the article and penetrating into any fissures or cavities.

Operating expenses are very low, the coating of one square yard entailing an expenditure of but 1 to 2 cents.

A perfect coating of a greyish blue, resembling glazed porcelain, has been found most suitable in connection with motor-car bodies. This has a high brilliancy, is resistant to mechanical injury and can be washed with hot or cold water. Unlike the usual varnish coating, which it takes several weeks to apply and dry, it will be ready for use after a few minutes. The same coating can be used in connection with any other vehicles such as railroad cars and airplanes; while ship outfits made of aluminum will be protected by means of similar coatings
(Continued on page 1058)

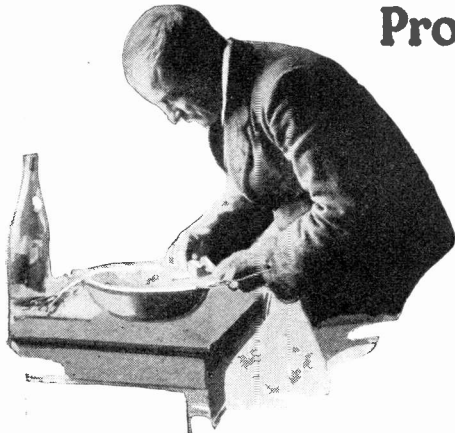


The "movie strip" above shows how the new aluminum coating method is carried out by the Jirotko process, and also a number of the practical

applications of the new corrosion-proof coated aluminum. These applications include roof shingles, etc. The coating can be electroplated.

Propagation of Tree Cuttings in a Sterile Liquid

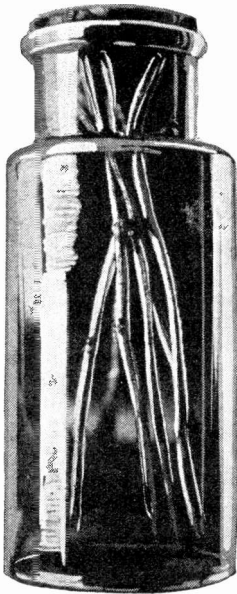
By COUNT A. N. MIRZAOFF



The surface of the slip is first brushed with 95% alcohol.

GARDENERS usually have incomplete success in propagating in the open air cuttings of certain trees. Accordingly they prefer to put the cuttings under bell-jars or in cold frames so as to regulate as desired transpiration, heat and humidity.

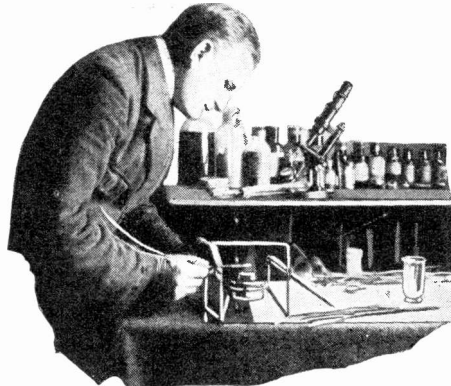
But certain French specialists of the present day now employ a more scientific method, propagation of cuttings in a sterile liquid medium,



which seems to give very encouraging results. This is how it is carried out.

They begin by moistening the branches with ninety-five per cent alcohol. To do this they rub the surface of the slips with an ordinary brush and after this they slightly char the end of each of them by passing the end where it has been cut off through the flame of a little alcohol lamp, and then they coat the charred end with paraffin wax.

When this has been completed, the cuttings thus prepared, are put into a vessel containing a solution, one in a thousand of corrosive sublimate, or else of formaldehyde, one-half of one per cent. strength, and leaving them in this receptacle for several months covered with a thin cloth.



Above, the end of the slip is carbonized in an alcohol flame. Left, the slips are placed in a jar of 1/2 of 1% formaldehyde. Right, in two weeks the slips are budded and ready to be placed in the ground for rooting.



Paraffin is applied to the end of the slip where it has been previously carbonized.

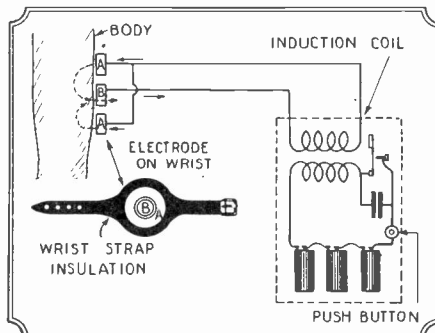


At the expiration of this time, the cuttings will have put forth leaves and all that remains to be done is to plant them and they will develop roots. This simple and rational process is now employed by several Parisian gardeners and succeeds excellently. It can be used for propagating almost all trees and shrubs, such as willows, Lombardy poplars and other trees to be found in French gardens. The system economizes space as it dispenses with frames and pots.

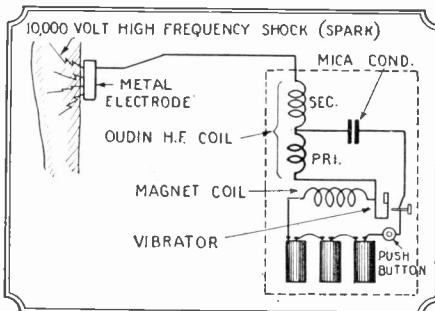
Electric Wristlet Baffles Assailants



By the use of an electric wrist band, similar in shape to a wrist watch and strap it is said to be possible to disable an attacker by rendering him temporarily unconscious.



One of the possible connections for such a protective device is shown by the above diagram. A spark coil is connected to the wrist band so that the assailant receives a shock when the circuit is closed.



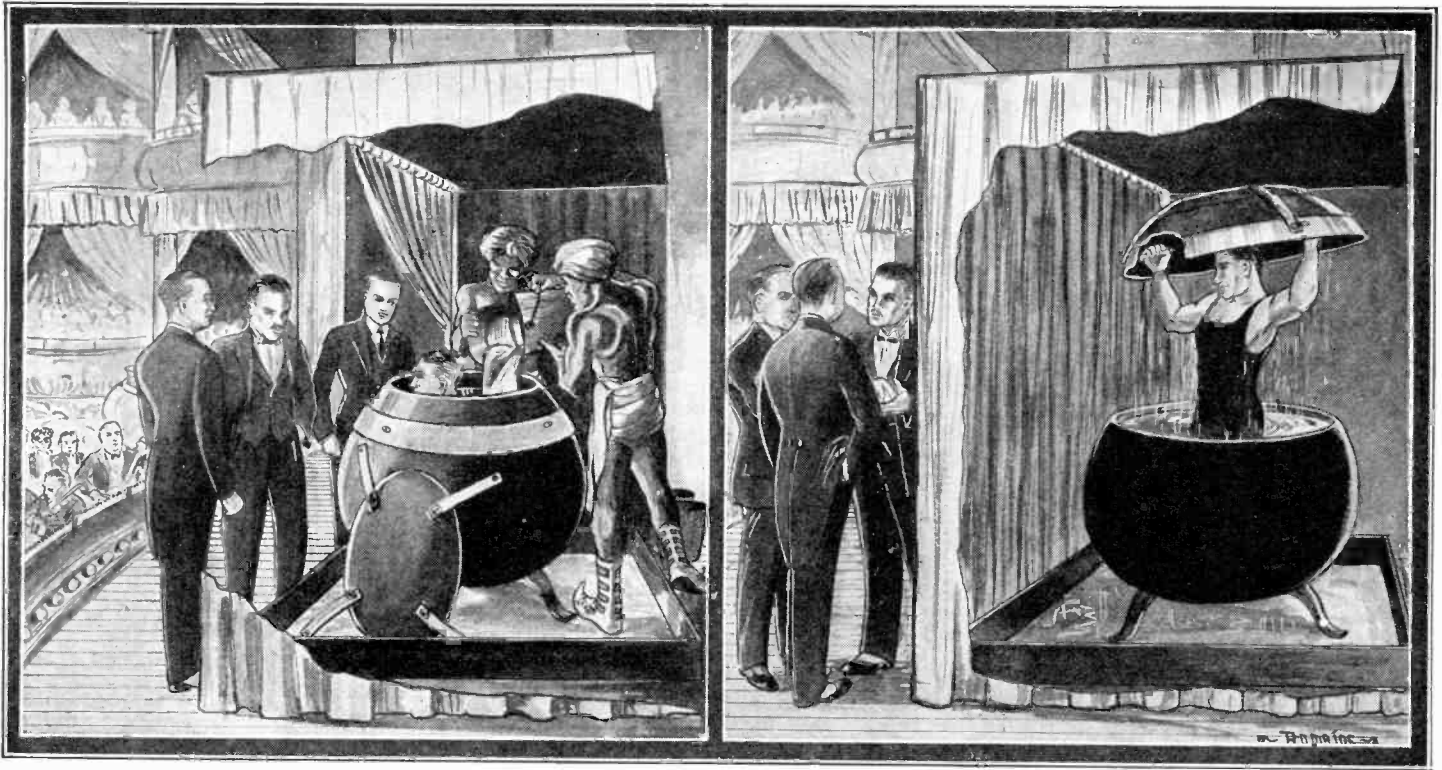
Another possible combination involves the use of an Oudin high frequency coil, arranged so that the secondary is grounded through the body of the attacker. A high voltage spark is produced.



The inventor, Emil Pruss, is shown above wearing one of the "protectors." The device is said to be very effective, and harmless to the wearer.

A GREAT many very useful protective devices have been developed recently for use against thugs and bandits. We recently published in these columns a description of a gas pistol made in the form of a fountain pen, the use of which rendered the victim powerless and subject to easy arrest. This month we are illustrating another device which employs high frequency, high voltage electricity to accomplish its object. The device is very compact, being about the same size and the same shape as a wrist watch, and

it produces a current sufficient to cause a severe shock. Such a current may be produced by either of the two methods illustrated in the accompanying diagrams. The use of the spark coil is perhaps a simpler method, but a higher potential will be obtained by the use of a high frequency coil.



Somewhat similar to Houdini's famous milk-can trick, well-known to American audiences, is this illusion of Monsieur Steens, who is entertaining Parisians with the act illustrated herewith. After the magician's assistants filled the cauldron with water, he crawls inside and the cap is locked and

sealed on by a committee from the audience. The picture at right above shows how the magician raises the whole top of the cauldron, thus making his escape, and at a signal the curtain is pulled back and there he stands outside the cauldron. How does he do it?—Read on.

Magician Escapes from Cauldron of Water

Well-Known Magician Entertains Parisians with Clever Trick

THE Magician Steens shows at the present time in various Parisian halls a new device of his creation which never fails to impress vividly the spectators. The artist jumps into the liquid which is contained in an enormous spherical boiler, and hides therein. He has hardly disappeared when an immense flame escapes from the boiler, rising up in lambent golden violet tongues.

The fire diminishes, goes out and presently, to the great astonishment of the public Steens rises up out of the boiler, free from all burns.

Again he disappears into the liquid and now some volunteers from the audience place upon the boiler a metal lid, which is screwed down securely. This time the diver is or certainly seems to be a prisoner.

Next for a few seconds a curtain surrounds the boiler. Then when the curtain falls to the ground, the public sees Steens standing up and smiling alongside of the magic boiler which he mysteriously escaped

from, and whose lid is screwed down hermetically.

How can this sensational attraction be explained? A man remaining for a greater or longer period beneath the water, which is the liquid contained in the boiler, only presents a question of personal aptitude which requires no special faculty. As to the inflammability (apparent) of this liquid, the effect is obtained by pouring into the boiler a certain quantity of ether, which as it is very light, floats on top of the water, and is lighted by contact with a particle of potassium or sodium thrown in secretly by the assistant.

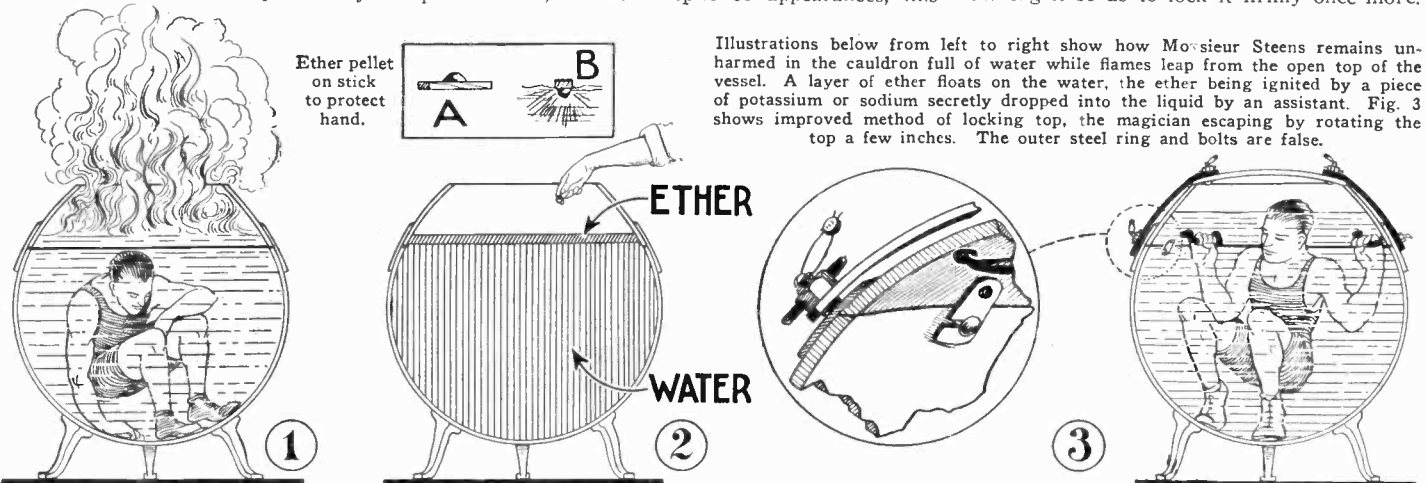
But when the cover is screwed down on the boiler how can Steens get out? Our two outlines seem to give clearly the key to the enigma; the upper part of the boiler has a detached segment. The line where the parts join is camouflaged by a band of metal. It is on top of the upper segment that the cover is screwed down by the spectators, but as in spite of appearances, this

segment which is now the lower part of the upper section, simply rests upon the lower part of the boiler, nothing is easier for the performer than to push it up as he gets out of the boiler, and then to put back upon the lower section the movable wall and its cover, so as to appear in the posture of a miraculously escaped prisoner causing intense surprise among the spectators.

The foregoing story is translated from a French description in *Je sais tout* and the present illustrations show several improvements in this apparatus.

A trick well-known to stage magicians is shown added to the French design of this cauldron, as per drawings below. Two or three slotted projections engage with studs on the inside of the cauldron.

All the magician has to do after the committee has apparently locked him in securely and sealed the nuts, is to grasp the handles inside the cap and turn it a few degrees. He then gets out and replaces the cap, turning it so as to lock it firmly once more.

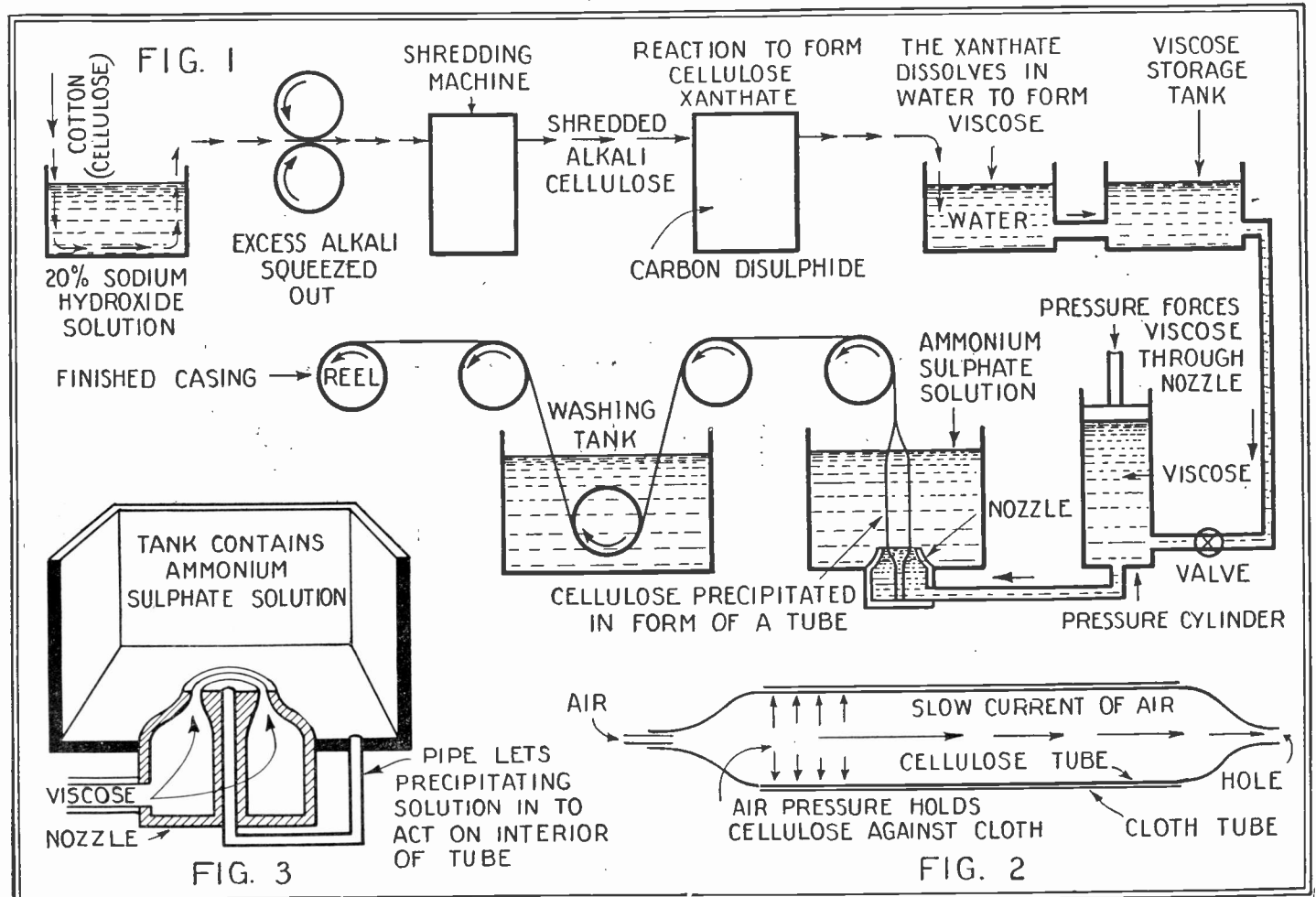


Illustrations below from left to right show how Monsieur Steens remains unharmed in the cauldron full of water while flames leap from the open top of the vessel. A layer of ether floats on the water, the ether being ignited by a piece of potassium or sodium secretly dropped into the liquid by an assistant. Fig. 3 shows improved method of locking top, the magician escaping by rotating the top a few inches. The outer steel ring and bolts are false.

Synthetic Sausage Skins

New Process Provides a Sanitary Cellulose Casing for Sausages, Frankfurters, Bolognas, and Other Similar Products

By D. B. McRAE



In former years the only coverings or casings available for sausages, frankfurters, and similar products, were those obtained from animal tissue. The newest synthetic casing for this purpose, made from cellulose, is evolved by

the clever technical process shown in the progressive diagram above. This work is the result of researches by Messrs. Henderson and Dietrich, of the Mellon Institute at the University of Pittsburg.

A COMPLETELY hygienic sausage casing has at last been produced which does away with all the undesirable properties of the animal casings. The new casing is made of cellulose by a method worked out by William F. Henderson and Harold E. Dietrich at the Mellon Institute.

A carefully selected grade of pure cotton linters, which consists of practically pure cellulose, is chemically treated in such a way that it is converted into a fluid or plastic condition from which it can readily be converted back to pure cellulose. While in the fluid condition it is forced under pressure through a nozzle having an annular opening as shown in Fig. 3. This nozzle is placed in the bottom of a tank containing ammonium sulfate solution. As the viscose, as the solution of cellulose is called, flows out and upwards from the nozzle into the solution of ammonium sulfate, a reaction takes

place which results in the cellulose being re-precipitated. Means are provided to withdraw the product as fast as it is formed.

Fig. 1, shows the details of the process from the time the original cotton is treated until the finished cellulose tubing is wound up on reels. The cotton is treated with 20% sodium hydroxide solution until it is thoroughly swelled. The excess alkali is then pressed out, the alkali-cellulose shredded, and then treated with carbon disulfide fumes to form a bright orange-colored product, cellulose xanthate, or cellulose dithiocarbonate. This product dissolves in water to form a syrupy solution, known as viscose. The viscose is allowed to stand for about eight days at a temperature of 10° C. to ripen before it is ready for use.

The ripened viscose is then run into a pressure cylinder from whence it is forced out through a pipe into the nozzle by means of pressure applied to a piston. As the seam-

less tube is precipitated by the ammonium sulfate solution it is continuously drawn away by a revolving drum and then passes over a series of drums which lead it through other tanks for washing or for any supplementary treatment that may be required.

In order to dry the tubing and keep it of uniform size without allowing it to bulge or shrink unevenly, an ingenious method was devised. The moist tube was placed inside of a thin cloth tube and was then inflated with air. Sufficient air pressure was used to keep the tube firmly inflated against the cloth tube which limited the swelling. A small hole was made in one end to allow a slow escape of air, thus allowing a current of air to flow through the tube. At the same time a fan blows a current of air over the outside. A 35-foot length of tubing can be dried in a very short time in this way.

Fresh Air and Bodily Temperature

A curious conclusion has been reached by Prof. Winslow of the Yale School of Medicine concerning ventilation with special reference to schoolrooms. He speaks as Chairman of the New York Commission on Ventilation. The result of his investigations is that the deficiency of oxygen and the presence of excessive carbon dioxide does no harm. Subjects were exposed to the action of breathing the air in a sealed chamber. The oxygen of the air decreased. The carbon diox-

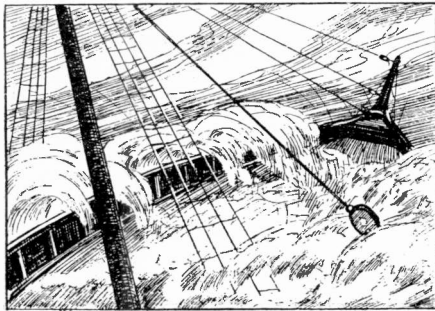
ide increased. Then they were supplied with pure air to breathe and the breathing of the pure air did them no good, after they had suffered from the action of the conditions of being sealed up and breathing the same air over and over again. Electric fans were then started and the air was set into motion. This reduced the temperature of the surface of the body, and at once improvement was shown. Long records of offices and the

like showed an eighteen per cent. increase of absences due to sickness when the temperature was kept in the neighborhood of seventy degrees; compared with results at sixty to sixty-five degrees. The general conclusion is that it is more important to keep air in agitation rather than to try to keep it pure by forced ventilation.

The much scorned ceiling fans seem to be coming into their own.

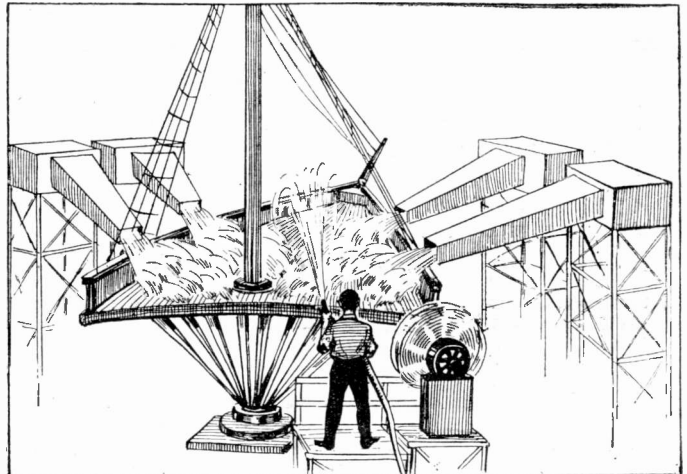
Storms to Order for the Movies

By EDWIN SCHALLERT

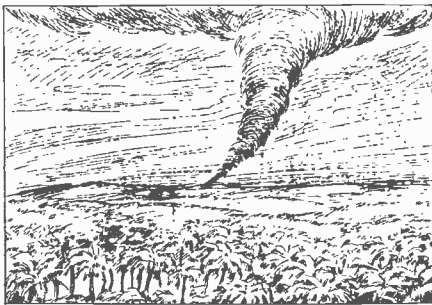


IT is probably a fact that participation in the motion-picture business requires more ingenuity and technical skill than almost any other industry. In many cases it is found necessary to duplicate in the studio those phenomena which Nature refuses to produce when they are most wanted. The garden-hose and wind-machine make a very creditable shower for a small set, but bigger problems require more thorough and scientific treatment. Sometimes it is absolutely impossible to produce the effects in full size, so the studio which possesses a good Model

THE crashing waves which rose high over the bow of the ship were produced as shown at right by water flowing from reservoirs and a fire-hose on to the deck of a "prop" ship installed in the studio tank. The pictures were taken at slow speed to heighten the effect of realism, while those taken of a small scale model of the ship were made at high speed to slow down the motion of the water. The camera was occasionally reversed to give the effect of suction which is characteristic of big waves. The camera was mounted on an extension of the deck of the "prop" ship.



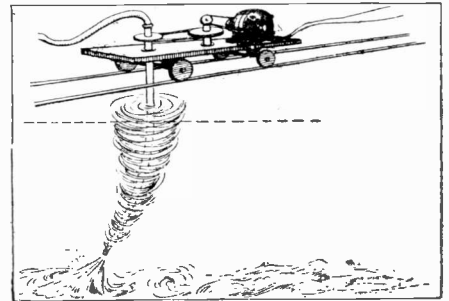
Sometimes it is very expensive to reproduce unusual effects upon the screen, as it was in this case where the bow of a ship was required to be constructed to full scale. A hydraulic pivot furnished the necessary rolling motion.



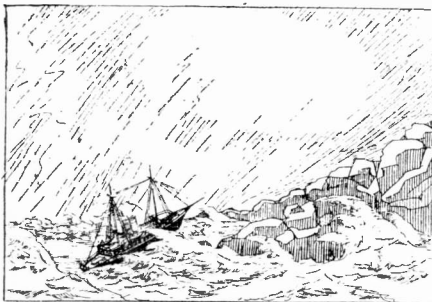
technician is indeed fortunate. The West Coast studio of the Famous Players-Lasky Corporation was recently faced with the problem of producing a storm involving tornadoes and water-spouts for the production of their new picture "Sea Horses". The problem was very ingeniously met through the use of models and trick photography, and the result upon the screen is an exceedingly realistic and awe-inspiring spectacle. The director of "Sea Horses", Mr. Allen Dwan,



The mechanism shown at the right and described elsewhere on this page gave very good results in simulation of the appearance of the tornado's whirling cone. The dotted line indicates the limit of that portion within the range of the motion picture camera. Water

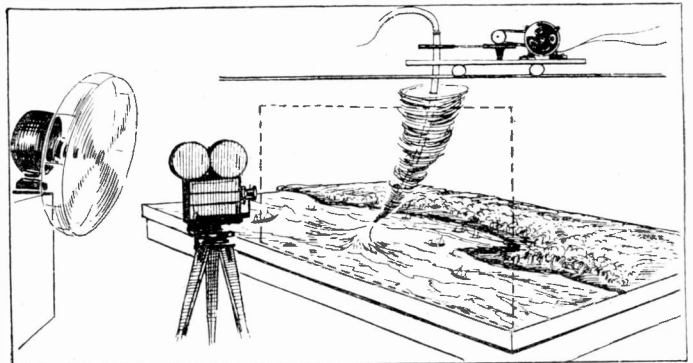


was now pumped through a rubber-hose inserted into the crepe-covered cone, and when the film was reversed, the water appeared to rise from the surface of the tank into the vortex of the tornado.



called upon the technical department of the Lasky studio for assistance, and they employed the methods illustrated on this page to achieve their effects. The script of the story called for views of a water-spout in a harbor, the swamping of ships, a tornado in the jungle, and views of the scenes of devastation. The effect of the waves rising over the gunwales of the ship was produced by standard methods first employed several years ago in the production of Charles Ray's "The Courtship of Miles Standish." In the upper right hand corner of this page will be found an illustration of the apparatus employed, producing an effect similar to that illustrated at the head of this column. All the other effects were produced with special apparatus shown on this page.

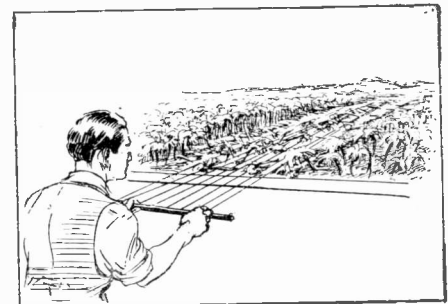
THE twister itself was produced by a motor-operated gyroscope to which was attached a spiral frame extending down to the miniature set. The frame was covered with loose folds of black crepe cloth, and was rotated at high speed by the gyroscope to give the effect of the pillar of vapor and dust typical of this kind of storm. A rubber hose was inserted in the frame to spray water vapor upon the water below.



In the middle of the first column is a sketch of the way the tornado first appears upon the screen. Later it is seen sweeping over the crowded harbor, destroying ships as it progresses. The latter "shots" were made with the arrangement shown in the drawing directly above.



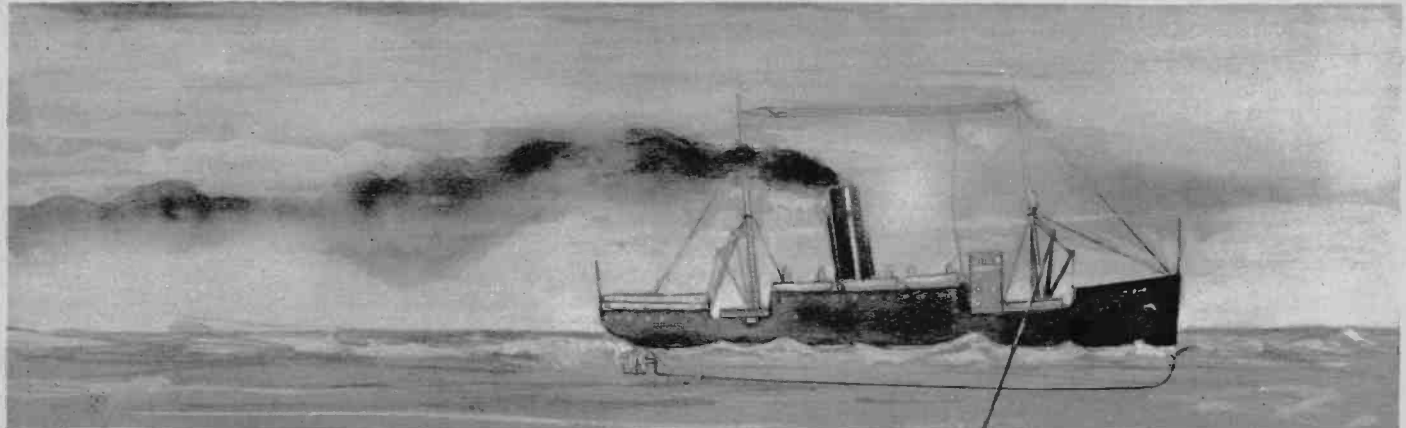
The lower picture in the left-hand column illustrates the scene in which the ill-fated ship was lifted by the suction of the tornado upon the treacherous rocks, called "sea horses", which bordered part of the harbor. This is, of



course, a miniature set. The two drawings above give the appearance of one sequence in which the tornado passes through the forest. Thin wires, held by an operator, knocked down the trees to order.

To Explore Ocean Depths in Steel Tank

Dr. William Beebe, the Famous Explorer, Is Having a Steel Tank Built to Study Deep Sea Fish

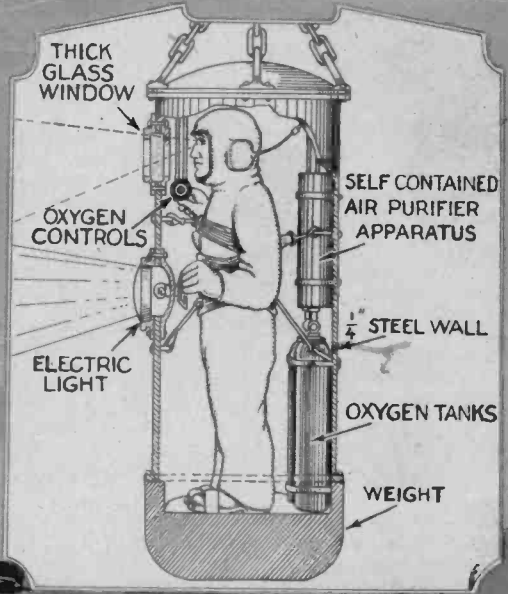
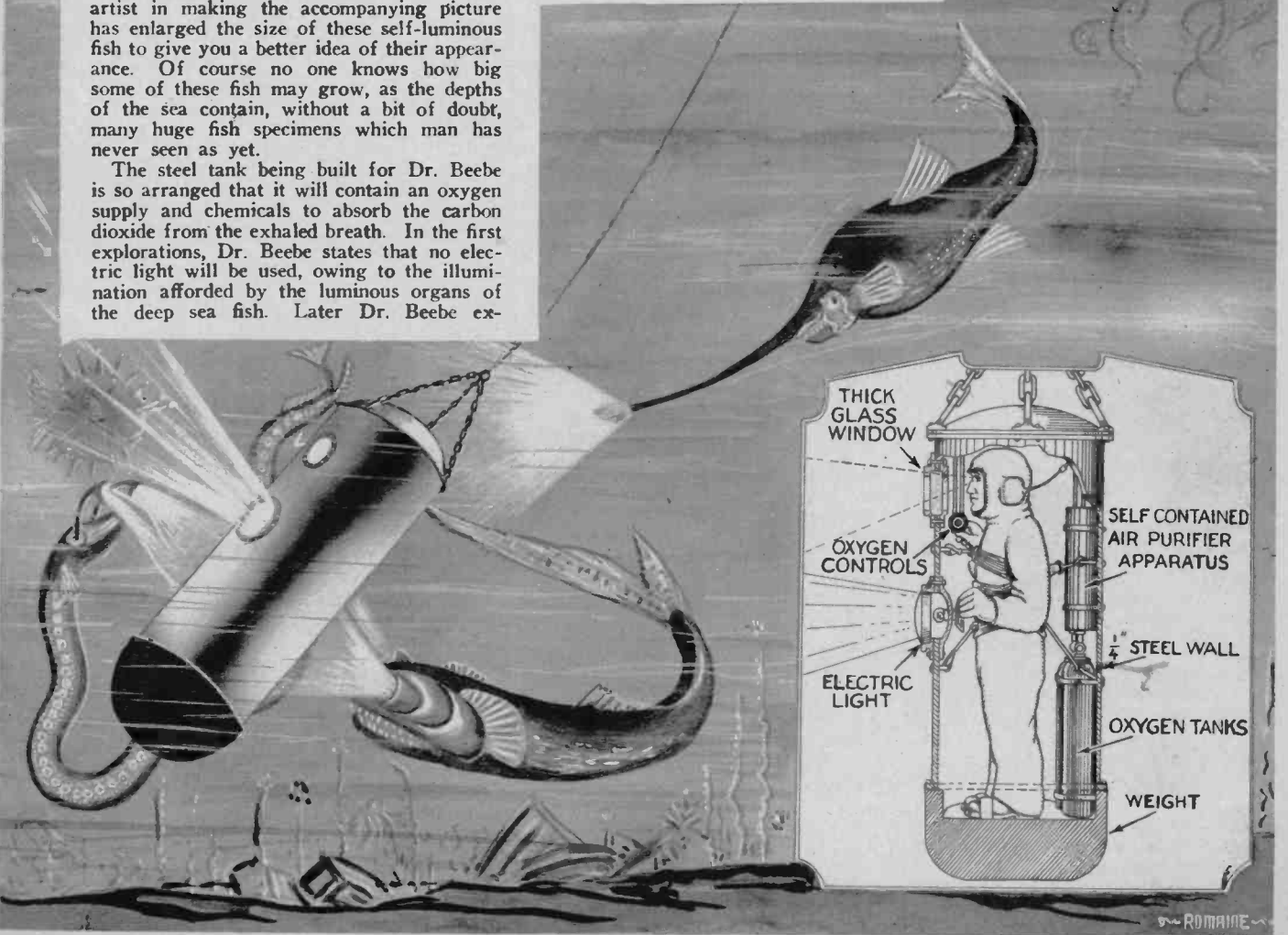


THE accompanying illustration shows how Dr. William Beebe, well-known scientist and explorer, intends to study the denizens of the ocean's depths at first hand. He is having built a steel tank of the size shown in the detail drawing in the lower right hand corner of picture, so that he can be hauled along in this tank on the end of a steel cable at depths as great as one mile or more. Offhand the average person will probably think that he will see nothing new except the average species of fish, sharks, et cetera, but as was pointed out in a remarkable article by Dr. Ernest Bader in the March, 1919, number of this journal, many of the fish inhabiting the deep waters of the ocean, supply a light of their own. The artist in making the accompanying picture has enlarged the size of these self-luminous fish to give you a better idea of their appearance. Of course no one knows how big some of these fish may grow, as the depths of the sea contain, without a bit of doubt, many huge fish specimens which man has never seen as yet.

The steel tank being built for Dr. Beebe is so arranged that it will contain an oxygen supply and chemicals to absorb the carbon dioxide from the exhaled breath. In the first explorations, Dr. Beebe states that no electric light will be used, owing to the illumination afforded by the luminous organs of the deep sea fish. Later Dr. Beebe ex-

pects to use a strong searchlight so as to take motion pictures at these great depths.

The steel tank, as the drawing shows, will be about 1½ ft. in diameter and 7 ft. high, while the steel walls will be about ¼ of an inch thick in order to withstand the terrific water pressure at great depths. The pressure of the water increases approximately one-half pound for every foot one descends. The exploring tank will have a thick glass window 7 by 12 inches in size and capable of withstanding a pressure of several tons to the square inch. Dr. Beebe expects to begin experimenting with his new deep sea tank next spring, after he returns from Haiti.

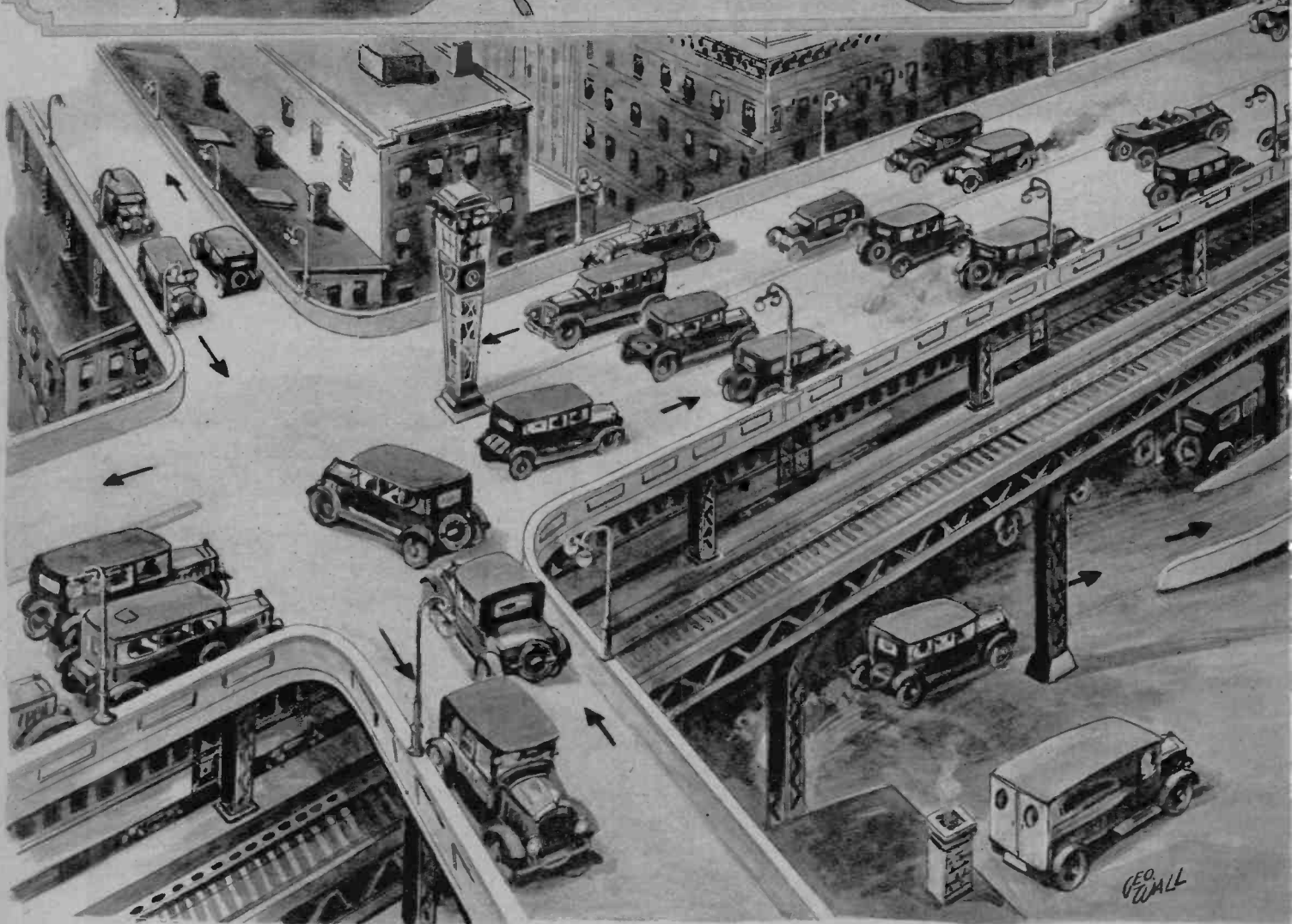
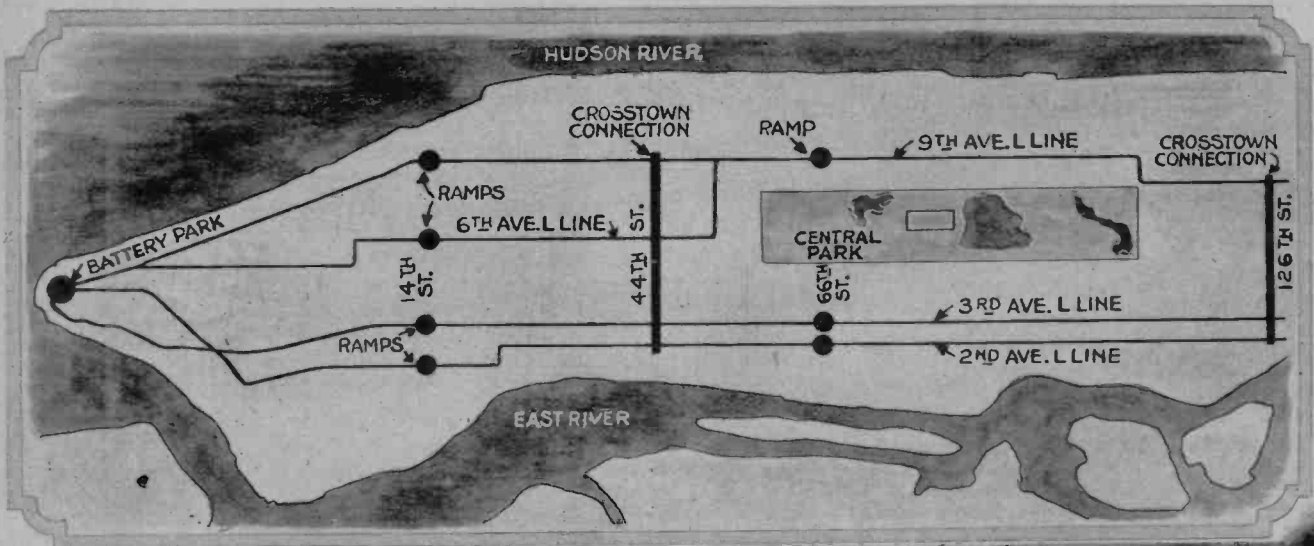


Scene showing self-luminous fish inhabiting ocean's depths and details of man-size exploring tank.

Solving Metropolitan

By HUGO

Member of American



Herewith is shown the project of putting 50 per cent. of New York's automobiles on top of the elevated structures by constructing an automobile speedway on top of the existing four elevated structures. The view above

shows the crosstown connection which connects the four elevated sections somewhere near 44th Street, as shown in the map. The author explains how to raise the funds for such a proposition.

THE student of traffic, particularly as it pertains to our large cities, must become impressed with the fact that if congestion gets much worse than it is at present, the very vehicles that are supposed to transport us and our freight rapidly will become obsolete, due to their staggering numbers. In our big cities this congestion has become so terrific that

if you want to get anywhere within the concentrated traffic areas you can get there much more quickly on foot than by using any surface vehicle. Evidently the evil is progressing rather than abating, and what the conditions will be five years hence becomes one of the most interesting speculative topics of the day. It is reported that in Paris at the present time experiments are

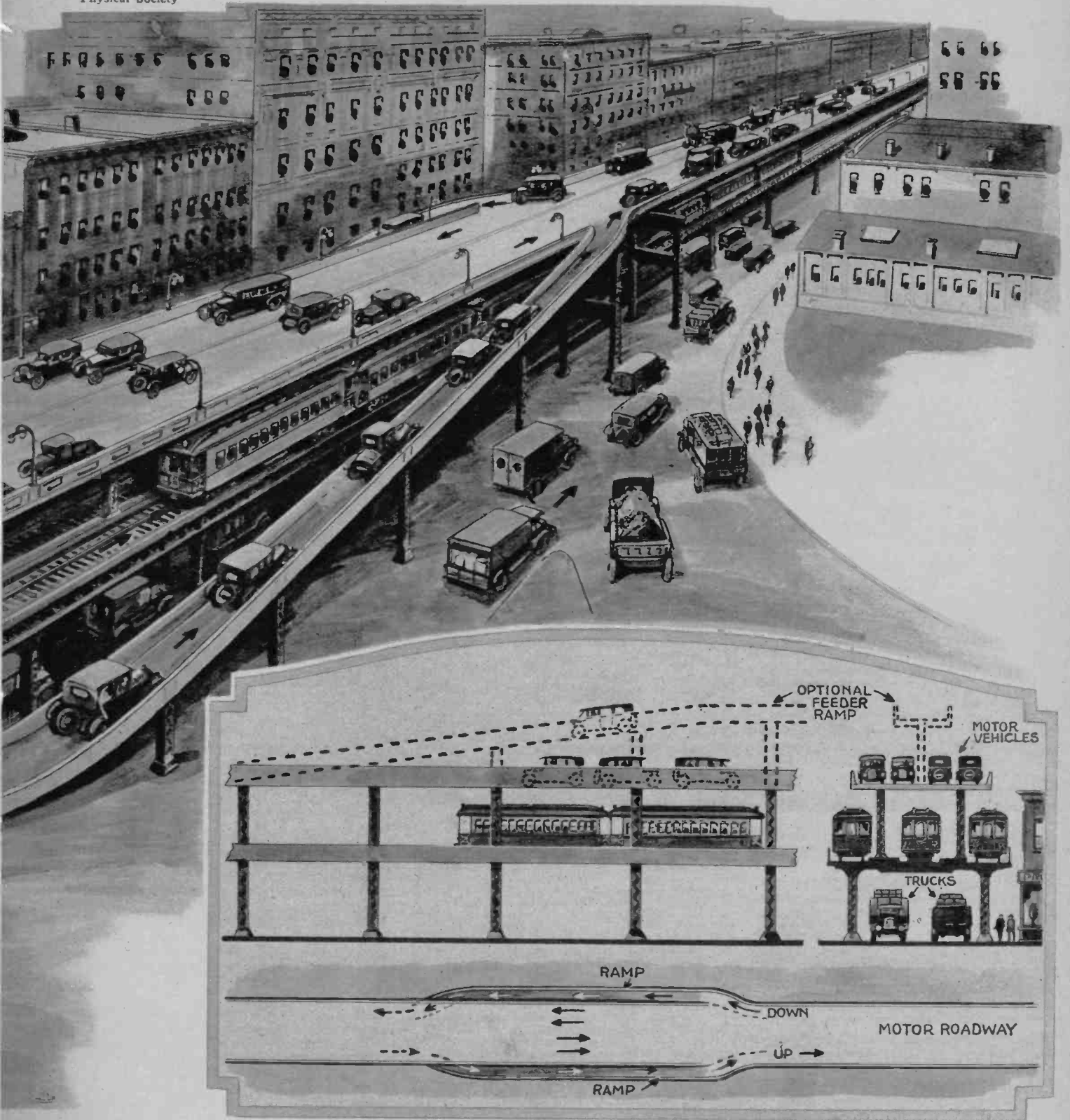
being made to park standing automobiles under the street by having an inclined ramp at certain corners, where automobiles can dive in and stand there out of the way. How many can thus be stored comfortably is not known.

The idea of double-decking streets is, of course, not new, having been suggested by many writers. It already has had a tryout

Traffic Congestion

GERNSBACK

Physical Society



The above shows the system of ramps, or approaches extending for almost two blocks paralleling the structure and curving underneath the elevated railroad to the street, to facilitate the automobile traffic, either coming or

going, to the elevated speedway. The insert below shows cross section of the speedway, showing that four rows of automobiles can be accommodated. The other view shows the motor roadway looking from top.

recently in Chicago, where one such street is already in use.

The counterpart of the traffic congestion that exists in the City of New York probably cannot be found anywhere else on earth. This city, due to its geographical configuration, centers all the traffic within a comparatively small area. There are more vehicles passing a given point in the con-

gested part of New York than any other traffic center on the face of the globe, and only those who have seen the terrific amount of congestion there have any idea of what is really going on.

It is, for instance, an everyday occurrence that at theatre time it will take some twenty or thirty minutes for an automobile to go the short distance of three blocks. The

same distance can be covered on foot in less than two minutes, and most people, when they are late, always leave their cars and travel on foot, weather permitting.

New York City, however, offers a sort of solution for this evil, and the proposal which I make herewith seems to provide relief for at least fifty per cent of the auto-
(Continued on page 1057)

Into the Fourth Dimension

SEVENTH INSTALLMENT
First American and Canadian Serial Rights
By RAY CUMMINGS

"Will saw but dimly. Saw shapes floating in there. Dismembered shapes. Others, whole, floating inert. A caldron with bubbles of sight and sound and smell."



CHAPTER XIII THE REALM OF DEATH

I MUST tell again of that moment when we—Bee and I—were standing beside the lolos field with Brutar and Eo. Brutar had turned away. Eo—prompted, I had no doubt, by Bee—murmured, "This is evil! We will escape—"

My arm reached for Bee. I told myself intensely that now we must escape . . . now I must fling my thoughts—my mind—out into the void. . . . And stay with Eo; he would lead us. . . .

I think my groping hand never reached Bee. I felt a swishing sound. A swirl of thoughts struck me—like feathers blown against me in a gale. But they seemed to cling. Invisible, imponderable—barely palpable; dimly I could feel these thoughts like a net entangling me.

I was floundering. Surging through blackness. Where was Bee? I thought I saw her and Eo whirling near me. But it was a thought unreal—hallucination; for as I tried to grip it and make them visible, they were gone. My thought of them dissolved into a realization that I did not see them, for they were vanished.

But Brutar I saw; a distorted wraith of him . . . his grim menacing face . . . grim with combat. . . .

I was rushing through blackness. But as an undertow may suck the strongest swimmer, something was pulling me back . . . a hampering net around me . . . materializing into greater ponderability . . . holding me firmly. . . . The blackness about me was taking form. I strove to think I saw the Big-City. Told myself that that hovering shape above me was Thone—the friendly Thone; not Brutar.

But it was not Thone; and this place that was clarifying to my vision was not the Big-City. The lolos field! I came—was dragged, sucked back to it! The lolos field—I was standing there where before I had been. And the menacing shape was Brutar—my captor standing there grimly confronting me.

But Bee and Eo were gone.

These two escaping, came upon Thone, Will and Ahla as I have related. Came upon them hovering nowhere in the void. Eo was stricken. Brutar, with what quick-

Synopsis

Robert Manse, a correspondent in the New York Office of a Latin-American export house, in company with Wilton Grant and his sister Beatrice, saw the first of the ghosts in February, 1946, a few miles from Rutland, Vermont. These ghosts were semi-transparent, glowing figures much resembling human beings. Attempts to destroy them with bullets or clubs had no effect on the shadows.

Some time later, Will calls Rob on the telephone, saying that his sister Bee is quite ill and asking Rob to pay them a visit. During the visit Will mentions that the ghosts have already arrived in the Borderland lying between their world and ours, and that they were on the point of coming into our world. Will himself has discovered a means of entering into this borderland, and declares that even though he is being watched by many of the ghosts he will make an attempt to enter their realm and turn the spirit-like creatures back into their former paths. While he makes the journey, Rob is to stay behind with Will's sister, Beatrice.

The preparations for the experiment are made, and Will clasps upon his arm a connection to the vibration-transformer which, by altering the vibrations of his body, is to transform it from normal substance to the wraith-like material of the other world. They see a ghostly form watching them as Will's body becomes transparent. Finally the apparatus is disconnected and they wait for his return. Five hours later, Will returns saying that they must go back with him to save the world from an invasion of the ghostly hordes.

Robert and Beatrice, though face-to-face with the unknown, succeed in suppressing their fear, and agree to accompany Will across the border. The three adventurers don their metallic garments, attach the batteries, and swallow the acrid compound which is to transform their tissues. In a few minutes they find themselves transported into the Borderland.

They meet Ahla who takes them to the big city. The triplet is told that Brutar is inducing his followers to enter our world. A battle of thoughts takes place among the ghosts. Brutar captures Rob and Bee with thought waves, and tells them that he can use them for his conquest of the earth. Will and Ahla go to the rescue.

Brutar brings a young man, Eo, on the scene and they both listen to descriptions concerning earthly life. Brutar shows how material things are made from thought waves. He also shows Rob and Bee the lolos plant which has a conscious mind. The blood from this plant enables the ghosts to enter our realm. During the demonstration Bee and Eo escape.

Now continue with the story.

ness and evil power of mind I could not conceive, had struck at Eo. A wound, a derangement not physical, but mental. His mind now—sick, stricken with disease. Almost wandering; yet not quite unhinged—for the power of his will was holding it. Bravely he clung to sanity. Fought for it. Yet those—his friends with him—knew then that he fought a losing battle.

They hung there in the void. Bee was sobbing, "I don't want him to die! He is my friend."

He held tightly to her. His eyes were very wistful. "They call you a girl—and now I know I love you!"

The void was moving. It seemed so to Will; seemed that the blackness was moving past them. Or was it that they—the little knot of their hovering shapes—was moving? Then Will realized that it was Eo—his stricken, wandering mind—dragging them somewhere. The void seemed moving—for how long Will did not know. And then, far away, in Space and in eons of Time, something became visible. A faint star-dust glow. A luminous patch. It broadened; spread to the sides, and up and down until everywhere before them lay its gleaming radiance.

The realm of disease! Will heard Ahla murmur it in accents of sorrow and apprehension. Eo was rushing for it—and no power that they had could stop him.

The radiance intensified. A fear—a shuddering horror possessed Will. With every instinct within him, he recoiled from the approach. Revolted. But he held tightly to Thone and to Bee; told himself that they would lead him safely.

Everything was glowing; they were wholly within the glow now. A silvery glow that shone everywhere about them. But soon to the silver there came a greenish caste. It deepened. A green, with its sickly look of death. Green, with the silver turning to a pallid, flat, dead whiteness. And then a mingled brown; a murk, like a fog pervading everything.

Abruptly Will became conscious that Eo was no longer with them. His last despairing cry; and Bee's echo. He was going—floating downward; while they, uncontaminated, hovered above, at the edge of the realm, to see it but not to enter.

Will saw but dimly. Saw shapes floating in

there. Dismembered shapes. Others, whole, floating inert. A caldron, with bubbles of sight and sound, and smell. Shrouded in murk. Unreal. . . . A wailing . . . sobbing . . . faint aerial voices wailing like ghosts distraught. . . . And a stench—the thought of it, no more . . . but to Will the thought, the knowledge of all this was horrible, fearsome. Singularly fearsome; above everything at that moment he feared this realm, this state of unnatural, tortured existence. . . .

They could still talk to Eo. See him there, laboring, losing his brave fight to come back to them. He seemed very far away; and yet very close, for though his form was down there, engulfed with all the leprous horrors of disease, his voice was very plainly heard. And his face, the image of it, the physical representation of it to Will's thought, seemed again at hand. His eyes were very wistful. He was smiling gently at Bee.

"Soon, girl, I will be gone—into death—it is very near now. I can see it—see it, just ahead . . ."

Will saw it, too. Another realm beyond the one they were skirting. The realm of death. It lay close ahead. Dark. Mysterious. Scarce to be seen, but only imagined.

Again came Eo's faint voice. "I shall—be there in a moment. It is very—beautiful. I can see it—right here—" And then he suddenly whispered, "I love you, my girl Bee—"

And vanished.

Or did he vanish? The shell of him then seemed lying in Bee's arms. But it was an empty nothing; the shell of a shape of something which once had been, but now was not. . . . Bee, with an abrupt revulsion, drew away from it.

Thone said gravely, "Watch it, Will. The Divine thought is gone from it. Our own thought-matter is all that is left. You shall see of what permanence that is."

The dead shell lay inert. It was dissolving; . . . Growsome. . . . Will turned away; then forced his vision back to see a

leprous wraith—a rotting shape which presently, like a melting fog, began to dissipate. Dissolving, until the very last essence of it was gone into nothingness.

Ahla seemed to sigh. "It is very horrible. Yet I think that we are wrong to consider it so, for it is Nature."

Will recovered himself. The realm of disease had withdrawn to a memory. Around him the blackness seemed purified. But ahead he could see—or thought he saw—that other endless realm where dwell what we call the dead. Questions flooded him. Eo was there? Could they not go and see him? Could he—this Entity which once had been Eo—could he not still speak to them from beyond the borders of death?

Thone said, "We will approach it if you wish."

Unnamable time; and then Will found that they were there, hovering; and a realm, a place—a something he knew not what—lay spread above them. Earnestly he groped for it. Not with his physical hands; but with his senses. His thought went there and back. He thought he saw shapes up there. Hovering, glowing shapes in



"a place lay spread above them. Earnestly he groped for it: Not with his physical hands; but with his senses. He thought he saw shapes up there."

a great light space. And with futile, childish imagination he endowed them with beautiful, ethereal qualities; transfigured them into glowing human shapes of beauty and peace. And thought he saw them; and that they might speak to him. Or that perhaps, because Thone

shrouded in mystery was more than childish. . . . Infamous. . . .

Thone said, "Eo is there, in the darkness and the light. You can think of him. Your thought will go there. And it will come back to you, fraught with what qualities your imagination may lend it. But nothing else."

"No," said Will, "nothing else. I understand that now. It is good that it is so."

"Good, indeed!" Ahla echoed. "We can probe too many mysteries for our own welfare. From whence and why we come—and where we go—we assume Divinity to seek these answers."

Will asked, "There are some in your world who think they can penetrate the veil of death?"

"Yes," said Thone. "There are some."

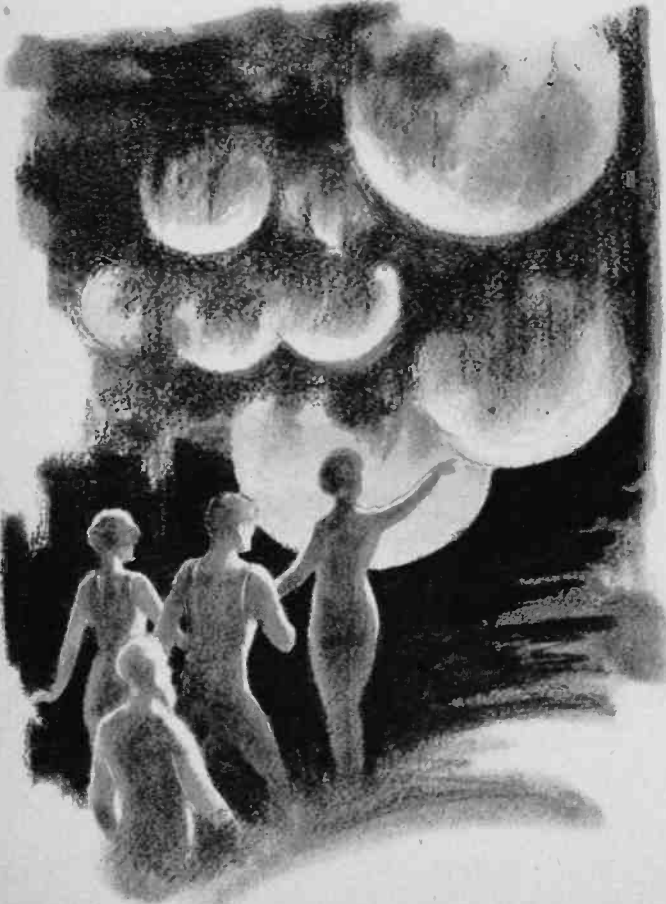
CHAPTER XIV

THE BIRTH OF A THOUGHT

THEY turned away in the void—away from the dark-light mystery of the realm of death, and drove themselves back to the Big-City. The search for Brutar's encampment was at the moment futile; they knew they could not reach it. And though Bee had escaped with Eo, she did not know whether I escaped or not.

They hoped to find me safely returned to the Big-City. But I was not there. But still Thone felt that I might come. To Will—with his inherent, instinctive conception

(Continued on page 1042)



"The encampment was deserted! Abandoned! The lolos field was disrupted; its plants gone. . . . disintegration already was taking place. Holes of nothingness were visibly eating their way into everything."

might be more than human, they might communicate with Thone, and thence to him.

And then he laughed. It was all so childish! But his laugh turned grim, for he knew at once that this futile desire to penetrate that which the Creator has



"As I had completed the writing, the medium asked for the slate, and read, out aloud what had been written on it."

Our Spiritualistic Investigations

NO. 8
OF A SERIES

By

Dunninger.

BELIEVERS in spiritual phenomena, particularly those who believe that they receive messages from the dead, either upon the surface of examined slates, or in the various forms of message-producing methods, employed by different "ghost controllers," lend themselves as an essential part to the wide and valuable advertising of the medium's name and talent. It is a fact that they are always requested to write down a question, referring to the information they desire from the spirit world, rather than a mere statement or a single word. Either could be read as well as the question, but the reading of neither would be as impressive as that of the question in general. For reasons not obvious to the average spectator, when a spirit worker reveals what has been written as an apparently concealed inquiry, the spiritualist gains at least a part of the glory that would have been attained, had he answered the query. This is the reason why the medium so often requests that the sitter write an invitation to their favorite ghost, before the spirit fingers can be made to answer. As to whether or not real spiritualistic messages are possible, that is a problem not unanimously decided upon. Certain investigators, who are worthy of respect, have convinced themselves of the possibility, but have not succeeded in causing their belief to be shared by anything like a majority of the psychologists, who also are scientists, with an admitted knowledge of evidential values. Mediums have various methods of obtaining information, other than calling upon their spiritual secretaries, from out the heavens of unknown spheres. They differ greatly from one another in their forms of procedure. One thing is sure, however . . . it is not by the exercise of any mysterious power, or sixth sense that they operate, and the explanations of these methods, when

\$21,000.00 for Spirits

Dunninger, who writes exclusively for **SCIENCE AND INVENTION** Magazine and who is the Chairman of our **PSYCHICAL INVESTIGATION** Committee will personally pay \$10,000.00 to any medium or spiritualist who can present any psychical manifestation in so-called spiritualism, that he will not explain or that he cannot reproduce by natural means.

More than two years ago **SCIENCE AND INVENTION** Magazine offered a prize of \$11,000.00 to anyone who could demonstrate his or her ability to communicate with the spirits or to give some definite form of a psychical demonstration which in itself was not trickery.

The result has been that mediums and spiritual organizations have been afraid to place proofs before us. Those weak attempts which have been made to demonstrate psychical phenomena were almost instantly proven fraudulent, and no medium has dared to contradict our findings.

In view of these facts, should we not consider all mediums fraudulent?

To the \$10,000.00 which has been offered by Joseph F. Rinn through this publication for Spiritual proofs and the \$1,000.00 in addition offered by **SCIENCE AND INVENTION** Magazine we now add Dunninger's \$10,000.00.

So now we have a total of \$21,000.00 offered for proofs of Psychical Manifestations. Spiritualists—get busy.

forthcoming, are as absurdly simple as the explanations of such "miracles" always are.

One of the foremost producers of messages, and perhaps one of the cleverest "readers" (a term used among bogus mediums), was Madame Lowe, a spiritualist in San Francisco. A tremendous business was established by Madame Lowe, who had no limited office hours, and boasted of a steady flow of customers daily. From 9 A. M. until midnight, came the callers. So numerous was her clientèle that she was looked upon with envy, by many of the neighboring fraudulent spiritualists, who were engaged in a similar line of business. She had been established at her residence on Mission Street, for quite a number of years, and was accepted by her many neighbors as a rather prosperous person. The medium occupied the entire building. Her waiting room consisted of what seemed to be originally two rooms, with the dividing wall taken out. At the time of the writer's visit to the medium's den of enchantment, this waiting room was well crowded. This probably accounted for the extra spacious sitting room. It was fully an hour that I waited, until I was finally ushered into the room by a short, stubby, elderly gentleman, in whose fine facial features, a studious expression predominated. He had all the semblance of a college professor, and in deep low tones I was introduced. I did not regret my long wait, however, as there was quite a lesson to be learned from the faces of the waiting visitors. A high amount of respect seemed to be maintained for the medium, as their conversation was carried on only in whispers, as if in fear to speak aloud. My inquisitive attitude got the better of me, induced perhaps by their whispering, and as time hung heavily upon my hands, I strained an ear to listen. I caught a sentence here

(Continued on page 1055)

Monthly Matchcraft Prize Contest

This Is a Continuation of the Famous Matchcraft Contest Which Has Just Completed Its First Year. This Department Will Continue to Award \$100.00 in Prizes Monthly for the Five Best Matchcraft Models Submitted During the Month



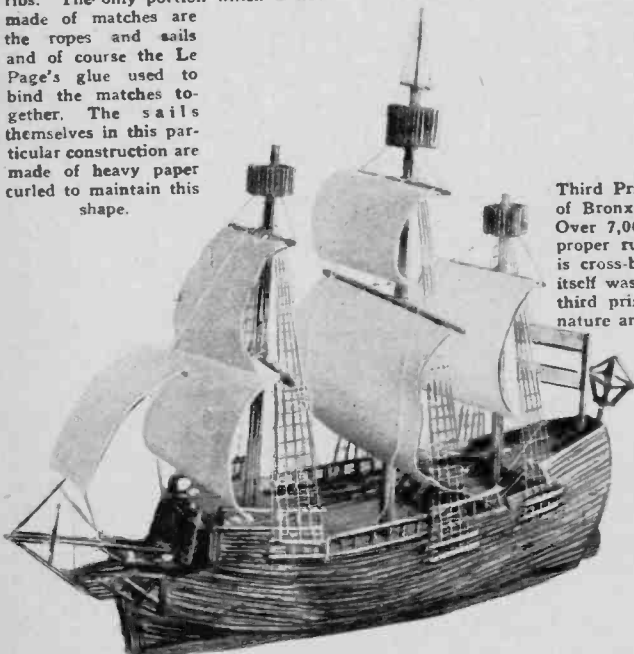
Frying Pan Wins First Prize—\$50.00. Article made by Fred Spinden, Abingdon, Ill. Coal tippie by C. W. Reese, Zanesville, Ohio, wins second prize—\$20.00.



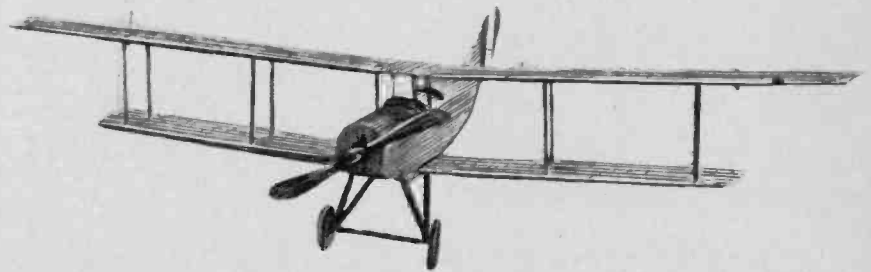
Second Prize—\$20.00 was awarded in the contest to C. W. Reese, of Zanesville, Ohio. Mr. Reese carefully reproduced those most important features found in coal tipples. Note the two railway tracks in the foreground, one for the small push car and the other for the larger freight cars. The entire article is mounted on a wooden baseboard which of course does not constitute a portion thereof.

First Prize—\$50.00 has been awarded in this month's revised Matchcraft contest to Fred Spinden of Abingdon, Ill., for the frying pan illustrated in the photograph above and to the right at the top of this page. Observe how each and every match in its construction has been bent to produce the curved bottom and sides of the completed article. Photograph posed by Miss Sadie Bernstein gives us an idea of the size of the model.

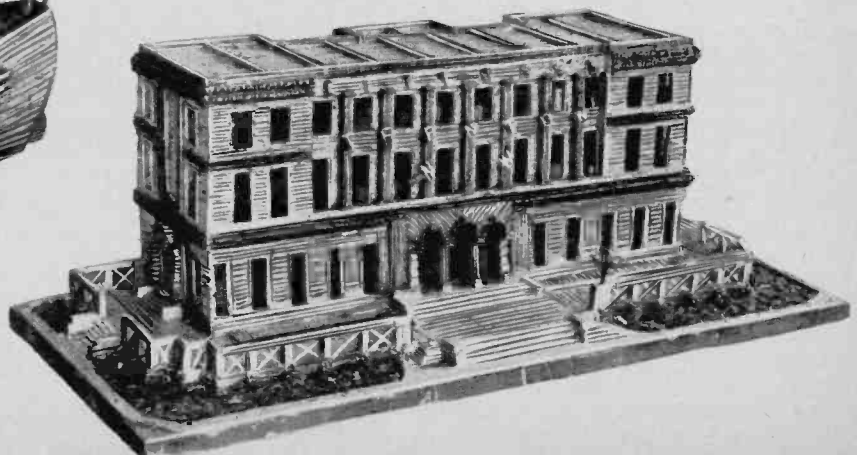
Fourth Prize—\$10.00 is awarded to Warren C. Brown, of Ossining, N. Y., for the model vessel illustrated in the photograph. This vessel is approximately 14 inches long and the sides thereof are built on regular ship ribs. The only portion which is not made of matches are the ropes and sails and of course the Le Page's glue used to bind the matches together. The sails themselves in this particular construction are made of heavy paper curled to maintain this shape.



Fifth Prize—\$5.00 was won in this contest by J. J. Bush, of Trenton, N. J., who should certainly know what the city hall should look like, inasmuch as he lives there. This model was approximately 30 inches long and many thousand matches entered its construction. Note that the name Trenton appears on the front of the building. Cut matches were employed to produce this effect.



Third Prize—\$10.00. The airplane illustrated in the photo above was made by Alfred Roman, of Bronx, N. Y. It is a scale model of the Curtiss J. N. 4-D-2 training plane 1/14 full size. Over 7,000 matches were used in its construction. The plane is of course provided with the proper rudders for steering and elevating and is likewise fitted with demountable wings. It is cross-braced with thin wires which do not show in this particular photograph. The model itself was very well finished and was then gilded. With this construction Mr. Roman wins the third prize. It is suggested that other matchcrafters continue their work on models of this nature and enter them in turn for the prizes inasmuch as this contest will continue until further notice with the present revised schedule of prizes.

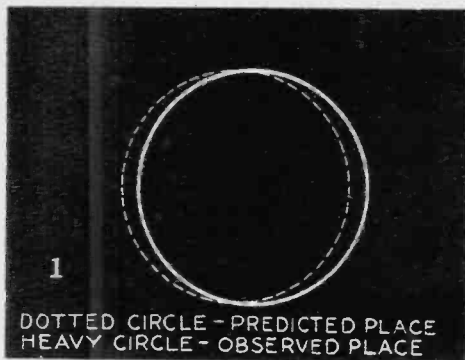


Now turn to the rules governing the Matchcraft Contest. They will be found on page 1071.

Is the Earth Slowing Down?

By Dr. DONALD H. MENZEL

Lick Observatory, Mt. Hamilton, Calif.



1
DOTTED CIRCLE - PREDICTED PLACE
HEAVY CIRCLE - OBSERVED PLACE

Fig. 1 above shows how the position of the moon varies from the mathematically predicted spot in the sky and the reason why this variation takes place and fools astronomers at times is explained in the accompanying article by Prof. Menzel.

RECENT investigations show that the rate of the earth's rotation is not constant but variable. Since the time of Newton, one of the tasks of astronomers has been to calculate the orbits of the heavenly bodies and predict their positions for the future. The problem has not been a simple one. If the earth were the only planet, few difficulties would be involved in computing its motion, but the presence of Mercury, Mars, Jupiter, and the other planets complicates matters. Each of these exerts a force upon the other, piling disturbance upon dis-

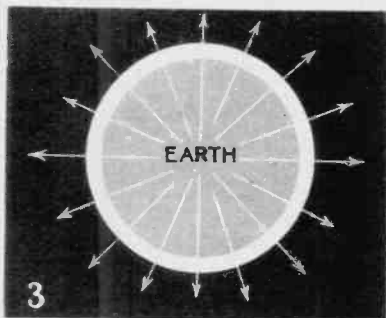
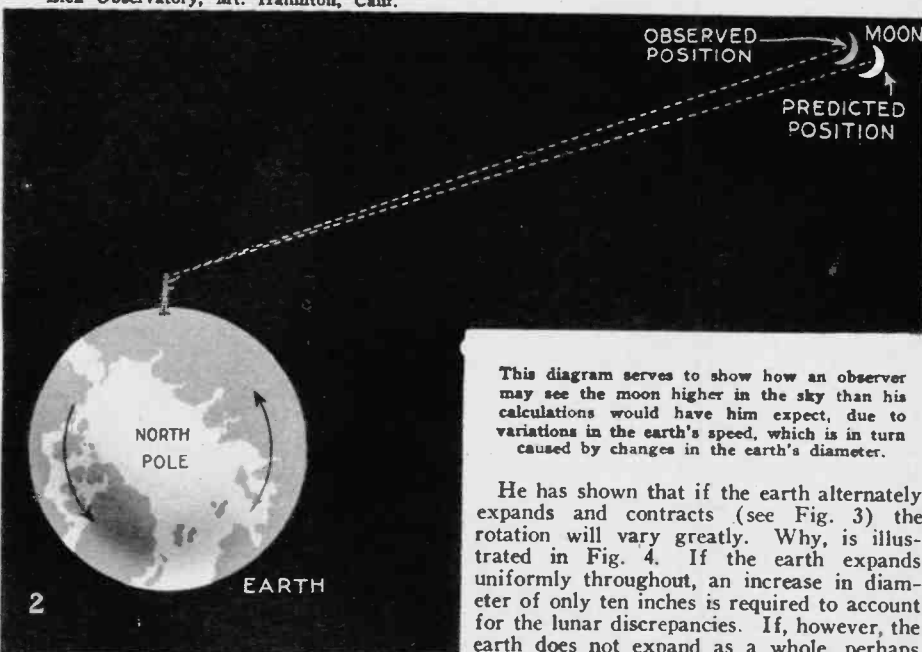


Fig. 3 above shows how the earth may expand at times and cause its rotational speed to change, which would cause an observer of the moon to make a mistake as to its position.

turbance over the simple motions until only the most intricate mathematics can untangle the effects and predict the future.

Of all the heavenly bodies, the most erratic is the moon. In the first place, it is the nearest to the earth, so that small discrepancies in its motion are more easily detected than for the distant objects. Professor E. W. Brown, of Yale, has carried out more computations for the moon than any other one person. It is his lunar theory and his tables that are used by the computers of the Naval Observatory to predict the position of the moon, eclipses, etc., for the Nautical Almanac. The curious thing that has gradually become apparent is that, after allowing for every conceivable disturbance, the moon still fails to keep to the predicted place; sometimes it is ahead, sometimes behind. (See Fig. 1; also Fig. 2.)

The discrepancies in the lunar motion were most noticeable at times of total eclipses of the sun. It is rather annoying, too, as well as inconvenient for the astronomers not to know the exact second that the moon will completely cover the solar disk. They are making observations under a schedule that makes every second count and delays or surprises may be costly.



This diagram serves to show how an observer may see the moon higher in the sky than his calculations would have him expect, due to variations in the earth's speed, which is in turn caused by changes in the earth's diameter.

He has shown that if the earth alternately expands and contracts (see Fig. 3) the rotation will vary greatly. Why, is illustrated in Fig. 4. If the earth expands uniformly throughout, an increase in diameter of only ten inches is required to account for the lunar discrepancies. If, however, the earth does not expand as a whole, perhaps only the top eighty miles or so participating in the swelling, the diametrical increase would have to be 24 feet.

An increase of one foot in the diameter of the earth will lengthen the day by about 8 thousandths of a second. While this may seem very small, in several years it would amount to considerable. How such a slowing down would affect the observations of the moon is illustrated in Fig. 5.

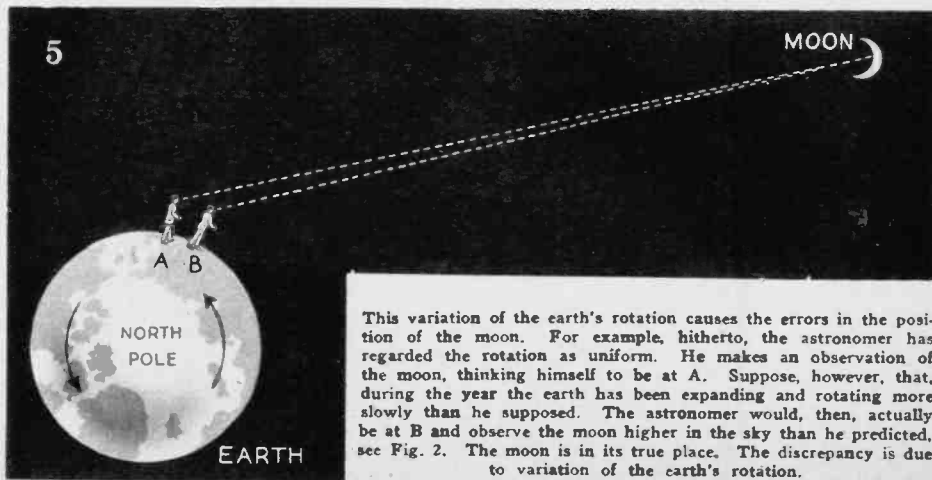
Another way of looking at the result is as follows: If the earth is slowing down we will not be conscious of it ourselves. However, since we set our observatory clocks by observations of the stars, it is obvious that they are slow compared with a clock set by a uniformly rotating earth. When we make an observation of the moon by the observatory clock, the moon would be higher in the sky since the clock is slow.

Professor Brown very wisely hesitates to comment upon the possible causes for such a pulsation of the earth. The problem is one for the geologists rather than the astronomers. Undoubtedly, radioactivity will be mentioned. Radium, thorium, and other similar substances are constantly disintegrating into other elements with the liberation of heat. It may be that the accumulation of energy finally causes an expansion until the heat is gone. Then contraction will follow and the process will be subsequently repeated. One wonders whether there may not be some connection between the upheavals and earthquakes.

A notable characteristic of the small variations in the moon's motion is that over long periods of time, they cancel out. This fact led Professor Brown to look within the earth for the cause of the lunar inequalities. Additional incriminating evidence against the earth came from the observation that when the moon was ahead, so, also, was the sun, etc., until recently, Professor Brown feels that he has clinched the argument.

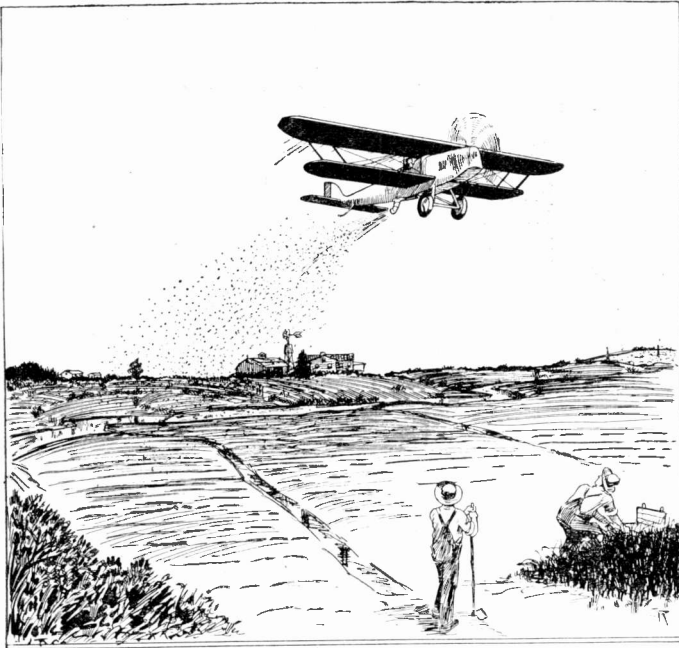


Fig. 4 shows man swinging a stone tied to a string. If he shortens the string by grasping it at the point A, the revolution time of the stone will be shortened. The same thing is true for the earth.



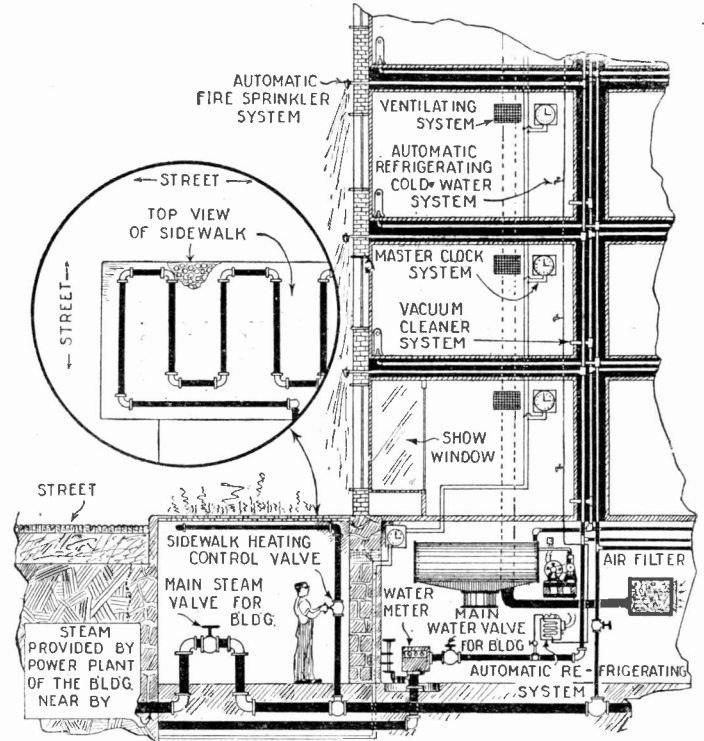
This variation of the earth's rotation causes the errors in the position of the moon. For example, hitherto, the astronomer has regarded the rotation as uniform. He makes an observation of the moon, thinking himself to be at A. Suppose, however, that during the year the earth has been expanding and rotating more slowly than he supposed. The astronomer would, then, actually be at B and observe the moon higher in the sky than he predicted, see Fig. 2. The moon is in its true place. The discrepancy is due to variation of the earth's rotation.

Sowing from the Skies



A dispatch from Winnipeg, Manitoba, announces that the Manitoba Department of Agriculture has decided upon the adoption of a new method of sowing rice in the great marshes of that region. A number of sacks of wild rice have been forwarded to the Lake Cormorant station on the Hudson Bay Railway for distribution by airplane over suitable marshes in the northland. It was found that no wild rice grew north of latitude 53°, attributed to the fact that ducks are coming south during the rice season. Prof. V. W. Jackson of the Manitoba Agricultural College suggested that some of the land be seeded, and an airplane was dispatched to distribute the rice from the air. This experiment is expected to result in a widespread use of the airplane in agriculture.

Modern Building Equipment



A new office building in Rochester, N. Y., is equipped with a number of novel mechanisms. Between every floor and ceiling is a space three feet high containing telephone wires, plumbing, etc. Electric clocks, air filters, drinking water refrigerators, and a sidewalk heated to prevent the formation of ice, are some of the features.

The Astrology Humbug

By JOSEPH H. KRAUS

Further Letters From Our Readers and Our Answers

Editor, SCIENCE AND INVENTION:

Though my present line of business does not permit me to investigate all manner of psychic things, I cannot help but wish that I had such an opportunity, for there is a fascination in such things that pleases me, but I fear I am too practical to swallow wholly everything that is told me, yet the idea is in my mind to want to be more decided, not upon what I see, as to discover whether we make our own conditions in life or whether we are doomed to a destiny, through the necessity of needing to go through certain earth experiences.

Astrological predictions never did worry me, and a couple of years ago I was told that at a certain time, which has since passed, that I, myself, would either die or a very good friend would die; fortunately for me, an old aunt of mine who has wanted to die for a number of years and couldn't, did at last pass away, and my friends were saved the necessity of weeping at my funeral. I did have one unpleasant experience with this particular so-called astrologer, in that I loaned him some money (why I don't know) but got it all back after threatening him with the District Attorney's office, and 225 pounds of a somewhat pleasing countenance behind my argument.

According to my chart you should never publish this enclosed article, for my progressed moon is forming an aspect, opposition to the writer's planet Mercury, which in the radical horoscope is a semi-square to Saturn in the ninth house in my chart, conjunction with my ruling planet Venus (which, by the way, causes me to be a H—L of a guy) and the progressed Venus is also forming an opposition to the progressed moon, and the progressed moon in the progressed horoscope is in opposition of the mid-heaven, so if you do happen to publish this article I have written, we will have to look further into the matter of the horoscope to see just why you did, which may require me to investigate the prenatal horoscope, a condition I have not done to date.

(Mr. Hatton then continues with an article on Astrology, telling us why he believes in the subject and also which portions thereof he does not believe. A part of this article follows here.—Editor.)

To my way of thinking, SCIENCE AND INVENTION Magazine is assisting in bringing to a conclusion the facts in the case, by making more prominent the truth of conditions as they now exist in Astrology,

\$6,000.00

For Proofs of Astrology

SCIENCE AND INVENTION Magazine holds that there is nothing scientific in Astrology, that Astrology is not a science and that statements made by astrologers unless very general cannot be entertained seriously.

Accordingly, this publication has decided to award an Astrology Prize of \$6,000 for the following:

\$5,000 will be paid to the astrologer or forecaster who will foretell three major events of such a nature that he will have no control over the outcome of the same. He must describe in advance each event in detail, giving the location and result or the casualties if the event is an accident.

\$1,000 will be paid to the astrologer or forecaster who will produce three accurate, detailed and perfect horoscopes, free of contradictions on the lives of three people whose initials will be given him when he requests the same and the birth dates and place of birth will also be supplied by this office.

This contest closes October 1st, 1927, and all entries must reach us by that time. In event of a tie, prizes of an identical nature will be given those so tying.

Address all entries to Editor, Astrology, care of SCIENCE AND INVENTION Magazine, 53 Park Place, New York, N. Y.

and it seems to me, that those astrologers who seek the truth rather than the piffle, and who are inclined to want more exact knowledge along this line, should welcome the opportunity for discussion, and those who are prominent in the astrological world, should make every endeavor to prove that this magazine does not know what it is talking about; if I could I would, and if I see a chart of a person who is about to have the progressed sun pass over his Jupiter, I'd certainly predict a fortunate year for him, or if I saw a progressed Jupiter transmitting his radical sun, I'd predict a number of good years for him, but I couldn't tell him why except that it was in the books, and the why of things is what counts, and until there are definite laws in Astrology which can be proven beyond any reasonable doubt to be fixed laws, such as the prenatal epoch and the law of sex, Astrology should be made plain to those people who are interested in it, and who want a horoscope, that it is not an exact science in this sense, that your predictions are absolutely correct, but that it is a science based upon observation and correlation, fitting planetary conditions to events that could happen, and not to events that will happen; that events do happen in cases, does not necessarily mean that the same event will happen to all such cases, and this alone proves that Astrology is not an exact science. There may be something to the idea that a person with Saturn strong in the horoscope shows certain definite characteristics pertaining to this planet, or that Mars imprints upon a person other characteristics, recognizable to the student of Astrology, and in this respect, these conditions can be classified and analyzed; it may be possible to predict in a limited manner, such events as radical transits and suggest times of events of the character of the transit, but not until definite laws governing the elements can be formulated, can we call Astrology an exact science; I believe that this is possible of accomplishment, and we are working towards this in the finding of the death ray, and the Proton-Neutron so ably described in SCIENCE AND INVENTION Magazine for December; and Astrology perhaps goes beyond the fact, and out of this condition will come laws of which we can judge correctly.

Astrologically yours,

RAYMOND HATTON,
Oklahoma City, Okla.

(According to your chart, you mentioned that we
(Continued on page 1069)

Science Makes Women More Beautiful

\$30,000,000 Spent by U. S. Women Daily in Quest of Beauty

By RHYS G. THACKWELL

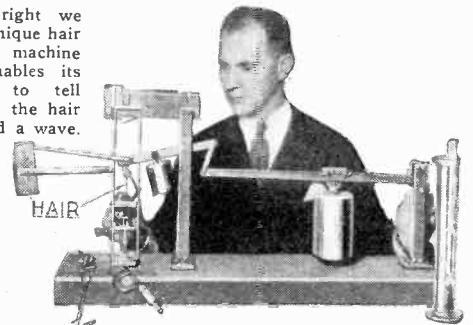


At the left is an example of the head-dress obtained when using the curling cap illustrated in the photo at the right. The curling cap can be worn in the morning or while asleep.



The cap above produces a water wave and this can be done in a few minutes without any skill and with a saving of much time. Its wearer can dress while the cap is in place.

At the right we have a unique hair testing machine which enables its operator to tell how well the hair will stand a wave.



The Department of Commerce of the United States claims that women of this country spend \$30,000,000 daily in making themselves more beautiful. There are more than 25,000 beauty shops and much of the money goes into home treating devices and cosmetics.

The article shown above is a hair tester which reveals the nature of the hair and eliminates the guess work in overcurling or undercurling. It will tell the girls if their permanent wave will last.

From time immemorial, women have tried to make themselves look more beautiful and attractive. More than 3000 B. C., vanity cases were used as excavations show. The reports have it that the woman of the United States spend three times as much money to beautify themselves as they do for bread.



The article shown in the above photograph is a combination marceller and curler, either portion of which is interchangeable. It is claimed that oil used after the shampoo is absorbed and does not show on the hair or scalp.



Lipsticks now come in a new form, namely they resemble safety matches and may be used once and then thrown away or the match may be reinserted into the packet for subsequent use. The pointed tips enable fine definition and the colors and flavors are numerous enough to satisfy the most fastidious.



In the photograph above we find a combination comb which forces shampoo through the teeth of the comb, enabling it to be worked down into the scalp and then afterward washes the hair with water, the water being also forced through the comb teeth. Below a marcel waver for curly heads whose hair should never be touched with irons or curlers. No skill is required.

The device illustrated in the photograph below is for the purpose of assisting in the development of the chest.



An indication may be obtained from the tape as to the amount of actual chest expansion. Exercising will increase the reading.



For those who desire that healthy outdoor complexion and that perpetual tan, H. Gernsback suggests the method illustrated above. It is merely an electric radiant heater, but it will produce its effect quite as well as the far more expensive ultraviolet ray lamps.



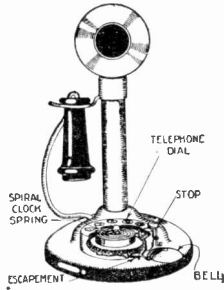
(Names and addresses of makers of above devices furnished on request.)

Science in Toyland

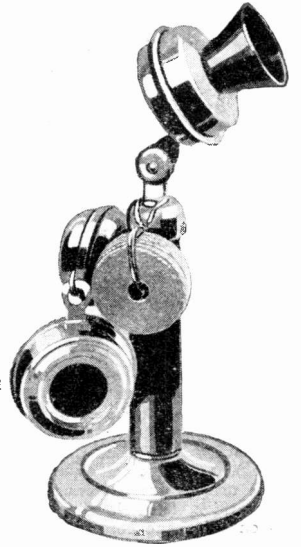
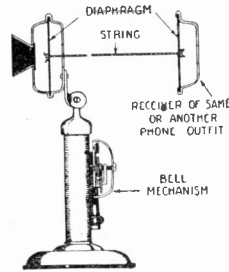
Descriptions of the Latest Toys Which Will Interest Purchasers This Year



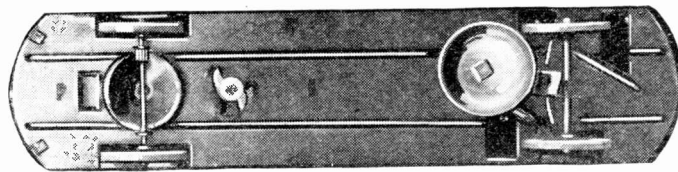
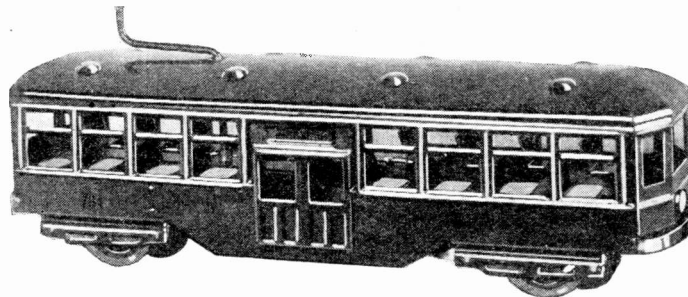
The telephone above is just the thing to delight the child who insists on having the very latest thing in toys to amuse himself. The telephone dial, when operated as if to call a certain number, rings a bell concealed in the base of the instrument. The action is controlled by coil spring.



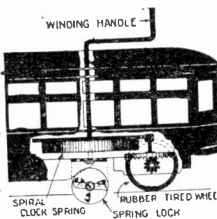
TOY manufacturers are constantly forced to work under pressure to produce novelties which will appeal to the critical taste of the juvenile mind. It is no easy matter to create entirely new toys and to design and produce them in such form that they are substantial enough to withstand the rough usage received at the hands of most youngsters. A few of the latest products of some of the larger manufacturing organizations are illustrated on this page. Their selection was based on merit.



Here is a toy telephone (constructed on a principle known to all boy mechanics), which actually works. The voice vibrations are transmitted along a string or wire attached to the diaphragm of the transmitter, and by this means they may be carried considerably further than the voice alone will go. Two strings are required to complete the circuit for two stations. They must be strung so as to be free to vibrate in transmitting the sound. The bell on the back of the instrument rings when receiver is raised.



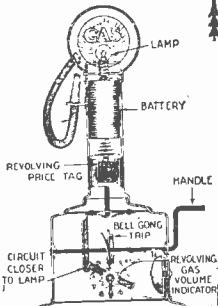
One of the best-looking toy cars which we have tested is shown in the above photograph. It is a street car made from heavy metal stampings. The wheels are equipped with rubber tires, so the device is practically noiseless when in use.



At the left, the constructional features of the street car. An offset on one of the axles operates a bell which rings realistically as the toy rolls along. The front wheels are adjustable, or straightaway or circular runs.



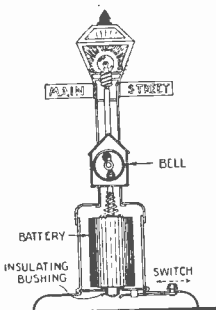
At the left, a gasoline filling station in miniature form which works very much like the real thing. Of course it will not pump gasoline, but a bell rings for each "gallon" and a light flashes realistically in the housing at the top. The device is made out of sheet metal.



The drawing at the right shows constructional details of the gasoline pump in the photograph above. The shaft attached to the outside handle carries most of the operating mechanism for the bell and lights, and it also indicates the amount "pumped" on a small dial.

indicates the amount "pumped" on a small dial.

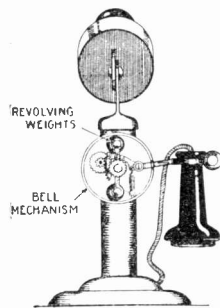
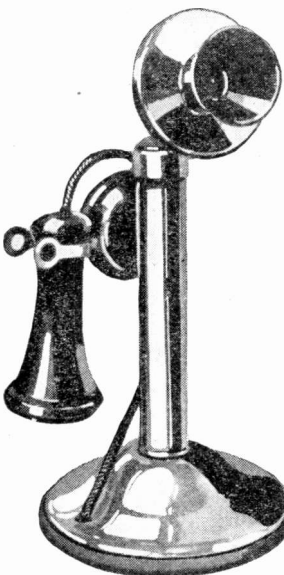
The fire alarm box shown at the right should be a part of the civic equipment in every boy's model city. When the knob is turned, a bell rings inside the box, and a light may be turned on by turning a switch in the base to guide the fire engines to the scene.



Above at left, a drawing of the mechanism contained in the fire alarm box. The battery used is of the type sold for installation in flashlights. The bulb is also standard flashlight equipment.

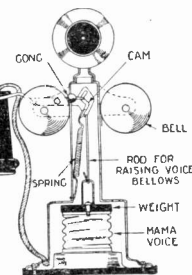
Pipe Contest

In the next issue of SCIENCE AND INVENTION Magazine, the awards in the Pipe Contest will be announced. Thousands of entries have been received in this contest and at the time this magazine goes to press the judges are busy in sorting out the prize-winning suggestions.

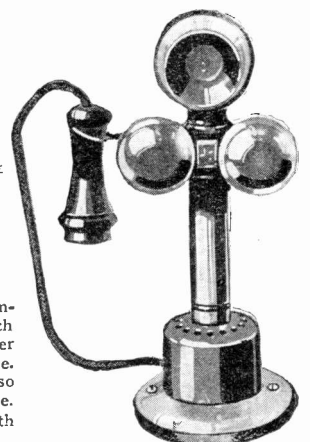


Another of the toy telephones is made so that when the hook is released the bell rings lustily.

ALL of the toys illustrated on this page are substantial enough to weather quite a few seasons of bumps. One of their most desirable features is their simplicity. All the parts of the mechanisms are built to wear, and there is no reason why they should get out of adjustment if the toys are not deliberately destroyed.

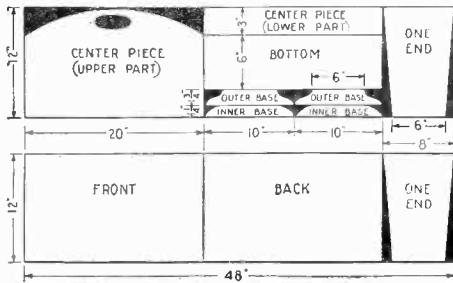


Here is a game similar to Quoits, which is adapted for either indoor or outdoor use. The object is to lasso the pegs if possible. Luck and skill both count.

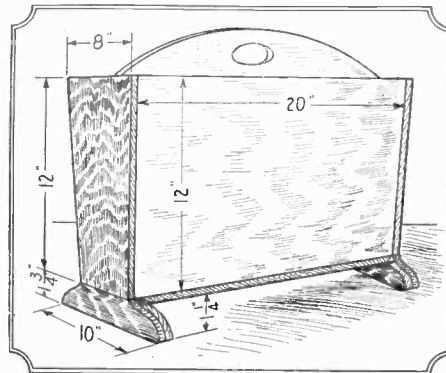


Further Board Contest Awards

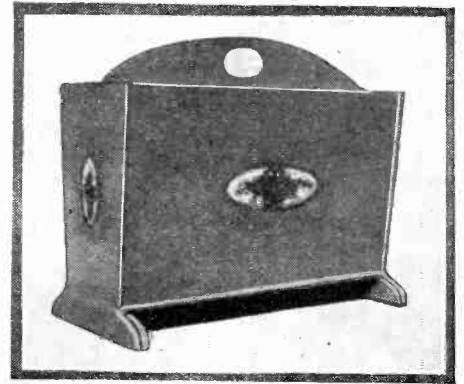
Continuation of the \$300.00 Prize List



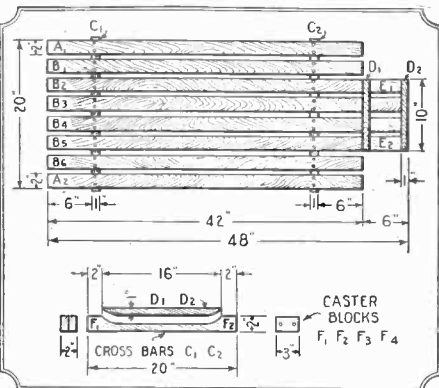
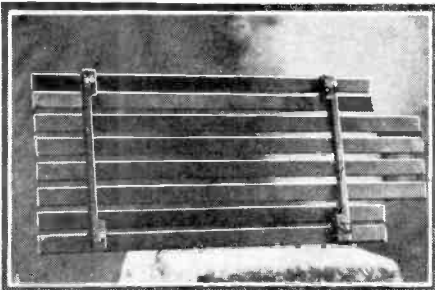
It will be remembered by many of the readers that a Board Contest was announced in a previous issue of *SCIENCE AND INVENTION* Magazine wherein they were requested to submit articles made from a board measuring 1 inch thick, 4 feet long and 1 foot wide. Prizes on this page conclude the list of awards.



Thirteenth prize—\$5.00, was awarded to H. G. Lihou of St. Louis, Mo., for the newspaper rack.



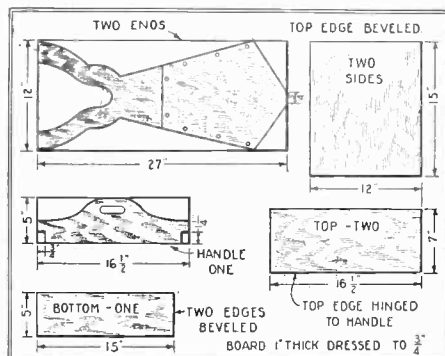
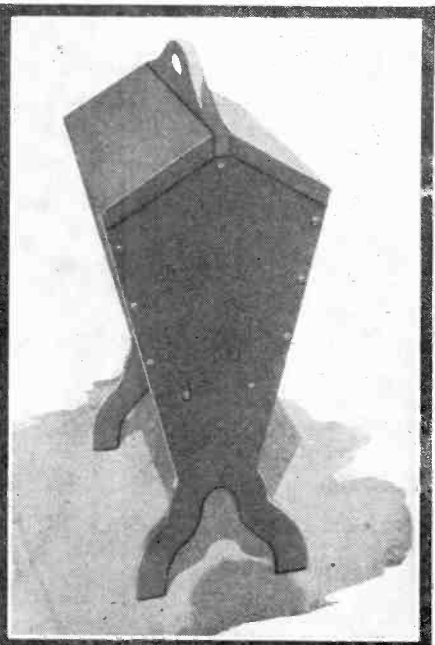
Another view of sewing cabinet.



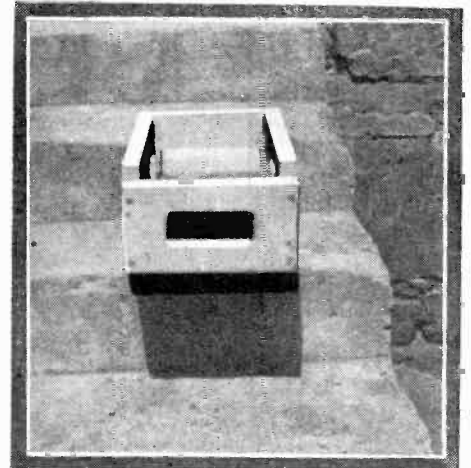
Fifteenth prize—\$5.00, to Lemuel G. Leighton, Waterville, Me., for the mechanic's carriage, the dimensions of which are given in the diagram above.



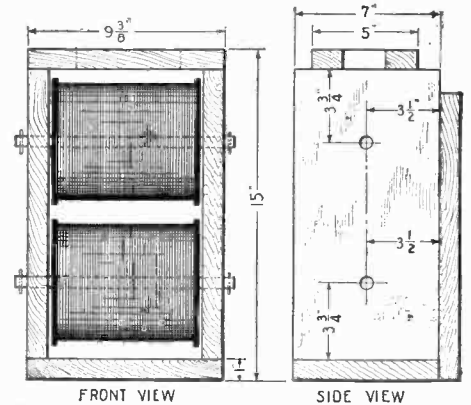
The above photograph shows Mr. Leighton and the mechanic's carriage which he built. This particular carriage is provided with roller casters on its under surface and with it the automobile mechanic can maneuver under any part of the car. Note the practical head rest.



Twelfth prize—\$5.00 was awarded to Oda B. Coryell of Winchester, Ind., for the sewing cabinet illustrated in the photograph at the left and the dimensions of which are given in the diagram above. A board 1"x12"x4' is required.



Sixteenth prize—\$5.00 is awarded to William M. Adams of East Stocton, Del., for his wire spool holder. This device is very handy to the radio man who winds his own coils.



Fourteenth prize—\$5.00 was awarded to Randolph W. Cormack of San Francisco, Calif., for the King Tut flower pot stand below.



The photograph at the right shows a remarkable wire bird lamp casting its radiant glow on the book being read by Miss Cleopatra Frager. Another view of the inside of the lamp is shown diagonally below. While the lamp in this photograph is mounted on a pedestal, it is obvious that it can be directly attached to the back of an overstuffed chair.



The photograph at the right shows the interior of the bird lamp which was entered in the Wirekraft Contest by a Wirerafter anxious for a prize.

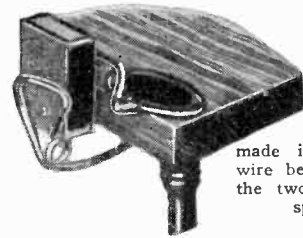
WIREKRAFT— \$3,000.00 PRIZE CONTEST



The device here will serve for the boiling of eggs or as a condiment holder.

the December issue of this publication. The first group of awards will officially be announced in the next issue of SCIENCE AND INVENTION Magazine. The Wirekraft Contest will remain in force for a period of one year and each month sixteen prizes will be awarded ranging from the first prize of \$100.00 to the sixteenth of \$2.00. The first prize in this particular contest will always be awarded for an article possessing utilitarian merit. Any artistic device or a model of a toy could not possibly win the first prize, but it could win the second, which in

this particular contest is \$50.00 and will be awarded to the best artistic, decorative or constructive effect entered during the month. The remaining prizes from the third down to the sixteenth will be judged from either



Here is a unique match-box and cigarette case holder which clamps directly to a table-top and which is made in one piece, the wire being bent to form the two holders and the spring clamp.

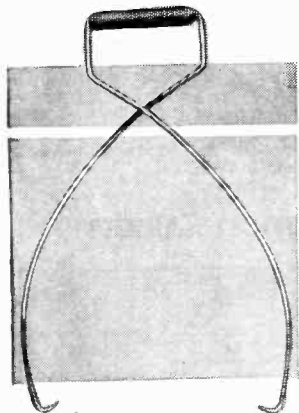
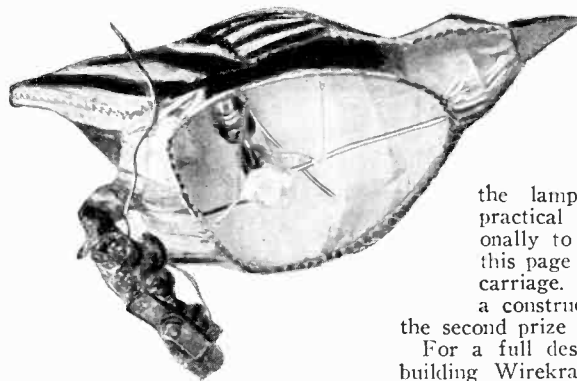
one or the other angle. Only those parts of the model actually constructed of wire will be judged by those awarding the prizes. Nevertheless, it is quite permissible to use any additional materials for the decoration

of the model as for example, the silk on the lamp-shade illustrated in the photograph at the left. While the silk itself does not become part of the Wirekraft model it is obvious to the constructor that the lamp-shade would be of no practical value without it. Diagonally to the left at the bottom of this page is a model of a naval gun carriage. This particular type of a construction could be entered for the second prize award.

For a full description of the method of building Wirekraft models, it is suggested that the Wirerafter write for a reprint of the December issue of this publication referring to the Wirekraft Contest.

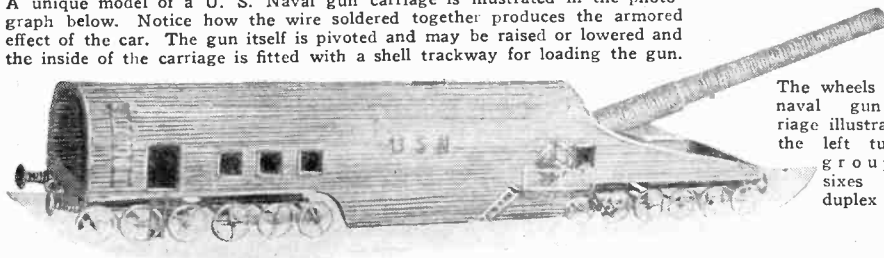
Judging by the tremendous number of entries already received in this contest (Continued on page 1064)

ON this page we again show a few more suggestions which have been entered by some Wirerafters in the new \$3,000.00 Wirekraft Contest announced in



Here is a pair of ice tongs practically constructed. The two jaws are not hinged at the point where they cross. The handle itself is made of wire coiled closely. Lifting the handle causes the jaws to spring together, and holds the ice firmly.

A unique model of a U. S. Naval gun carriage is illustrated in the photograph below. Notice how the wire soldered together produces the armored effect of the car. The gun itself is pivoted and may be raised or lowered and the inside of the carriage is fitted with a shell trackway for loading the gun.

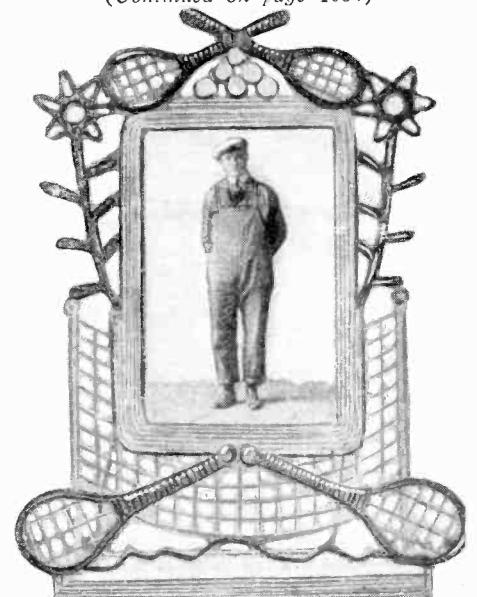


The wheels of the naval gun carriage illustrated at the left turn in groups of sixes on a duplex truck.

Wirerafters Note

THE first awards in the Wirekraft Contest will be announced in the April issue. If you have submitted a model made of wire in competition for the awards in this contest you may find your article listed among the fortunate ones in the next issue. If your name is not on the list you will know by comparing it with the other models in what point your construction is inferior to the prize-winning suggestions. You will then still have eleven more months to enter further models.

"Hints to Wirerafters," a reprint from the December issue will be sent free upon request. Address Editor, Wirekraft, c/o SCIENCE AND INVENTION Magazine, 53 Park Place, New York City.



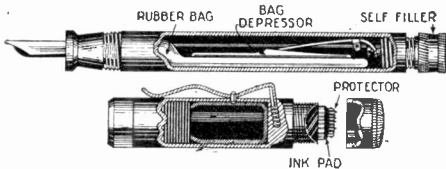
Here is a splendid picture frame which has been made by one contestant and in which wire screening is used to produce the effect of a tennis net and to take the place of the gut strings on the racket.

The Month's Latest Devices

CHECK PROTECTING FOUNTAIN PEN

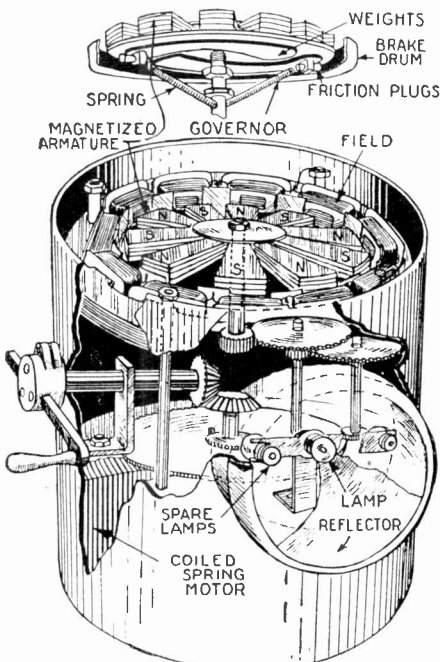
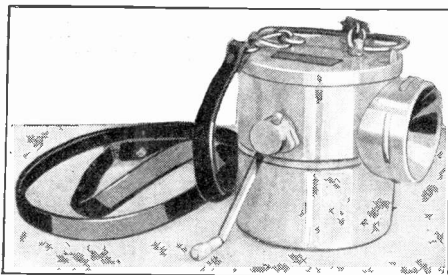


In the photograph above we show a new departure in fountain pens. In this particular construction a seemingly usual type of pen is seen until the top cap is removed. This is a cap at the top of the regular cap and conceals a steel multi-disk check protector which cuts an impression into the check and inks that impression with an indelible ink. The ink pad constantly touches the rollers.



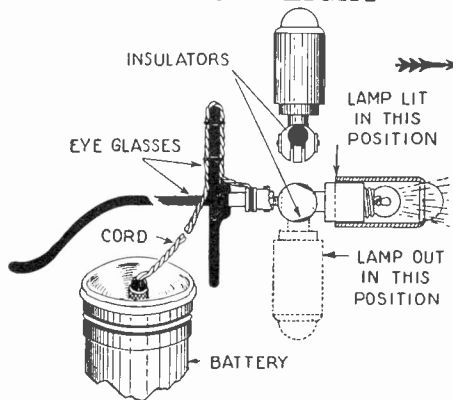
Aside from the check protecting feature of the pen, there are several other important departures from the usual style of fountain pen. The first is the method of filling the pen. At the right end we find a screw which when extended causes a lever to press down on the rubber bag. The clip also is provided with a spring inside to preserve and maintain a constant tension on the clip itself.—Security Pen Corp.

BATTERYLESS FLASHLIGHT

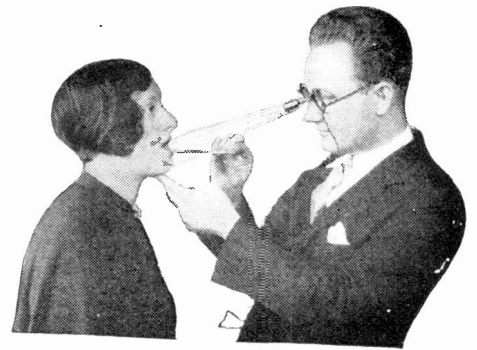


Here is a never failing source of light with no upkeep expense. One merely has to wind it up and turn the switch. A powerful spring motor in the base operates a generator of the magneto type and produces a steady light for 3 minutes on each winding but it can be kept going indefinitely by occasionally turning the crank.—Slaymaker Mfg. Co.

SPECTACLE LIGHT



The diagram of the light attached to spectacles or to extra spectacle rim appears immediately above. Note switching arrangement.



In the photograph above the new spectacle light for the use of physicians, dentists, and nurses is illustrated. This particular device consists of horn spectacle rims at the center of which a unique lamp housing fitted with a miniature bulb and a lens is affixed. This lamp housing is mounted on a pivot at the bridge, and wire leads to the lamp being attached at the edge of the rim and then leads directly to a battery placed in the physician's pocket. The illustration at the left shows the construction of the device itself. It will be observed that there is a small switch making contact with the central strip of the ball-like swivel. This brush does not close the circuit when the lamp is in either vertical position. Glasses may be fitted into the spectacles or they may be worn without or in conjunction with the regular pair.—Complex Oscillator Co.

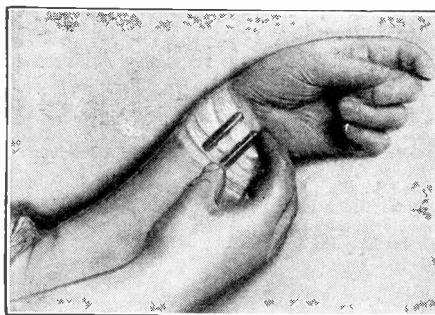
REMARKABLE VIOLIN



The violin was made by Waldo G. Morse, an attorney who spent many years in phonographic researches. The photograph here shows the rough product as well as the finished violin. The face of this violin has a larger proportion of oat hulls, whereas the back has a larger proportion of marl.

Many times the audience of WRNY has been thrilled by the sound of a unique violin played by some of the artists at that station. The violin shown here is made of 1 part of glue, 2 parts of marl and 4 parts of oat hulls. This compound is molded and produces remarkable tonal effects. The product can also be used for loud speakers.

BANDAGE CLAMPS



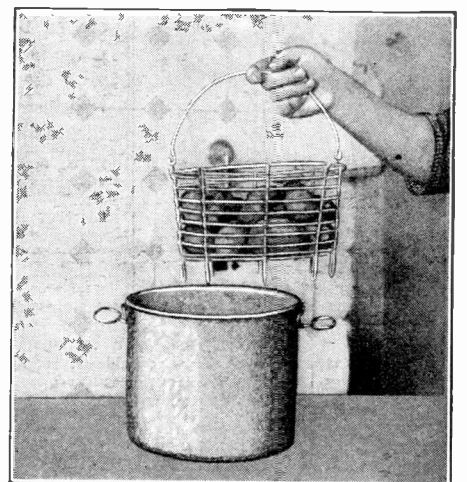
In Germany a new rubber binding fitted with two clasps is used to hold bandages in place. After the bandage has been applied, the rubber tape ripped by the teeth of the clasps is added and then the tape is wound around the bandage.—Certa-Gesellschaft and T. P. A.

MOLDABLE WOOD



A new product has recently appeared on the American market which is a putty-like substance which when dry, resembles wood. In other words, it is wood to all intents and purposes in a plastered state, and may be used as a crack filler or molded and later carved and cut, stained and painted just like wood.—Addison-Leslie Co.

WIRE FOOD BASKET

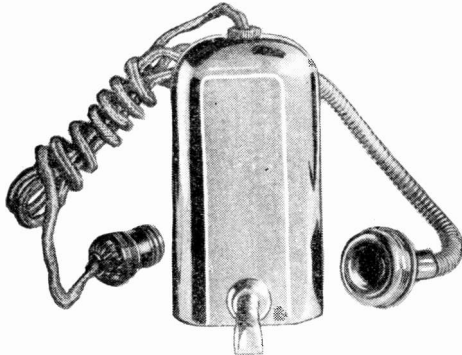


The photograph above presents another German article in the form of a wire basket which is lowered into the pot in which potatoes or other foods can be boiled and then removed at one time.—F. & R. Fischer and T. P. A.

Addresses of manufacturers furnished on request.

The Home Scientific

ELECTRIC WATER HEATER

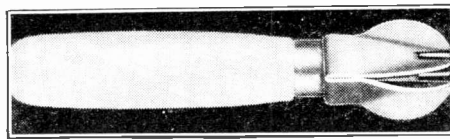


Here is an instantaneous hot water heater which is electrical in nature and is attached to an outlet socket. Hot water may be had immediately from the cold water tap. The nozzle fits the cold water faucet. Hot water issues from the spout when the current is turned on.—H. L. G. Mfg. Co. and J. B. Roswick.

MEAT TENDERER

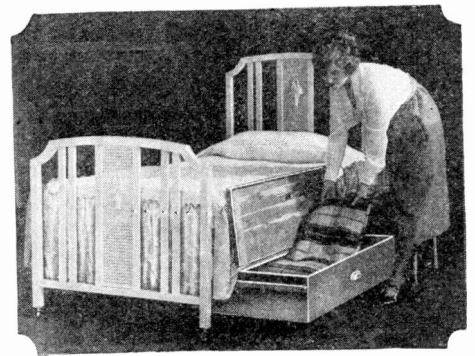
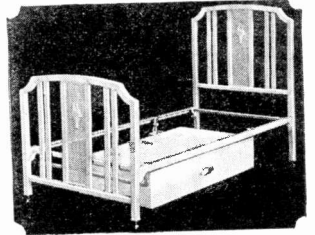
This steak tenderer has prong arrangements that permit close operation to the bone so that the entire steak can be made equally tender. It does the work without effort and without tearing or hacking the meat. It is easy to clean, having nothing to take apart and therefore very sanitary. An up and down motion of the hand performs the operation—Harry Kaley and the Taplin Mfg. Co.

The sharp prongs are driven into the meat and break up the long fibers so that when the steak is chewed, it will fairly melt in the mouth. The tenderer also serves the additional purpose of making the steak more juicy.



BED TRUNK

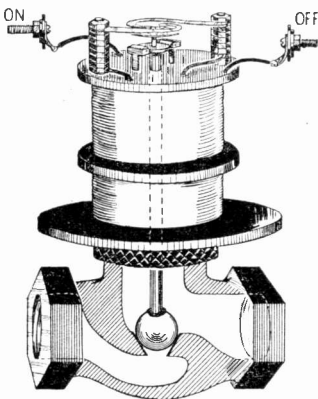
In the photograph at the right a new system of employing the space under a bed is illustrated. At the present time, large quantities of space go to waste in bedrooms and storage space for comforters and the like is at premium. In this system, comforters are conveniently located.



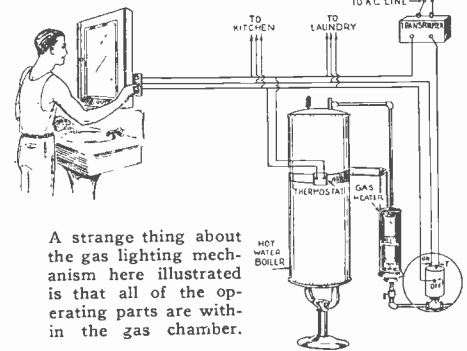
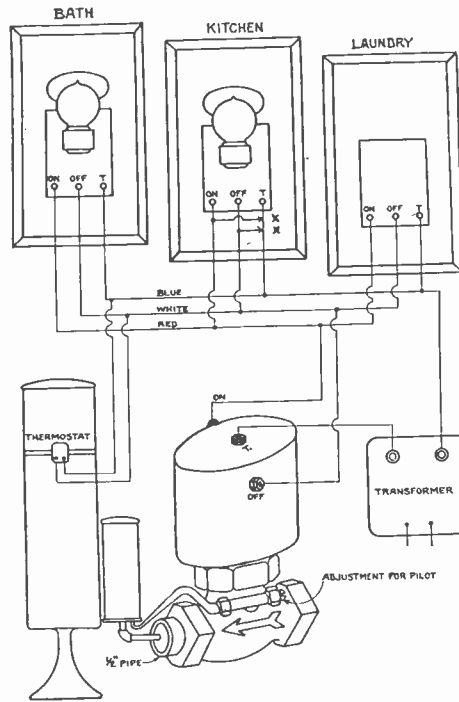
The photograph above shows how the "bed" trunk is fitted under the bed. This trunk rides on rollers which are in a trackway directly attached to the bed so that if the bed is moved, the trunk likewise shifts. Notice that the trunk has its own cover.—Space Saving Furniture Co.

PRESS BUTTON—HOT WATER

At the right is the mechanism which controls the supply of gas in this device. There are two solenoids actuating the valve either turning the gas on or off as desired.

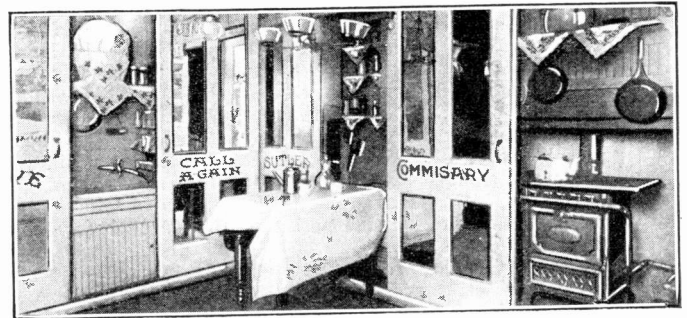
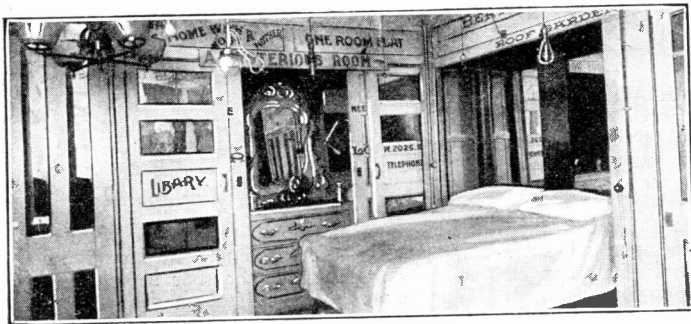


The diagram at the right shows the installation of a mechanism to turn on the gas in the cellar from either the bath-room, the kitchen or the laundry. The three panels indicated give us a back view of the fittings which are mounted on the walls of the respective rooms. When a button is pressed, current from a bell ringing transformer raises the valve and permits the gas to flow through the hot water heater. The gas is lighted by a pilot and at the same time a red light shows indicating it is on. Should the boiler become overheated, the thermostat turns off the gas. X—X on kitchen panel shows circuit of switches.—Sav-u-time Co.



A strange thing about the gas lighting mechanism here illustrated is that all of the operating parts are within the gas chamber.

TABLOID FLAT PRESENTS MANY ROOMS IN ONE



A Cincinnati, Edward Beall, has proven that one may live in perfect comfort with every convenience in a one-room flat. The actual dimensions of the room itself, at least those visible, are 6x9 feet. There are signs on the walls indicating what lies behind the sliding doors. Pressing against the door at one side causes it to open and a folding bed attached to the inner side of the door comes down gently. In a farther corner of the room another door opens to the bath. Behind a door in the rear wall is an entire

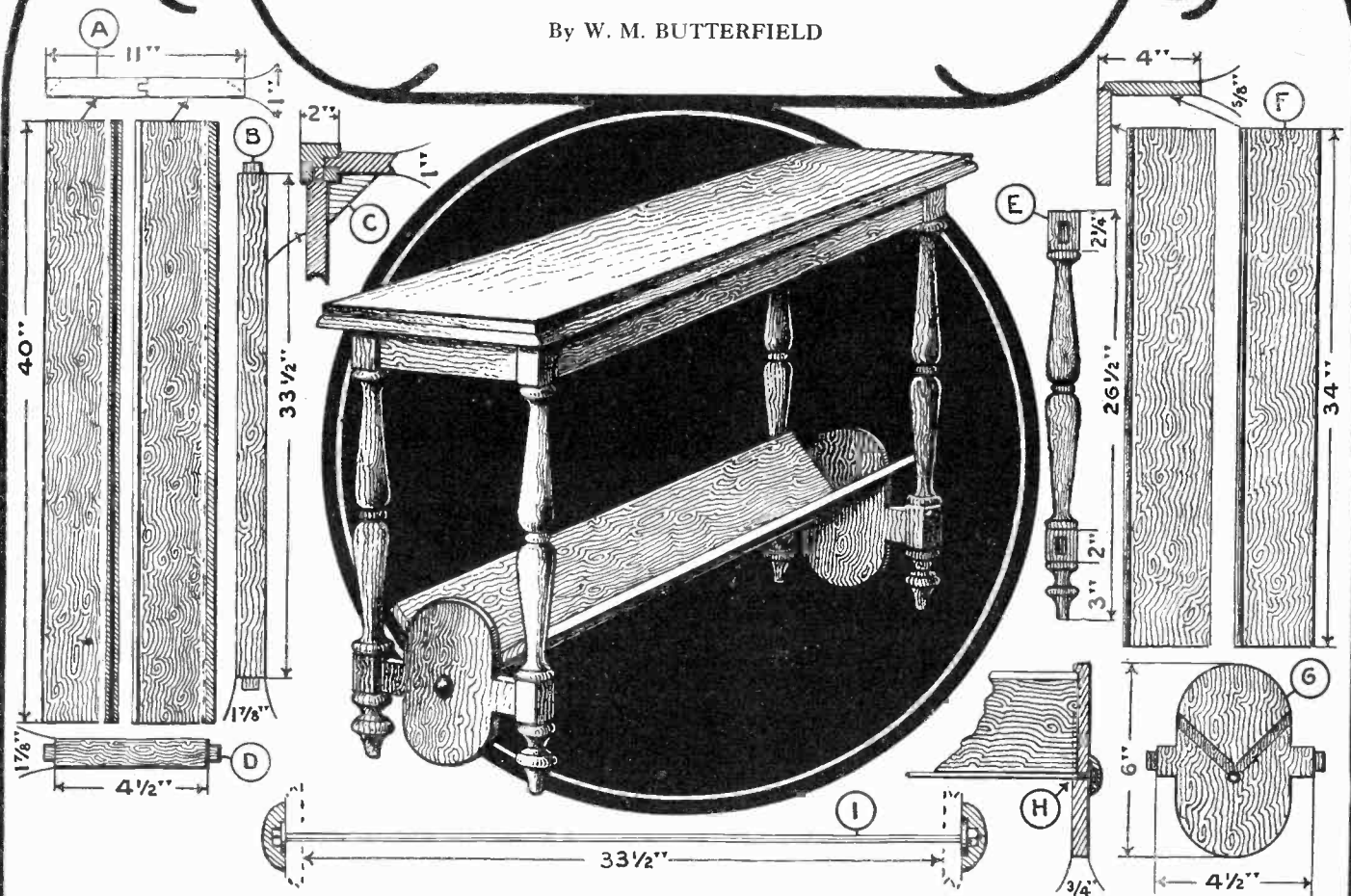
pantry and cooking outfit, the sides, ceilings and floors being covered with galvanized iron to prevent fire. Adjoining this there is a compartment containing a sink and another, containing an ice-box. With all these open we have an ideal kitchen. A table is then let down from another door behind which there is room for China and silverware. When all trace of a kitchen is removed, we have a dining room. There are compartments for a library, wine cellar, telephone and four berths for guests.—F. J. Koch.

(Names and addresses of Manufacturers may be obtained upon request)

Home Mechanics

A Book Trough End Table

By W. M. BUTTERFIELD



The Home Mechanic will find a good use for his talents in building this very useful and desirable Book Trough End Table. This piece of furniture may be finished with high gloss varnish, or else in mission style with

a wax finish. This table may be made from cheap wood properly stained, or if possible it should be made from mahogany or walnut. Veneered wood is available for the purpose.

THE book trough end table has become popular by reason of its novelty or perhaps from its supposed convenience. At any rate, it is a very much admired piece of furniture. It is manufactured in various woods—walnut, mahogany, maple or oak, and is to be had in various sizes and styles ranging from the diminutive table 20 inches high, 9 inches wide and 24 inches long to tables having proportions given with our illustrations for this article.

In all cases the object is the same, namely, to provide a long, narrow receptacle for a limited number of the "best sellers," favorite authors, and the like. It is considered quite "smart" nowadays to have several of these tables distributed throughout the house, and placed in close proximity to favorite lounge-chairs, settees, etc. Sometimes the table top is filled with a row of books, backs uppermost, and held in place with heavy bronze end pieces; at other times the top is used to support an electric reading lamp, and carelessly piled books, laid sides down, arranged flanking the lamp at either end. Books are placed in a single row, and in an inclined position, in the trough.

Although the tables present the appearance of high class workmanship, they are, nevertheless, quite easy to make. Outside of the four turned legs, the two buttons covering the rod ends, and the moulding on the edges of the table top, the tables can be easily made by any

home mechanic. The local lumber yard mill can solve all difficulty for the most indifferent worker, and will turn out the legs, buttons and the moulding at little more cost than the price of the lumber. It might be well to leave this article with the mill man, depending on his experience for furnishing the parts in the best and easiest working shape. The list of lumber and parts is as follows:

6 feet 10 inches of $1\frac{1}{8}$ inch lumber $6\frac{1}{4}$ inches wide.

10 feet 2 inches $2\frac{1}{8}$ inch by $2\frac{1}{8}$ inch lumber.

1 foot 3 inches of $\frac{7}{8}$ inch lumber $5\frac{5}{8}$ inches wide.

5 feet 9 inches of $\frac{5}{8}$ inch lumber 4 $\frac{1}{2}$ inches wide.

$\frac{1}{4}$ inch rod with head, washers and nut $33\frac{3}{4}$ inches long under head.

10 23-16 inch screws.

8 1 inch screws.

We show the top of the table as formed of two pieces, each $6\frac{1}{4}$ inches wide. The object is to provide a more pleasing grain when finished and to prevent warping. This is accomplished by marking a board on one side in two places before sawing into lengths, then gluing together with the marked sides reversed—one on top and the other on the bottom. A $\frac{3}{8}$ inch groove, $\frac{3}{8}$ inch deep is cut with the rabbeting plane in one piece and a $\frac{3}{8}$ inch tongue slightly less than $\frac{3}{8}$ inch long is cut on the other piece. This joint must be accurately fitted, showing no joint before gluing,

and must be a tight fit at all points. After gluing the top is smoothed down to 1 inch thick, 11 inches wide and 40 inches long, it is then ready for the moulding machine. It is fastened to the top rails with screws $2\frac{3}{16}$ inches long driven through the rails from the bottom.

B. and D.—Four top rails are used 1 inch thick and $1\frac{7}{8}$ inches wide. Two are $34\frac{1}{2}$ inches long with tenons $\frac{1}{2}$ inch long at each end, or $33\frac{1}{4}$ inches long between tenons; two are $5\frac{1}{2}$ inches long with $\frac{1}{2}$ inch tenons at each end, or $4\frac{1}{2}$ inches between tenons. Two form the side rails and two the end rails. The tenons should be cut leaving a $\frac{1}{8}$ inch shoulder on each four sides. The rails sit flush with the top of the legs.

C. and E.—The legs are $26\frac{1}{2}$ inches long 2 inches square and have a turned spindle and foot 2 inches in diameter at the largest points. There are two right legs and two left legs. Mortises are cut in the legs to fit the tenons on the top rails and for the tenons on the end boards or under-braces G. These must be cut very accurately and fit the tenons tight and snug at all points. Every joint must be fitted together carefully and surely before gluing. In fact, it is wise to fit the table together before any glue is used at all; if the mortises and tenons fit properly this can be done, and any possible twist or pull in the various joints may be detected and repaired. Screw holes should be bored

(Continued on page 1059)



MAGIC "DUNNINGER" By

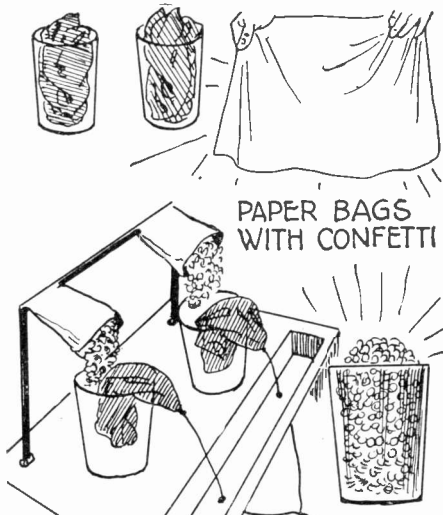


THE MAN WHO MYSTIFIED
 Pres. Coolidge
 Prince of Wales, Ex-President
 Harding, Tatt, Roosevelt,
 and other celebrities
 Writes Exclusively for
SCIENCE AND INVENTION



NO. 48 OF A SERIES

Handkerchief and Confetti Trick

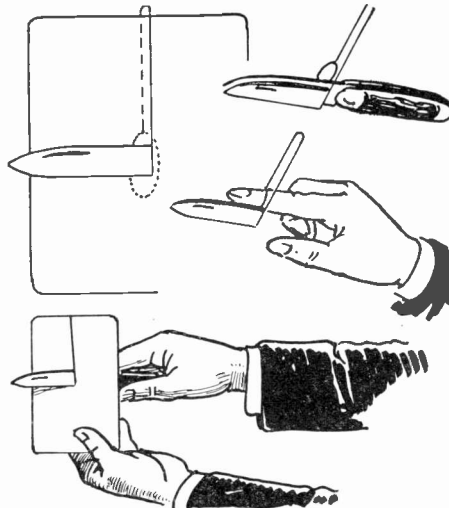


As indicated above, two kerchiefs are placed in two glasses mounted on the table. A cloth is held in front of them and the kerchiefs mysteriously change into confetti. The appliance illustrated is employed.

THE conjurer exhibits two ordinary drinking glasses, which may be passed for examination, and then places them on an undraped side stand. He puts a blue silk kerchief in one and a red kerchief in the other. The wizard now holds a borrowed linen handkerchief momentarily in front of the glasses. When it is removed, red and blue confetti will be found in the glasses. The kerchiefs have disappeared. The trick is accomplished with the aid of a trick table, having a lever working on hinges and carrying two metal envelopes for the confetti. The lever is lifted under cover of the linen kerchief and the string is pulled to remove those in the glasses.

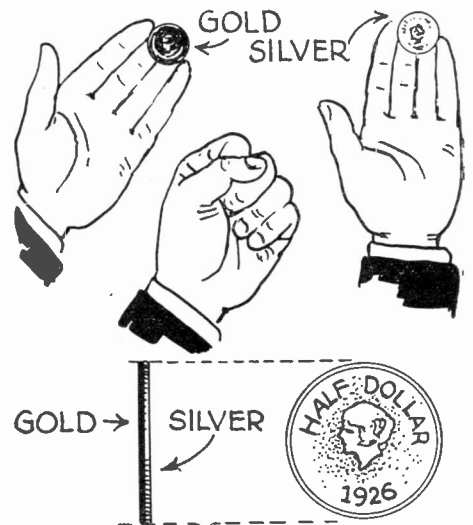
Mystic Knife Trick

HERE is another original problem which will be found effective. It should be presented a short distance from an audience in order to protect the illusion. A pocket knife is passed for inspection and then a playing card is selected from an ordinary deck. The magician, picking up the card, proceeds to cut it as illustrated. A moment later, both card and knife are again passed and the card will be found in no way injured. The trick is accomplished by the aid of a duplicate knife blade a little shorter than the original, to which a piece of steel wire, bent as illustrated, has been soldered. The loop fits the index finger of the hand, and encircles the card so that the knife blade apparently projects from the card. The thin wire connecting to the knife blade enhances the cut-like effect.



By the aid of a blade of a knife fastened to a thin wire and the wire looped to fit the finger, one can apparently cut a card and immediately restore it again.

Gold and Silver



A gold coin held in one hand and a silver coin held in the other mysteriously change their places when the hand is closed. The coins are made in halves, fastened together as the diagram above indicates.

TWO coins are shown. In size they resemble the American half-dollar, but one is of gold and the other of silver. One of these is placed in the right hand and the other in the left. With the hands quite a distance apart and away from the performer's body, the magician closes his fist upon the respective coins. When the hands are opened, the pocket pieces are found to have mysteriously changed places. As an explanation, it would be advisable to state that the coins are prearranged. Half of the coin is gold and the other half silver. When placed on the ends of the fingers, it is natural that in closing the hand, the coins are turned over.

Egg-Straordinary



An excellent comedy trick. The magician requests the loan of a gentleman's pocket kerchief and persuades the victim to assist him with the problem. An egg is chosen from a tray, placed under cover of the pocket kerchief and struck with a hammer. The owner of the handkerchief realizes that it will never be the same, but, when the magician shakes it by its

corners it is quite intact. Secret. The magician prepares himself with an empty egg shell and a small cloth bag attached to an elastic. Beneath cover of the kerchief the real egg is placed in the vest pocket and the blown egg and sack put under the handkerchief. It is the blown egg which is struck with the hammer and the pieces are carried up the sleeve.

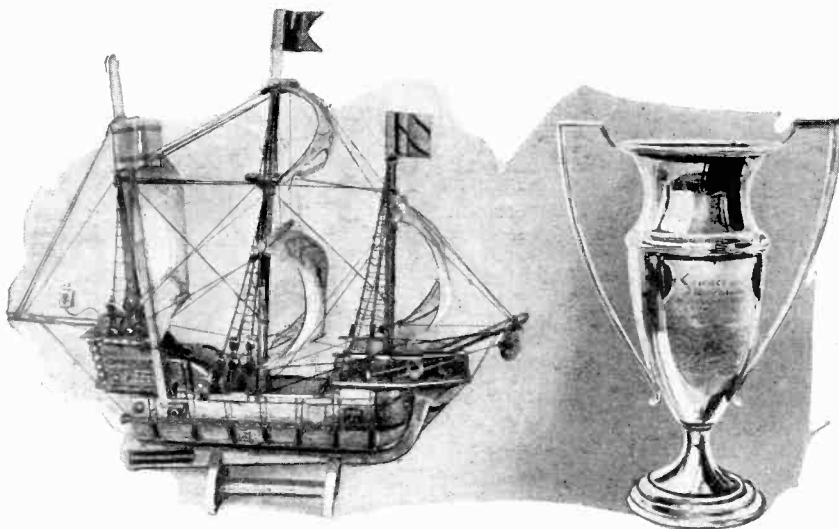


MODEL DEPARTMENT

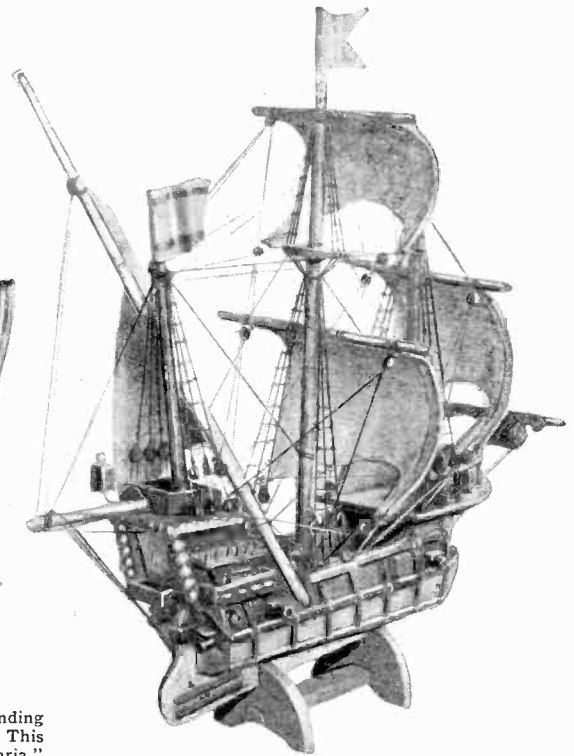


“Santa Maria” Wins Trophy

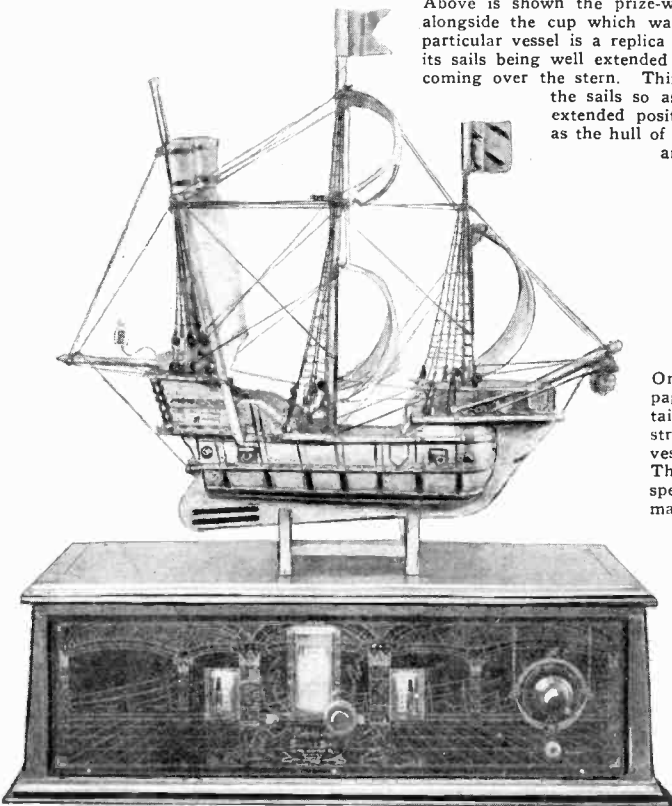
Model Entered by Clara J. Bierbower of Philadelphia Wins
 Ninth SCIENCE AND INVENTION Model Cup—First
 Woman to Win a Cup in the Model Contest



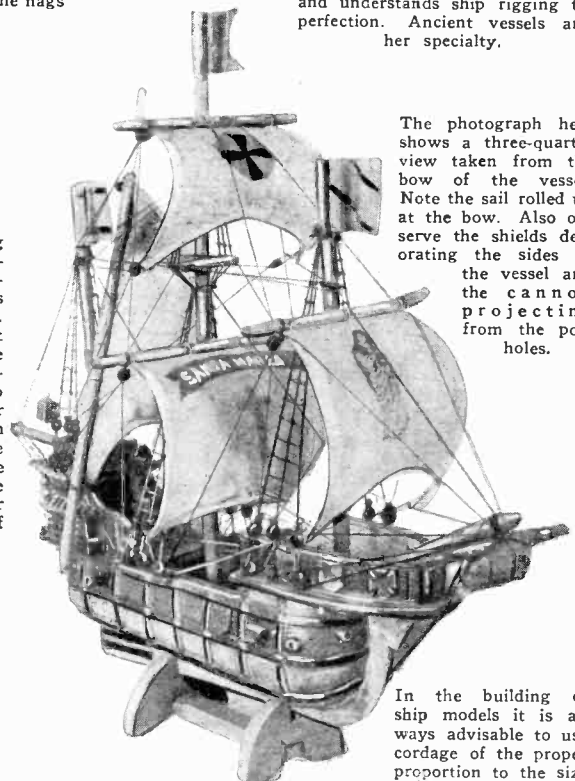
Above is shown the prize-winning model standing alongside the cup which was awarded to it. This particular vessel is a replica of the “Santa Maria,” its sails being well extended by an apparent breeze coming over the stern. Thin wires are sewed into the sails so as to keep them in this extended position. The sails as well as the hull of the vessel and the flags are painted.



A three-quarter view looking from the stern of the prize-winning “Santa Maria” made by an active model builder of the fairer sex. Mrs. Bierbower has built many other interesting models, and understands ship rigging to perfection. Ancient vessels are her specialty.



On the following page the full details for the construction of this vessel are given. The color is not specified because many model builders prefer to decorate their models in such a way that the color scheme will combine with other articles of furniture.



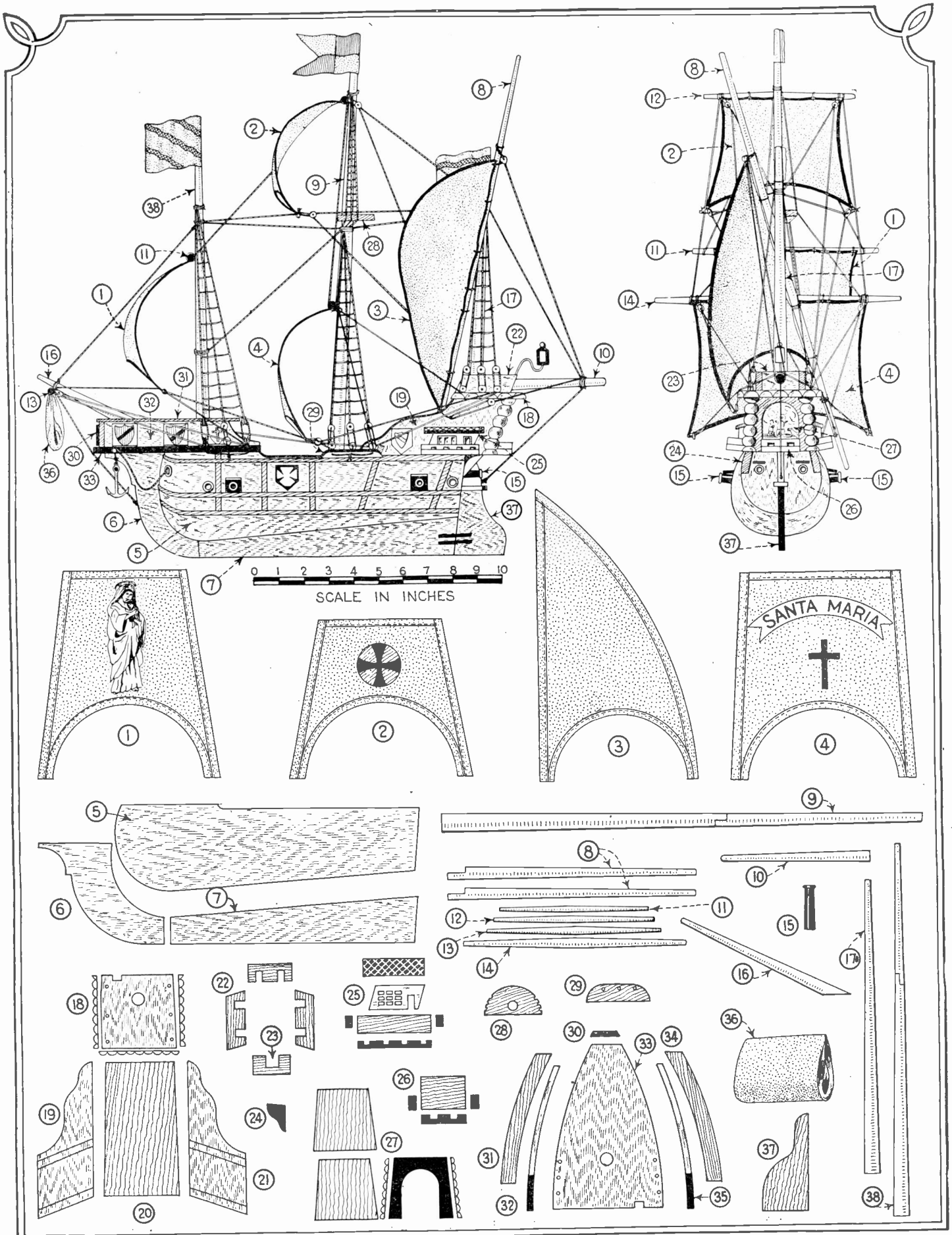
The photograph here shows a three-quarter view taken from the bow of the vessel. Note the sail rolled up at the bow. Also observe the shields decorating the sides of the vessel and the cannon projecting from the port holes.

Above is a photograph of the prize-winning idea entered in this month's contest as it would appear if placed on a radio set. Ships of this nature are very fascinating both to build and to decorate, and when the work has been finished, the builders will rarely sell the vessel for less than five times its actual cost. The flags in this model are of painted metal.

In the building of ship models it is always advisable to use cordage of the proper proportion to the size of the vessel.

Blue-prints of Models are available from the Model Department. Rules for model contest appear on page 1063.

Details of "Santa Maria"



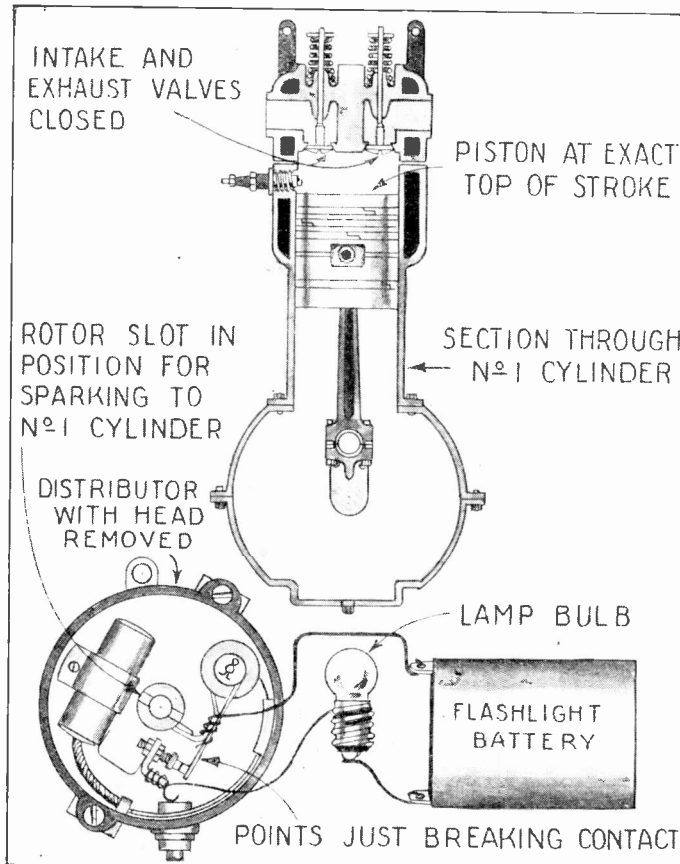
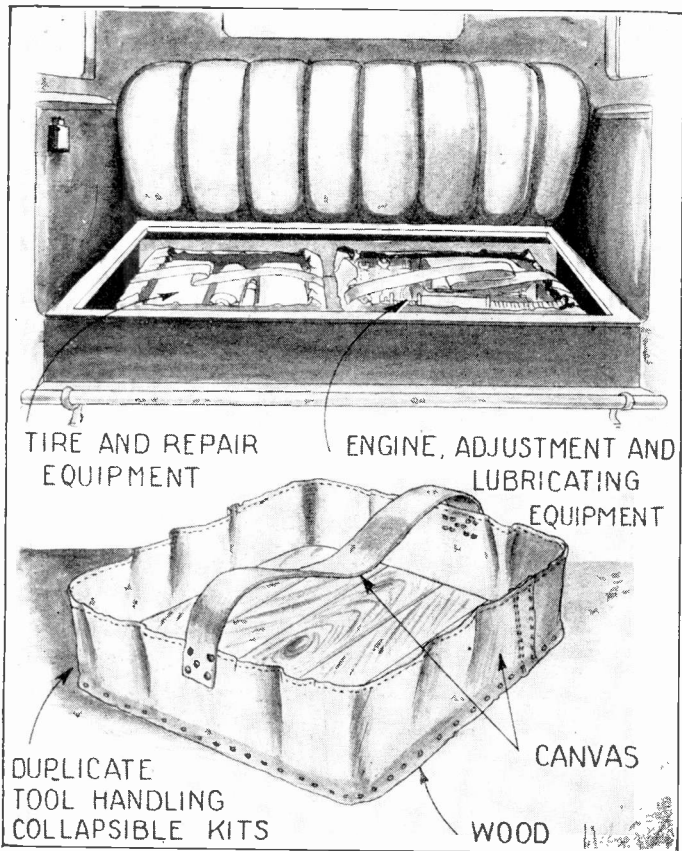
Here is a diagram showing how to build the Santa Maria, the vessel which won the cup in the SCIENCE AND INVENTION Model Trophy Contest. In this particular contest a large cup, 17 1/2 inches high is awarded monthly for the best model of any article submitted during the month.

MOTOR HINTS

Conducted by **GEORGE A. LUERS**
 A New Monthly Department Prepared by a Well-Known Automotive Engineer

FACILITIES FOR GROUPING CAR TOOLS

TESTING IGNITION WITH BATTERY AND BULB



The tool tray idea illustrated above will be found very practical by every motorist. It keeps certain tools together in one group, saving much time.

The picture above shows a simple method which may be used for checking up the timing of the ignition on your engine with battery and lamp.

AN excellent idea for handling automobile tools, is used by many motorists and is shown in the attached sketch. This idea will be appreciated by drivers, especially when the car is of the type in which the tool compartment is under the rear seat and there is only a few inches of space under the low hung bodies, as used on the newer cars.

In the sketch, a boxlike bag is shown, which occupies one half the tool compartment. This bag is made in duplicate, each section fitting half of the compartment.

The bottom of the bag is of wood, while the upper part is made of canvas, with a canvas handle. In this way the bag is of considerable depth when lifted, but tucks away under the lowest seat.

In one bag, tire tools, tire repair material, pump and other equipment for making road repairs is stored. In the other bag, the tools for adjustments, engine repair, greasing and spark plug tools are carried. This idea will solve the perplexing problem of tool handling in a satisfactory manner.

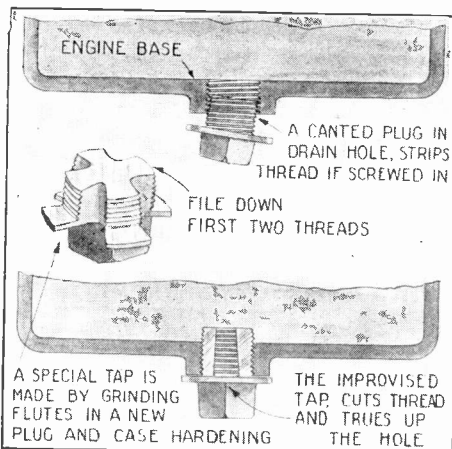
CHECKING UP ON IGNITION WITH A BATTERY AND BULB.

Several weeks ago one car owner came to an abrupt halt on the road, while the exhaust gave forth occasional violent explosions.

This owner had recently been in the repair station for reason of ignition failure

"DO YOU KNOW, if battery liquid shows a 1150 hydrometer reading, it will freeze readily. Repairs to a frozen battery cost practically as much as the cost of a new one."

and the mechanic had adjusted the distributor to make the firing order coincide with the piston movement. It so happened, how-



If you ever strip the threads in the opening at the bottom of the crank case, here is a clever way of re-threading the opening.

ever, that the real trouble was due to the loss of a connecting taper pin between the timing gears and the distributor shaft and only a temporary hold was existing between the two shafts.

This was found to be the condition when road repairs were attempted on the car. The entire ignition setting had to be made correct before the engine could be started.

To time the ignition, as was done in this instance, the following procedure was used:

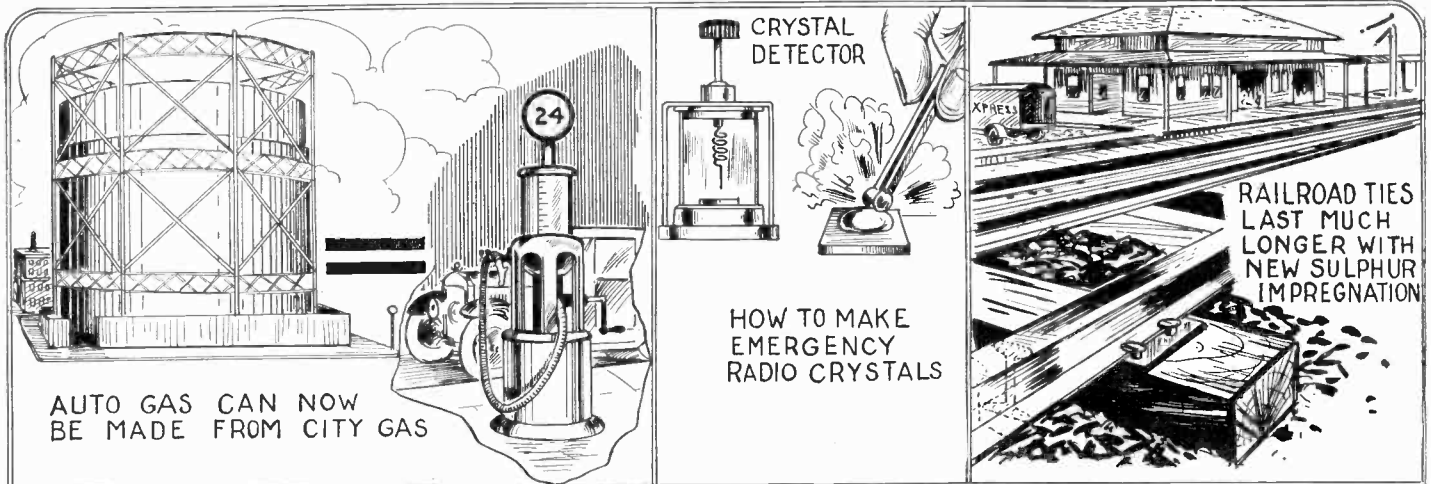
1. The spark lever was set in the retarded position.
2. The spark plug from number one cylinder was removed and through this opening a small rod was placed to determine when the piston was at the exact top of the stroke and both valves closed.
3. The lead to number one spark plug was determined and the rotor position for firing at this time was determined.
4. The distributor shaft was turned to bring the rotor slot and cam around.
5. A small piece of wire was used to connect up the blades holding the breaker points and a small flashlight bulb and battery was connected in circuit. The adjusting screw was then turned so the points separated to the point where the light went off.

The illustrations show the position of the piston and valves in number one cylinder and the second part of the illustration shows the connections for the bulb and battery.

(Continued on page 1061)

Everyday Chemistry

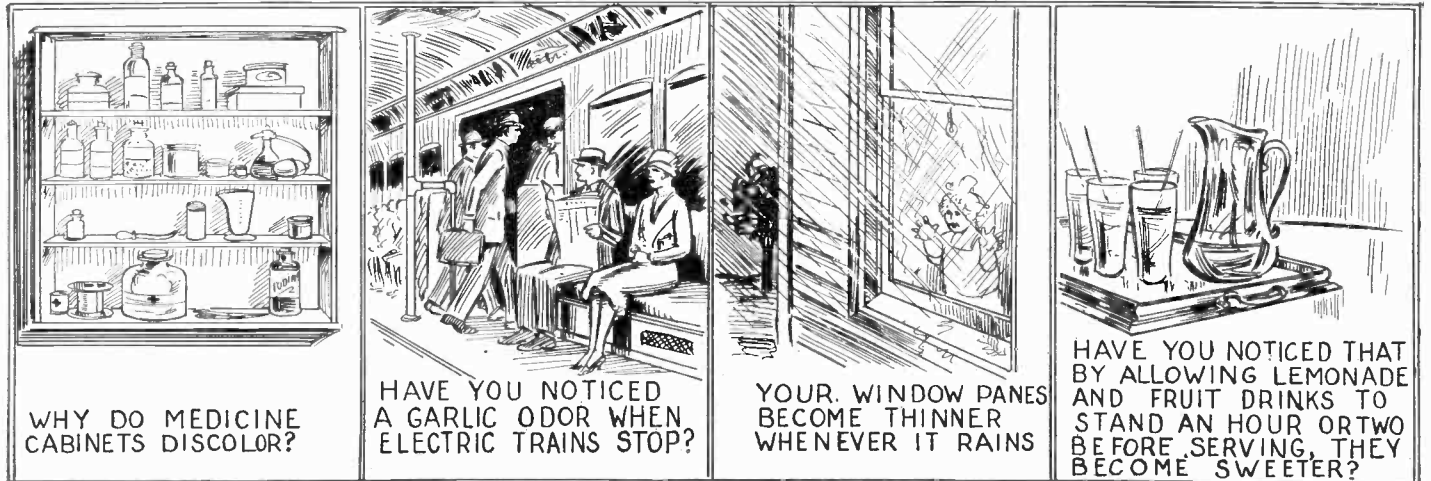
By RAYMOND B. WAILES



Processes have been developed which make it possible to produce a combustible liquid fuel from common illuminating gas by subjecting the gas under high pressure to the action of a catalyst. This fuel may be used in internal combustion motors, and it may some day supplant gasoline for our automobile and other engines.

It is very easy to improvise a crystal for your crystal detector if you find it necessary to do so. Melt a drop of solder as big as a crystal cup and hold the live heads of two matches upon it. The heads will burn and form a coating of sensitive lead sulfide, "artificial galena," upon the solder.

Research on the part of lumber producing industries has brought out the information that railroad ties and other wood impregnated with sulphur lasts longer than creosoted ties. Sulphur is highly resistant to weathering and insect destruction, and this development in its use gives promise of further useful applications.

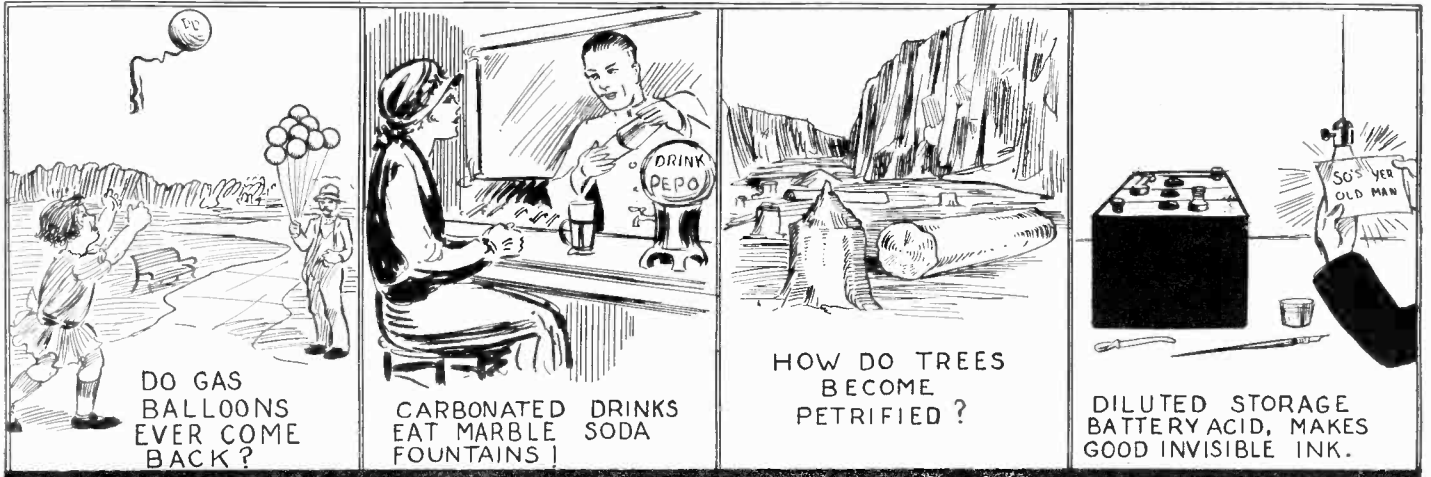


The frequently-noted discoloration of white enameled medicine cabinets seems mysterious. As a matter of fact the explanation is very simple. The vapor from the universally used tincture of iodine reacts with lead paint to form a yellow iodide of lead.

Most electric trains are equipped with brakes which cause the train to stop by electrical means rather than mechanical. Sparking may occur as a consequence of this action, and is usually accompanied by the production of ozone, hence the odor.

Glass, as in the case of nearly all other substances, is more or less soluble in water. This action is infinitesimal, but a minute amount of glass is dissolved in the rain water beating upon window panes during each shower.

Fruit acids found in all fruit juices react with cane sugar, slowly but surely, to form other sugars which are somewhat sweeter than cane sugar. If sugared fruit drinks are permitted to stand for some time, they become considerably sweeter.

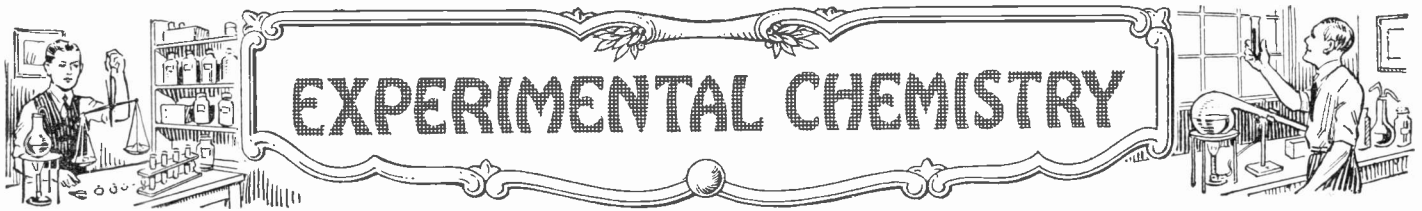


Although it would appear on first consideration that gas-filled balloons would rise indefinitely, such is not the fact. However impervious the tissue of the balloon may be, the molecules of hydrogen will eventually find their way out.

Although it is not precisely true that carbonated drinks "eat" marble soda fountain, the carbonic acid contained in carbonated water reacts with the marble of the fountain-top, to form calcium bicarbonate which is a soluble salt.

Petrified or silicified trees were formed by being exposed to water which contains silica, the component part of sand, in solution. The water was introduced into the cells of the wood and broke down the tissue, leaving the silica behind.

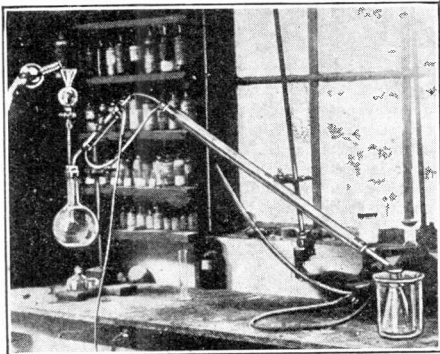
Diluted storage battery acid may be used very nicely as "invisible ink." Write with a gold or glass pen point on white paper; the writing will be invisible until the paper is heated, when the hot sulphuric acid carbonizes it, giving brown to black marks.



Experimenting with Aldehydes

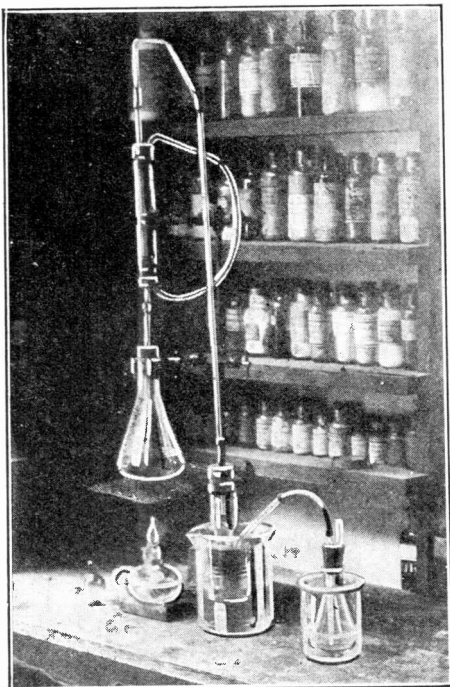
By DR. ERNEST BADE

THE aldehydes are dehydrogenated primary alcohols and a number of them exist as such in certain essential oils of plants. The simplest member of this type is formaldehyde, a gas, which, when dissolved in water containing about 15% of wood alcohol, is known as formalin. It is an antiseptic and disinfectant. As an antiseptic a



Sulphuric acid is brought to a boiling point in the little flask. An alcoholic solution of potassium bichromate is put into the separatory funnel and is allowed to drip into the alcohol.

few drops will keep a large quantity of material fresh, but its use for preserving food is undesirable. A sensitive test for its presence may be applied. To ten cubic centimeters of the suspected solution add 2 cubic centimeters of a 1% solution of phenylhydrazine hydrochloride and 1 cubic centimeter of a 5% solution of potassium ferricyanide. Mix and add a few drops of



Here aldehyde as produced, is placed in the flask and very gently heated. Reflux condenser returns impurities to the flask while the pure aldehyde passes over and is collected in two ether bottles, the last catching what the first one missed.

concentrated hydrochloric acid. When formaldehyde is present a rose red tint is developed. Formaldehyde has also been used to preserve milk. Dilute the milk with an equal quantity of water, add a few drops of concentrated ferric chloride solution and mix. Carefully add concentrated sulphuric acid so that it descends to the bottom of the test tube; the other solution will float on top of it. If formaldehyde is present, a violet colored ring will be formed on the surface of the sulphuric acid between the two liquids.

Acetaldehyde, the second member in this series, has a boiling point of 21° C., and since it is very difficult to separate the acetaldehyde from impurities by fractional distillation, the acetaldehyde is first changed into a salt which is later decomposed resulting in the formation of the pure liquid. Quite a little skill in handling chemicals and apparatus is required to give efficient results, but with care any laboratory enthusiast will obtain satisfaction from the experiment.

Ethyl alcohol is oxidized by means of sulphuric acid and a bichromate and the resulting aldehyde is collected in a freezing mixture. Into a liter flask put 125 cubic centimeters of water and carefully add 30 cubic centimeters of concentrated sulphuric acid and mix. Place a two-hole stopper in the flask and through one hole pass a dropping funnel and through the other a slightly bent goose-neck tube. The dropping or separatory funnel is used to control the flow of the aldehyde generated. The slightly bent goose-neck carries a very short condenser used as a reflux, which condenses vapors of the higher boiling points and brings them back into the flask. A very long condenser is attached to the short condenser, and this condenser points downward so that the volatile aldehyde may be condensed. The condenser terminates in an adaptor or tube bent downward and leading into a small flask which is placed in ice and salt or in other freezing mixture.

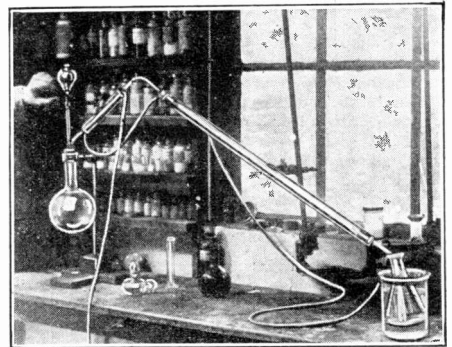
Now prepare, in a beaker or flask, a solution consisting of 100 cubic centimeters of water and 80 grams of sodium bichromate to which 75 grams of alcohol, medicated, grain or ethyl alcohol marked "for external use," may be employed. Mix thoroughly and fill the dropping funnel with this solution. Then heat the flask until the solution just begins to boil. In the meanwhile place the receiver in ice water, ice and salt or other freezing solution. Then let the water pass through the condensers and open the stop cock of the dropping funnel slightly so that a small, thin stream passes into the slowly boiling solution.

During the addition of the bichromate mixture, it will hardly be necessary to heat the flask for the reaction which takes place is of such a nature that it is sufficient to cause ebullition. The aldehyde formed, together with some alcohol and acetal, is vaporized and enters the short reflux condenser.

If uncondensed vapors of aldehyde escape from the receiver, the mixture from the dropping funnel is added more slowly, and if the contents of the large flask does not boil gently, as the mixture from the funnel is added, then a small flame is brought under it so that the reaction may be more complete. When all the mixture has been added, continue to heat the flask with a small flame

for a number of minutes in order to complete the reaction as much as possible.

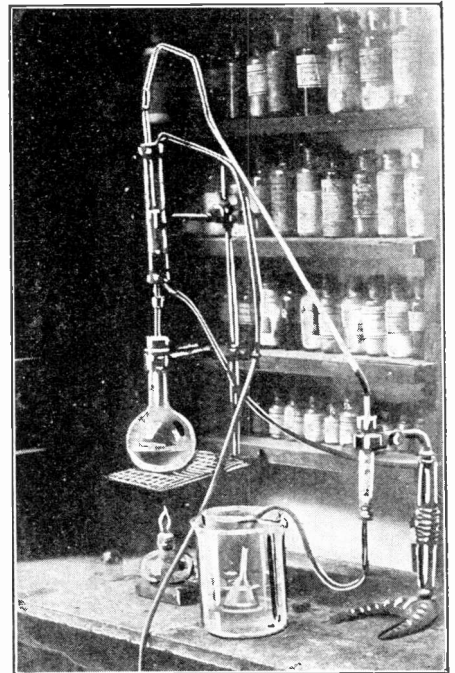
The impure acetaldehyde in the receiver is now removed and placed in position for boiling. This time a one-hole stopper is used and the short reflux condenser is connected. From the reflux condenser a glass tube is brought down to the table and an adaptor or inverted thistle tube is attached



This shows a second step in the process where the alcoholic bichromate solution is allowed to drip into the boiling sulphuric acid.

to the tube. The end of the wide tube reaches slightly below the level of a bottle containing 50 cubic centimeters of ether. This bottle is provided with a two-hole stopper, a tube passing through the other hole leads to a second bottle containing 50 cubic centimeters of ether.

Fill the short condenser with water having a temperature of 35° C. and gently heat the



Strong ammonia solution is put into the flask and by gentle heating ammoniacal gas is evolved, passes through the reflux condenser and through a drying tube and into the ether solution of aldehyde contained in a beaker surrounded with the freezing mixture. Crystals of ammonium aldehyde are thus formed.

flask containing the aldehyde. The acetaldehyde passes the reflux condenser and the vapors enter the ether, which absorbs it. Place the bottle of ether in cold water and add a few pieces of ice. The second bottle of ether absorbs any aldehyde which may not have been absorbed by the first bottle.

To obtain the aldehyde ammonia, a current of dry ammonia is passed through the ether solution. This is accomplished by placing the ether solution in a beaker surrounded by a freezing solution of salt and ice. A small funnel is placed in the ether solution and the stem is connected with rubber tubing

to a drying tube containing a mixture of sodium hydroxide and calcium oxide powdered together. The free end of this drying tube is connected by means of glass tubing, to the top of a small condenser, the lower part of the condenser being connected to a flask containing a concentrated solution of ammonia. From 150 to 200 cubic centimeters of ammonia solution is sufficient, and this is heated by a small flame. The gas passes through the condenser, through the drying tube, and into the ether solution where it is absorbed. During this process the ether first becomes turbid and then clear and a large

quantity of crystals of ammonium aldehyde will be deposited. Scrape these into a suction filter and dry and then bottle the white crystals.

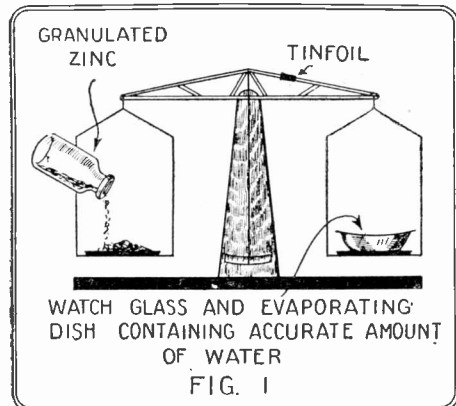
The pure aldehyde is obtained by dissolving 10 grams of ammonium aldehyde in 10 cubic centimeters of water, to which a cold solution of 10 cubic centimeters of sulphuric acid (concentrated) mixed with 20 cubic centimeters of water are added. This mixture is heated on the water bath and the pure aldehyde, distilling at 21° C. is collected by means of a long condenser, whose receiver is placed in a freezing mixture of ice and salt.

Home Made Balance Weights

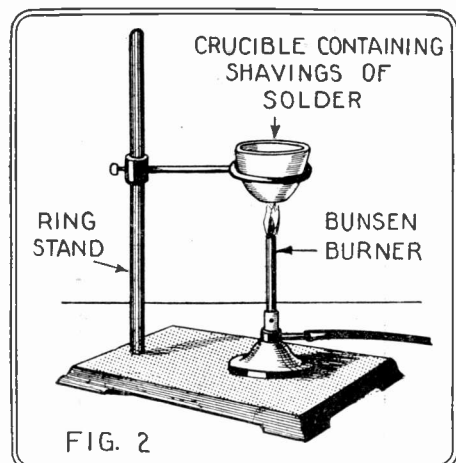
By HOMER S. POWLEY

FOR the experimenter who does not have all the money in the world to spend, there are some pieces of chemical apparatus that offer financial difficulties. I discovered that two of these difficulties were, a laboratory balance and gram weights for it. In the past, many good balances have been described in this department, but no system for making weights was offered.

These weights I am about to describe are accurate and desirable from the experimenter's standpoint, providing, of course, they are made with some degree of care. If they are made very carefully the writer has found that they answer just as well as some of the higher-priced weights.



The dish on the right-hand balance pan contains an exact measure of water in cubic centimeters. It will be remembered that 1 c.c. of water weighs one gram.

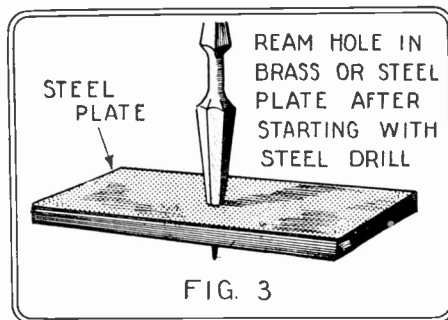


Solder is melted in a crucible as shown. The crucible is best a porcelain one. On no account use one which solder will attack. Printers' type metal may be used instead of solder.

First, procure a bar of good quality solder and some No. 24 copper wire. Shave up some of the solder into fairly small pieces and then file off some to be used when measuring out the solder to get the right amount for the weight. The copper wire can be cut into short enough lengths to serve as handles for the finished weights. Next place a small evaporating dish and a watch

glass large enough to cover it upon one pan of the balance. Now balance this with small pieces of metal, such as granulated zinc. A piece of tinfoil slid along the balance arm will help make them balance accurately.

Now place the exact number of cubic centimeters of water in the evaporating dish

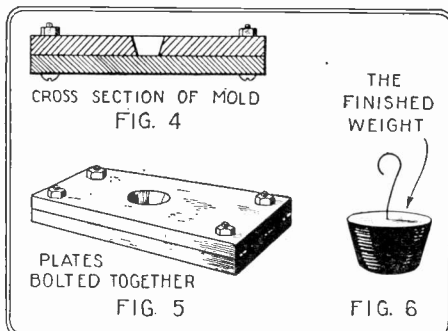


In order to give the weights the proper conical form so that they can be withdrawn from the mold readily, a reamer is used to follow up the drill so as to get the conical contour.

that you want the weight to weigh in grams (thus for a 5-gram weight, 5 cc. of water should be placed in the evaporating dish). Cover the evaporating dish with the watch glass. Covering the granulated zinc with a small piece of paper, put your copper wire and enough shavings of solder to exactly balance the water in the evaporating dish. Fig. 1.

Laying the piece of copper wire aside where you know where it is, pour your solder shavings into a small, clean, porcelain crucible and melt it slowly over a Bunsen burner flame. Fig. 2. When melted it is ready to cast into a mold with the end of the copper wire embedded in it, the wire providing a handle for the weight.

A convenient mold for the weights can be made by drilling a hole just large enough to start a reamer, of the type shown in Fig. 3, in a 1/2-inch plate of steel or brass. This sheet is bolted or clamped to another sheet of the same size as in Fig. 5, the mold having the section shown in Fig. 4. If the mold is deep enough, it can be used for mak-



Here it will be seen how the reamed hole gives the proper shape to the weight; a finished one is shown in Fig. 6. They can be adjusted if desired, using a set of standard weights, by filing, provided care has been taken to make them a little bit too heavy.

Useful Gas Generator

By H. B. ATTELL

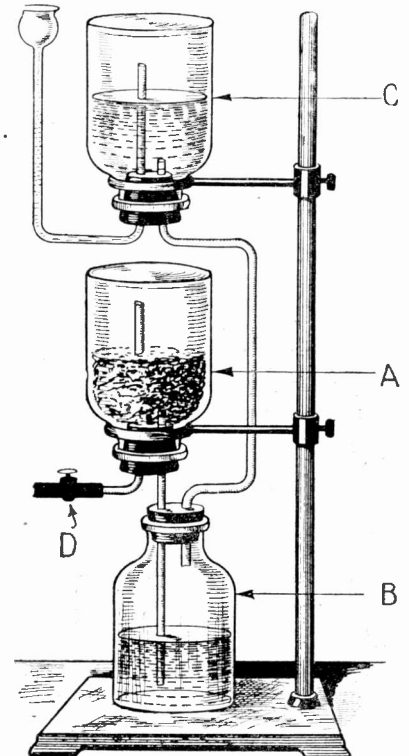
ing several different sized weights. After being poured into the mold, the wire can be set into it, the finished weight having the appearance of Fig. 6.

A wooden block for holding the weights can be made after the same fashion as the mold itself. These weights will be found to answer most laboratory requirements.

If the following weights are made any number of grams up to 38 can be weighed by shifting different weights from one pan to the other. 1, 2, 5, 10, 20. For example: To weigh 4 grams of a substance, place the 1-gram weight on same pan as the substance to be weighed and 5-gram weight on the other.

THE simple gas generator shown here is an excellent laboratory constant pressure apparatus.

The middle bottle (A) is filled with iron sulphide, if it is desired to generate hydrogen sulphide; or with zinc, to generate hydrogen; or marble chips, to generate carbon

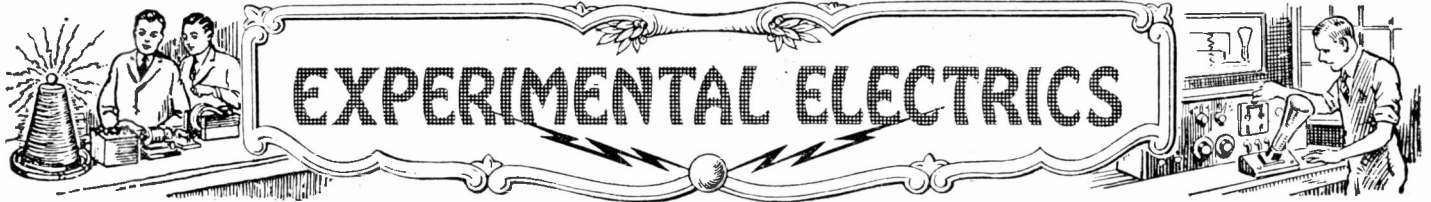


A very efficient gas generator is shown here whose principal feature is that it is made with three salt-mouthed bottles.

dioxide. The other bottles, (B) and (C) contain the hydrochloric or sulphuric acid necessary to liberate the gas.

When gas is needed it is only necessary to open the stop-cock (D). The acid rises into the bottle (B), and reacts with its contents, giving the desired supply of gas. When the stop-cock is closed the pressure of the gas in (A) forces the acid back into the lower bottle, thus stopping the generation of gas until the stop-cock is again opened.

The bottle (C) should be large enough to receive all the acid from (B).



Interesting Experiments with High Frequency Currents

(Continued from February Number)
By S. E. NEWHOUSE, JR.

IT will be of interest to give a brief discussion of the theory connected with high-frequency currents. In order to obtain high-frequency currents by means of an oscillatory circuit it is necessary to supply power to a circuit containing suitable inductance and capacity. The circuit will contain some resistance, but this will not affect the value of the frequency, which is determined by the following equation:

$$f = \frac{1}{2\pi \sqrt{LC}}$$

Where f is the frequency in oscillations per second, and L and C the inductance and capacitance of the circuit in henries and farads respectively. The resistance which will allow a current to oscillate is called the critical resistance which is expressed as:

$$R = 2 \sqrt{\frac{L}{C}}$$

Therefore in order to produce oscillations the value of R must be made low so that R is less than $2 \sqrt{\frac{L}{C}}$

This is easily accomplished by using conductors of low resistance in the oscillatory circuit.

In order to obtain the maximum discharge from the secondary of either the Tesla or Oudin coils, the primary and secondary should be tuned to the same frequency. Since the inductance and distributed capacitance of the secondary are practically fixed values, the inductance of the primary must be varied by varying the number of primary turns, and the capacity must be changed by varying the number of condensers in parallel, until the point of maximum secondary discharge is reached. At this point the following relationship will be true:

$$L_p C_p = L_s C_s$$

The subscript letters pp indicate primary and ss secondary.

Hence the natural frequency of the primary circuit will be equal to that of the secondary circuit since L_p and L_s represent the inductances of the primary and secondary

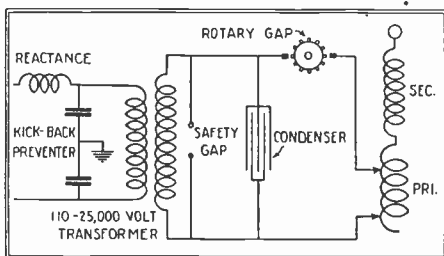
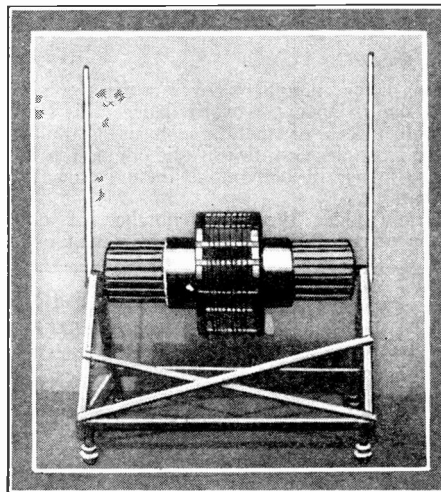


Diagram of the connections for high frequency apparatus as applied to an Oudin coil. Notice particularly the rotary spark gap, giving a mechanical make and break, and also the kick-back preventer grounded to the transformer core.

respectively and C_p and C_s represent the capacities of the primary and secondary.

The power circuit used with the two types of resonators are identical. The circuit diagram is shown with an Oudin coil. With a Tesla coil the only difference would be that the secondary would extend on through the primary and the discharge would take place



The general structure of a 4-foot Tesla coil of bird-cage construction with wooden frame; not a particle of iron has been used in the frame, dowel pins are used to secure the strips to the circular core discs.

between the two secondary terminals. The power supplied to the transformer was varied by moving an iron core in and out of the reactance shown in series with the primary. Kick-back preventers in the form of small condensers connected across the primary and grounded to the core of the transformer at their mid-points were used to prevent any possibility of high frequency surges passing back into the 110-volt circuit. A safety gap was connected across the secondary of the power transformer to protect the condensers. The secondary voltage was therefore never allowed to exceed 25,000 volts.

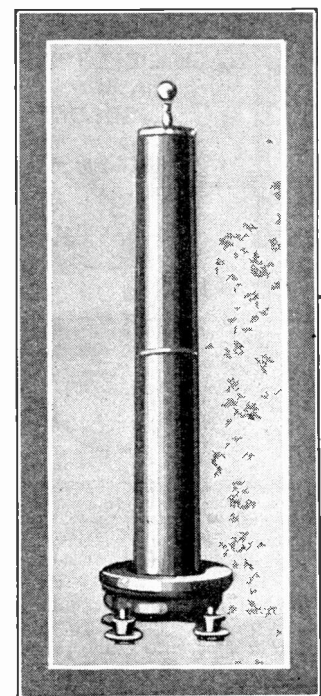
Each condenser is built in two sections with 5 dielectrics each. The thickness of each dielectric is $\frac{1}{4}$ inch, being made of two panes of $\frac{1}{8}$ inch window glass each 16" x 16". The conducting plates were of copper sheeting 13" x 14". Alternate plates were connected together, there being 6 plates for each section. The sections were clamped firmly together and held by a wooden framework, the whole being immersed in tanks of transformer oil, with two sections in each tank. The tanks were of galvanized metal and the sections were insulated from the metal. The capacity of each section was calculated and found to be 0.00057 microfarads, giving a capacity of 0.0114 mfd. for each condenser tank. Two such condensers were used for the large Oudin and the Tesla coils. Only one condenser was used with the smaller resonators.

The rotary gap was adopted to prevent the formation of a power arc after the condenser voltage had jumped the spark gap of the rotor. A stationary gap, unless of the quenched gap type, would not be so satisfactory. The rotor was an aluminum ring 7 inches in diameter having 12 aluminum discharge tips on the periphery, each tip being $\frac{1}{8}$ inch thick and 1 inch wide. The stationary electrodes were copper bars. The rotor was run by a 3500 rpm, $\frac{1}{3}$ horsepower

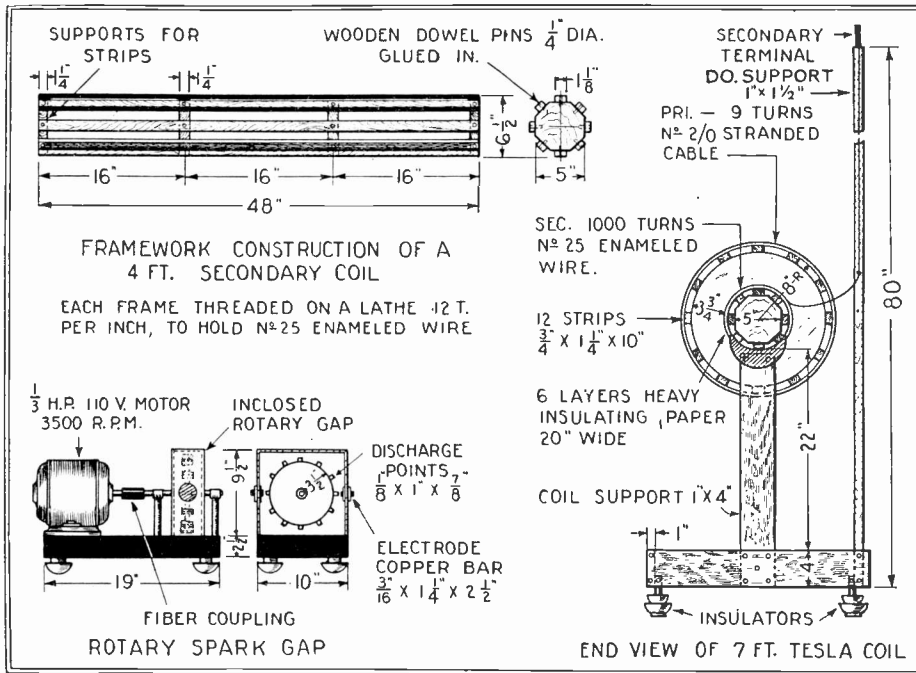
motor. A small motor with somewhat lower speed could be used almost equally as well. The motor must be insulated from the rotary gap by means of a fiber coupling. The rotary gap was enclosed.

No iron nails or screws are used in the construction of the high-frequency resonators; they are put together with wooden dowel pins, and brass screws were not found to be objectionable. The Tesla coil is nothing more than an air core transformer; plenty of insulation being provided between primary and secondary.

The secondary of the four-foot Tesla coil was a "squirrel cage", 12 inches in diameter and 4 ft. long, wound with No. 24 B. & S. gauge enameled wire, twenty turns per inch. Five, 11 x $\frac{3}{4}$ -inch discs carried the twenty 1 x $\frac{3}{4}$ x 48-inch strips, which were mitered to hold the disc and were glued and doweled in place. The cage was turned down to a cylinder of proper dimensions in a lathe, and the groove for spacing the winding was cut with the thread-cutting mechanism on the lathe. The wire was then wound into this groove, by passing it through a slot in the tool holder which moved 1 inch for each 20 turns of the coil, being actuated by the lead-screw of the thread-cutting mechanism. There were 46 inches of winding in the coil which gave 920 turns. The coil was given a coating of melted beeswax and paraffin. Over the middle portion of the coil was wound a heavy insulating shield of pressboard two feet wide. The primary consisted of two wooden rings and sixteen $\frac{1}{2}$ x 1 x 12-inch slats, which were glued and doweled in place. The outside diameter of the rings was 23 inches and the inside diameter, 13



Vertical secondary of a high frequency coil. The sparks and conduction effects are drawn from the brass sphere at its upper end.



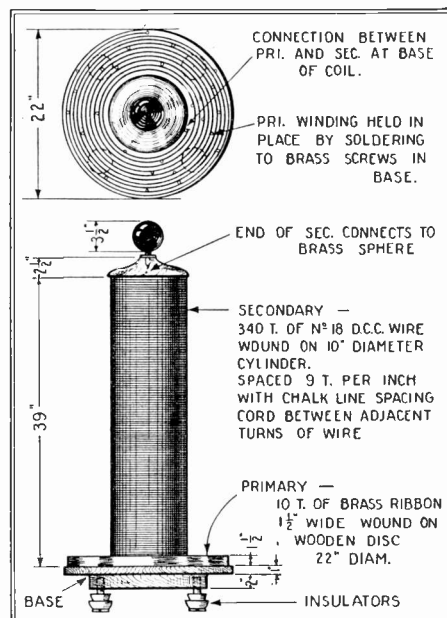
Various diagrams of the construction of a Tesla coil and in the lower left hand corner is shown the construction of the rotary spark gap which gives the mechanical make and break.

inches. The secondary was placed in the primary and the whole arrangement was supported by a wooden framework, the primary being wound with 10 turns of heavy stranded cable about 1/4-inch in diameter.

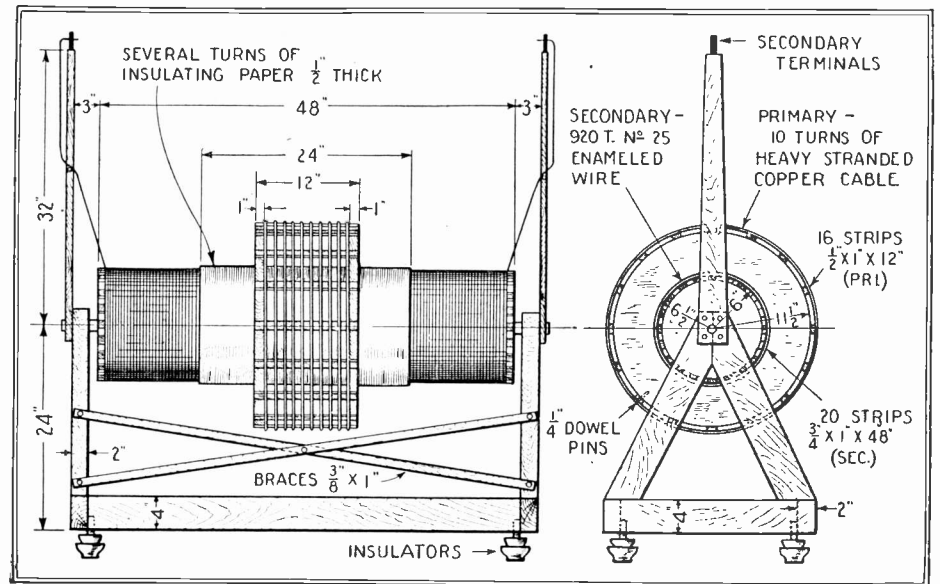
The construction of the 7-foot Tesla coil was similar to that of the 4-foot Tesla coil described above. The secondary was a squirrel cage 6 1/2 inches in diameter after being turned down in the lathe. 8 wooden strips instead of 20 were used to support the winding. The secondary was wound in two sections, one being 4 feet in length and the other 3 feet, giving a 7-foot secondary when connected. The winding was placed on the secondary in the manner previously described using No. 25 wire, 12 turns per inch. This type of construction was employed since quite a high frequency was desired, the 4-foot section of the secondary of this coil being identical with the 4-foot Oudin coil secondary used in part of the experiments. The primary of the 7-ft. Tesla coil consisted of 9 turns of No. 2/0 stranded copper cable wound on a "cage" 16 inches in diameter similar in construction to the primary of the 4-ft. Tesla coil.

The two 39-inch Oudin coils, which when connected together gave a 6 1/2-ft. secondary, were somewhat different from the Tesla coils. Four layers of heavy cardboard 39" wide, were wound on circular heads 10 inches in diameter. The winding consisted of 340 turns of No. 18 D.C.C. wire with chalk line spacing cord between adjacent turns preventing flash-overs, since the voltage per turn was high. The primaries were constructed of 10 turns of brass strip 1 1/2 inches wide, wound on edge on a large wooden disc 22 inches in diameter. The turns were spaced 1/2-inch apart, and were held in place by soldering them at various points to brass screws turned into the wooden disc which served as the base. At the middle portion of the disc there was sufficient room to place the secondary coil, which was connected at its lower end to the inside turn of the primary. The other end of the secondary terminated in a brass sphere, 3 1/2 inches in diameter. Four insulator pins were fastened on the bottom of the base, a petticoat porcelain insulator being placed on each. The secondary was given two coats of shellac and thoroughly dried before putting the resonator into operation.

The winding on the secondary of the conical Oudin coil consisted of 130 turns of No.



Some details of a 39-inch Oudin coil. Note the primary winding of brass ribbon.



Construction details of a 4-foot Tesla coil. Here stranded copper cable wound on the large diameter drum forms the primary. The secondary is wound on the drum of smaller diameter.

18 D.C.C. wire with chalk-line spacing cord, wound on a heavy card-board cone 15 inches high, 13 inches in diameter at the base and 6 inches in diameter at the top. Wooden discs supported the cardboard at top and bottom. The coil was shellacked in the same manner as the 39-inch Oudins. The same type of primary was used with this coil as was used with the larger Oudins except that only 6 turns were wound in the primary. The advantage of the conical shape is that the distance between the primary and secondary is greatly decreased as the potential difference increases.

The construction of the other small Oudin coils will not be dealt with here. The connectors used for connecting the apparatus in the oscillatory circuit were copper ribbons either 1/4 or 1 3/4 inches wide. The reason for using this form of connector is that the resistance of the oscillatory circuit must be kept down to as low a value as possible, and a large surface area operates to do this. The resistance to the passage of high frequency currents is more nearly proportional to the perimeter of the cross-section of a conductor than to the cross-sectional area.

A number of other experiments besides those mentioned have been performed with this equipment. A very interesting experiment was that of connecting a copper wire 1/4-inch in diameter in the high frequency circuit with an ordinary 25-watt lamp, having its terminals connected to two points on the wire about a foot apart. With ordinary 60-cycle current the lamp would have been short-circuited and would not have given any light. However with these high frequency currents the lamp was lighted to full brilliancy.

A splendid example of wireless power transmission was given when a 24-watt light, connected in series with 3 turns of wire wound in a loop 3 feet in diameter, was lighted to full brightness when the loop was held several feet away from one of the Oudin coil primaries. For best results with this experiment the axes of the two coils should coincide. It is not beyond reason that some day we may be transmitting power on a large scale.

Although the power transformer was rated at 5 kilowatts, it was found that even the largest resonators operating at full power did not require more than 3 kilowatts of power. Very satisfactory results were easily obtained with a 1-kilowatt transformer supplying the power for the smaller resonators, since the small coils operated at

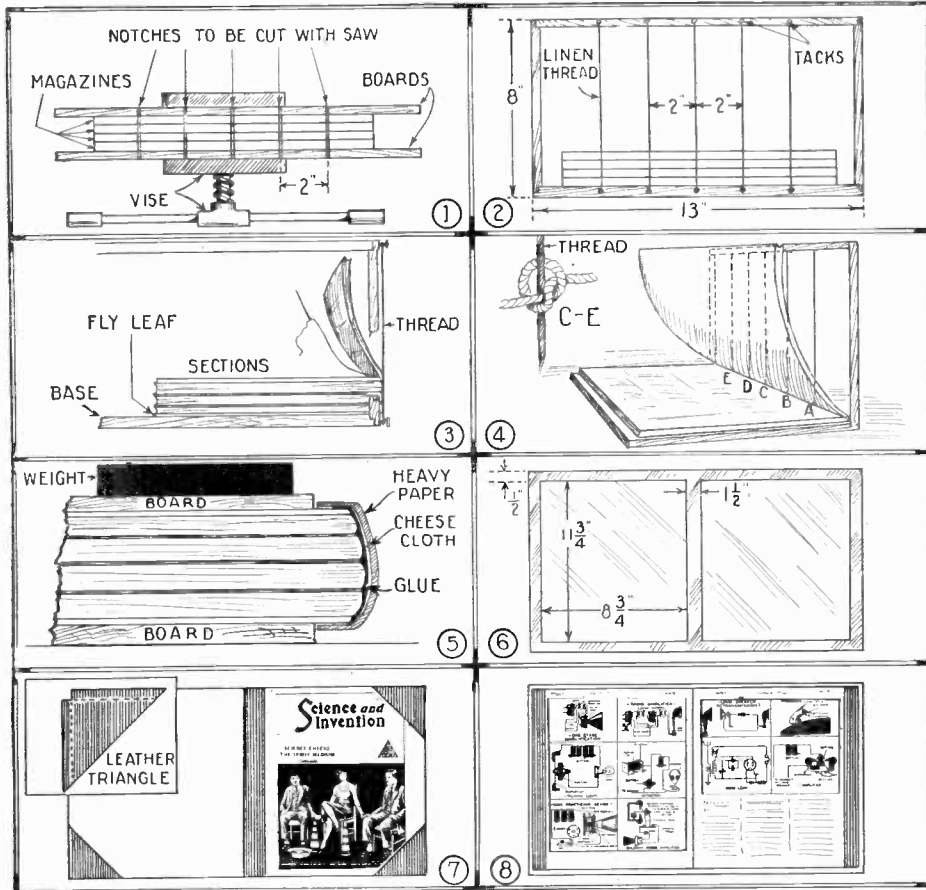
(Concluded on page 1069)



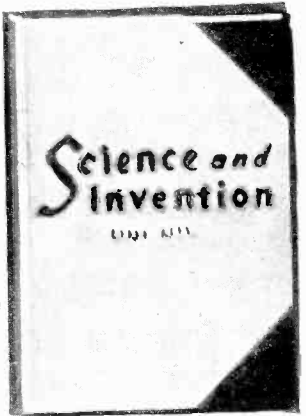
THE CONSTRUCTOR



Permanent Binding for your Magazines



THE covers of the magazine must be removed, the clips taken out, and each section of 8 or 12 leaves separated. The glue is scraped off, the pages evened up, and they are placed in a vise to be notched, beginning at the center, as in Fig. 1. Vertical threads are then arranged in a rack, as at Fig. 2, to aid in the tying of the sections. Barbour's No. 50 linen thread may be used throughout. Cut two sheets of white paper as shown at Fig. 6, and fold in the middle so that they will be about the same size as the magazines. Lay one on the base of the rack, folded ends toward threads. Tie one end of a 4-ft. length of thread at A in Fig. 4; then bring the thread through the paper, holding half of the sheet up, make a loop around B and tie at C, keeping the string taut. Make a loop around D and pull the thread out at E, and tie a knot. Repeat this with each section, working back and forth, and be sure to keep the thread tight. Place a fly leaf at each end when the volume is completely assembled. After assembly place a weight upon it as in Fig. 5. Coat the back heavily with glue; put on a piece of cheesecloth 4 by 11 inches to strengthen it, and then a piece of stout paper, same size, over it. Permit to dry and clip rough edges. Covers may now be added by splitting out openings for the five transverse cords in the covers and pasting them in under heavy pressure, and the book should be pressed for several days in a book binder's press before being put into use.—Alfred L. Woods, Rep. No. 13916.



A Home-Made Wood Turning Lathe

The wood-turning lathe illustrated here may be built up at small cost from parts easily obtainable by the average person. The head stock shown at the right is made from a polishing head or buffing wheel arbor purchased from a mail order firm. The spur center which engages the block of wood to be turned is made from a butterfly nut which has been filed to a sharp edge.

The tool rest can be made of $\frac{1}{4}$ by 1 inch iron and may be fixed slightly below the axis of the lathe or may be movable if desired. The lathe is best assembled by first placing the head stock and then lining the tail stock up with it. The vertical adjustment is made by lengthening or shortening the upright nipple of the tail stock.

The tail stock of the lathe is adjustable from left to right and runs along the wooden bed made of two-by-fours. The tail stock is made of $\frac{3}{4}$ -inch pipe fitting. The center is a $\frac{3}{8}$ -inch plug.

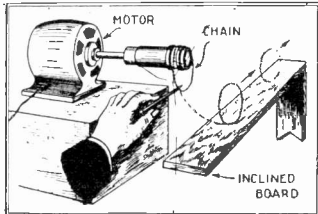
The tail stock is made entirely of pipe fittings. The horizontal adjustment is provided by making the axis of the tail stock of $\frac{3}{8}$ -inch pipe threaded throughout its entire length. — Raymond B. Wailes.



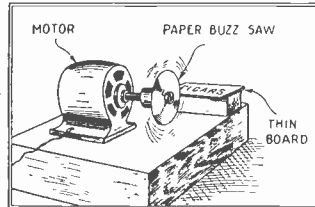
HOW TO MAKE IT



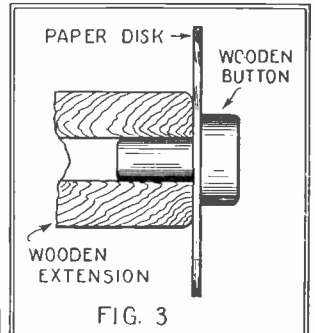
A Magic Chain and a Paper Buzz-Saw



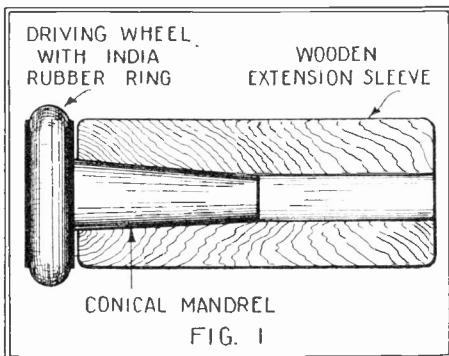
A small electric motor will provide a great deal of amusement to those interested, and may possibly do a lot to illustrate a scientific principle. A chain loop hung on the shaft of a fast-revolving motor forms a rigid ring which may be caused to roll up-hill.



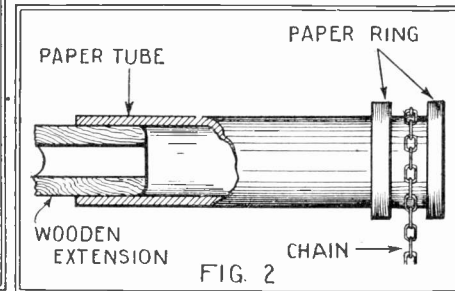
If a paper buzz-saw is revolved at high enough speed, as illustrated at the left, it will be possible to cut cigar box wood with it. The method of fastening the paper disc is illustrated at the right.



These experiments may be performed with the aid of a sewing machine instead of an electric motor, if a wooden extension sleeve is fitted to the shuttle-driving wheel of the sewing machine. The extension sleeve is necessary to prevent the chain from striking the sewing machine at high speed, as this might result in injury to the experimenter.

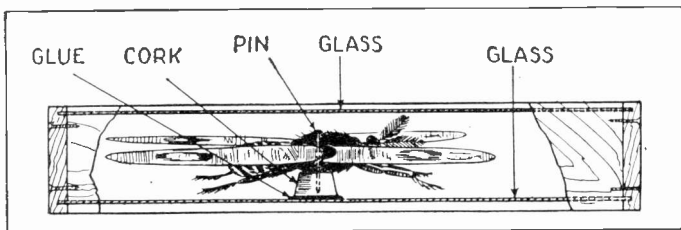


A paper tube is slipped over the end of the wooden extension sleeve, with two paper rings glued to the outside of the tube as guides.

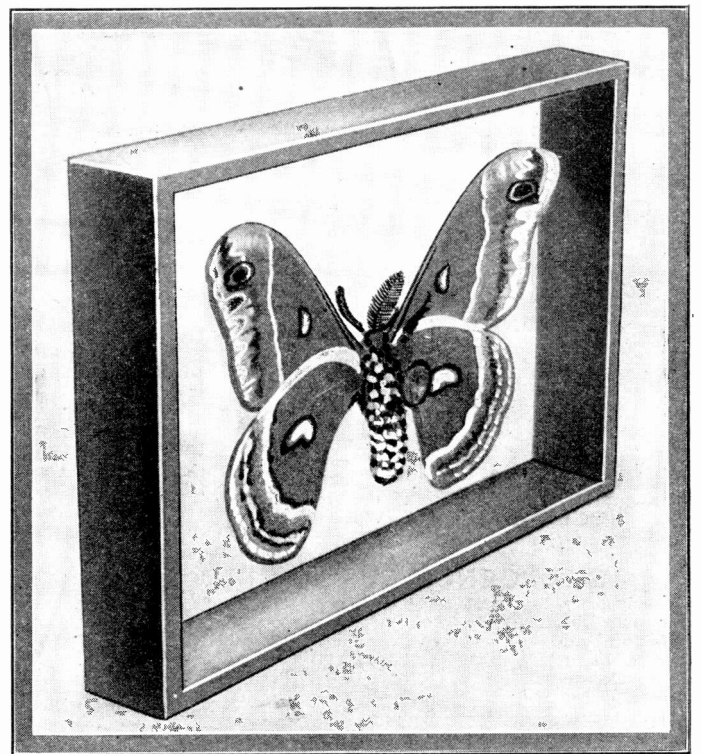
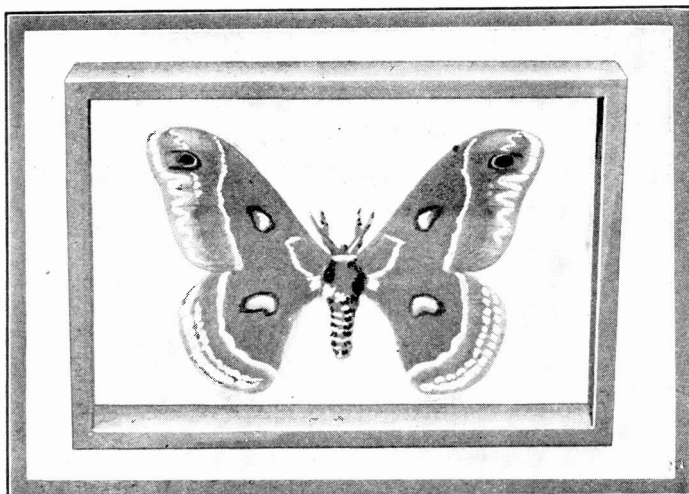


The drawing above illustrates the method used in fastening the paper buzz-saw disc to the wooden extension on the conical mandrel of the driving wheel. The first experiment, that involving the chain, illustrates the action of centrifugal force in causing a chain running at high speed to tend to assume a rigid open form. The effect lasts until the speed falls to a point where the centrifugal force is too weak.

An Excellent Method of Mounting Specimens



HERE is a very excellent stunt for the entomologist, who is more commonly called a "bug catcher." When the specimens are to be mounted for future inspection, it is desirable that the mounting be arranged to permit both sides of the specimen to be seen without removing the specimen from the case. If two sheets of glass are mounted about 1/4 inches apart, separated by a wooden frame, the specimen may be pinned to a cork to be glued to one of the glass plates. Perhaps the simplest way to hold the glass in place is to first build up the frame out of cigar box wood or similar material, cut the glass plates to size, and then fasten them in place by the use of passe-partout paper.



Above will be seen an illustration of an unusually beautiful specimen of a rare moth which has been placed in one of the cases of the type referred to. There is no reason why it should not be possible to mount specimens other than butterflies and moths in this kind of case; it occurs to us that it would be an ideal method of preserving the dried skins of small snakes. At the left is a view of the same specimen from the top. If this type of case is utilized, it is possible to file specimens as one would stack books, with the name at one end. (Author, please send address.)

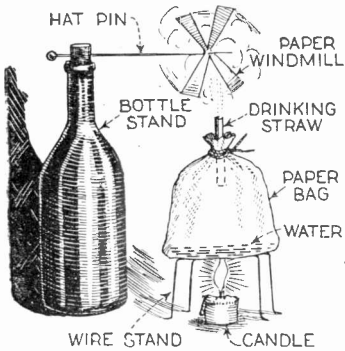


WRINKLES RECIPES & FORMULAS



Edited by S. Gernsback

PAPER STEAM ENGINE



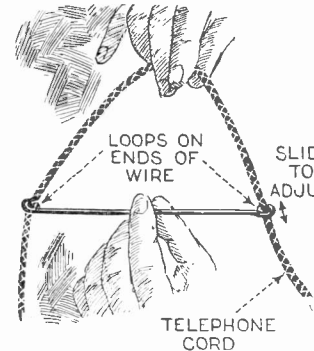
A few experimenters are familiar with the fact that water may be boiled in a paper bag, but it is doubtful if many of them have tried utilizing the steam thus generated to operate a model engine. By assembling the apparatus shown in the drawing at the left, such may be done.—F. C. Jones.

MINIATURE VOLCANO



Here is another stunt which is more or less familiar in principle to all who have made a study of chemical novelties. Required: A small amount of potassium permanganate (K Mn O₇) finely divided, which is formed into a shape more or less resembling a mountain with a crater at its peak, and a few drops of glycerine.—F. Bishop, Rep. No. 25,545.

KINK-PROOFING WIRE



A length of bus bar about 3 inches long and a pair of round-nose pliers fulfill the manufacturing requirements of this useful device. A 3/8ths inch loop at each end of the bus bar is fastened as shown about the telephone cord or other wire. This effectively eliminates kinking.—Arthur Loventhal Rep. No. 27,898.

REMOVING DEVELOPER STAINS

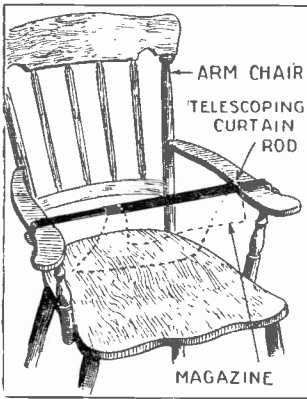
Stains on the fingers from developer solutions, particularly from pyro, are the bane of every photographer. Heat equal amounts of olive oil and beeswax until the latter liquefies. When cool, apply to fingers, rubbing in well and wiping off excess to prevent finger-printing the negative.—D. R. Hoag.



EQUAL AMOUNTS OF OLIVE OIL AND BEESWAX

MAGAZINE REST

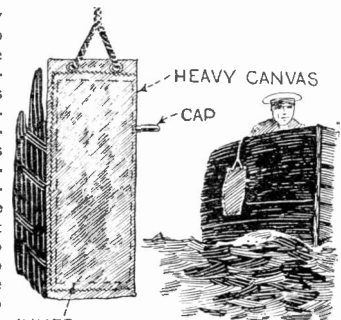
Here is a more or less novel idea to use up old curtain rods which have no other excuse for existence. The theory is that a curtain rod placed across the arms of a chair will make a very nice newspaper or magazine rack for the occupant of the chair. Don't say we didn't warn you.—



Author please send address.

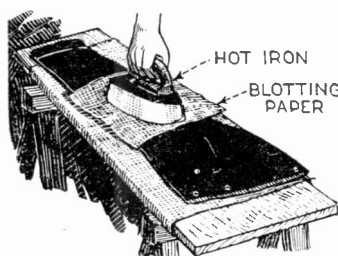
PNEUMATIC BOAT FENDER

The lucky person who owns a nice looking motor boat is usually desirous of keeping it in as good condition as possible. One of the best ways not to do so is to permit the boat to bump into the landing stage. A AT BOTH ENDS inner tube cemented buffer as illustrated here, made from a section of inner tube and a canvas bag, is recommended.—



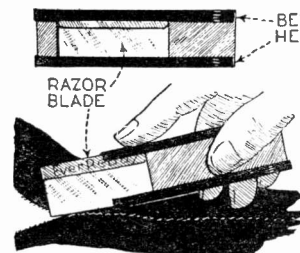
Arthur Moyer.

CANDLE GREASE SPOTS



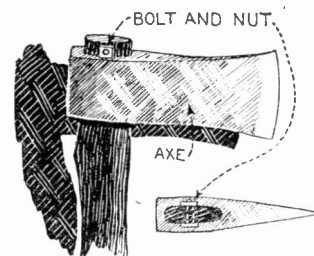
To remove candle grease spots which cannot be rubbed off, use this method. The hot iron will cause the candle or other grease to be absorbed from the cloth to the blotting paper, and no trace of the troublesome stain will remain.—F. J. Wilhelm.

RAZOR BLADE HOLDER



What does the miser do with his old razor blades? Ha, ha! He shaves with them! We don't recommend such methods, but instead we suggest that you use a holder made of thin sheet metal bent as shown here. Result, a useful fabric-cutting knife.—C. W. Brown, Rep. No. 24,960.

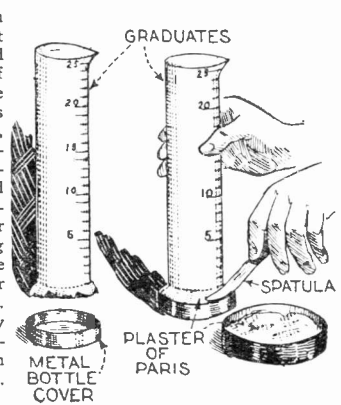
SAFETY FIRST AXE



A bolt and nut may be inserted into the handle of an axe if the axe is driven considerably further than usual onto the handle. This will prevent accidents due to the head flying off.—H. M. Cohen.

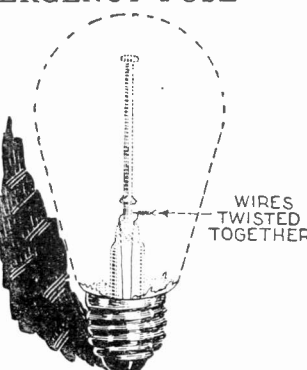
REPAIRING SHATTERED GRADUATE

It quite often happens that the solid glass base of a graduate cylinder is broken, either by expansion under heat and sudden contraction or by knocking the base against other apparatus. A base may be improvised as shown here.—A. Caldarone.



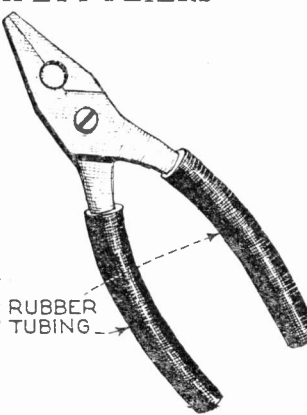
EMERGENCY FUSE

An emergency fuse may be improvised from a burnt out electric light bulb. The glass is broken away, and the heavier wires of the filament are twisted together, forming a link which is equivalent to that of a household circuit fuse.—Alfred Woods, Rep. No. 13,916.



SAFETY PLIERS

The experimenter who works to any extent with electrical circuits sometimes finds it necessary to make adjustments of "live" wires. This is unsafe, unless the precaution illustrated here is observed. Not safe for high-voltage lines.—Thomas Patella, Rep. No. 26,450.



HAVE WE A SOUL?

Editor SCIENCE AND INVENTION:

Instead of speculating on whether or not the dead can be reunited, wouldn't it be more opportune if we were to turn deaf ears to the false exponents of our outgrown superstition (known as religion) and were to make an attempt to prove by scientific methods whether or not we really exist after death?

There is really no scientific basis for a belief in a soul, as religion advocated that theory, and religion will continue to, as long as it gives the clergy a hold on the individual, and incidentally, on his pocket book.

Now I'm not trying to start a rumpus with the religionists—far from it. I'm simply trying to present my argument in the only way I know—by showing that this belief in a soul is unscientific.

Well, science has investigated everything else pertaining to man without the aid of religion. Why not the soul? Why take the word of a number of so-called prophets we know nothing about? Who are not even mentioned in history? Who believed the earth was flat, and that the sun revolved around it? Who believed in witchcraft and devils? Who believed that the sick and insane were inhabited by devils? Who knew less about science than the modern school boy? Why?

Now I recently read an article in which the author claimed the cells in our bodies are immortal, and that death is simply the breaking up of the organism. Genuine science that.

Lets have more genuine science and coax this soul into a test-tube. Surely the men who are counting the electrons would have discovered the soul if it existed. Does it?

Just a word of praise for your publications. They're immense.

HARRY G. OWEN,
Chicago, Ill.

(Your statement to the effect that there is really no scientific basis for a soul may or may not be held, dependent on your own personal view. Most scientists will agree that there is something which disappears from this body immediately after death. You may call it a soul, the ego, the spirit or anything else you wish, proverbially it would be a "rose by any other name." The fact of the matter is that the body is exactly identical immediately after death with what it was before death. The brain has not disappeared, the cells are still there, movements may still be coordinated by stimulating the nerve endings by means of an electrical current or by heat or cold, reflexes may be absent or present a short time after death, depending on the nature of the reflexes and the heart may even be stimulated to beat again. The heart of animals for instance, can be removed from the bodies after the animals are dead and can be made to actually pump warm saline solutions for many hours. So what is it that is missing? What is lacking in the body after death and was present before death? Perhaps it is because we do not know, that we call that agency a soul. Scientists do know that the body decreases in weight immediately after death. This may be due to the volume of expired air, or may also be due to a certain amount of evaporated moisture or as some scientists would prefer to state, it may be the soul. This has not been proven. We can only conjecture at the cause of the decreased weight. The only reason that modern scientists call that indefinite "something" which disappears or which is lacking at the time of death, a soul, is because it was called that in more ancient times. We are not accepting the definition of the soul as given by some prophets, although we might just as well do so because their definitions are as good as any of ours. Your statement to the effect that death is merely the "breaking up of the organism" is to us representative of "painting the lily." To what organism are you referring? Nails and hair continue to grow after death. This would not indicate a breaking up of organism. Reflex actions and stimulated actions can be produced; this would seem to show that organism is present. Then what is meant by this term organism? Nerve cells are still present and are practically unchanged, the nerve endings are still in evidence and the anatomosis of the nerve is also to be found. What then is that something which most of us prefer to call the soul, whose departure has made from our living bodies a mass of inanimate flesh? What is that energy and where has it gone which is found in the brain of man? Scientists know that nothing can be lost in this universe. Nothing can be gained. Matter or energy is merely changed from one form to another. Where does the energy of the mind go when a truly brilliant character departs from this earth? Scientists are quite frank to admit that they don't know what the soul is. Even though you may choose to call it by any other name, there is something present in the living form which is entirely lacking when the sythe of death mows down the individual.—EDITOR)

SLIGHT FAULTS

Editor SCIENCE AND INVENTION:

This is neither an ultimatum nor a praise from my part, but my own poor, opinion, with the brain of a boy of 16.



SCIENCE AND INVENTION desires to hear from its readers. It solicits comments of general scientific interest, and will appreciate opinions on science subjects. The arguments pro and con will be aired on this page. This magazine also relishes criticisms, and will present them in both palatable and unpalatable forms. So if you have anything to say, this is the place to say it. Please limit your letters to 500 words and address your letters to Editor.—The Readers Forum, c/o Science and Invention Magazine, 53 Park Place, New York City.

Several people say they could never do without SCIENCE AND INVENTION Magazine. I don't believe this statement. What I do know is, that the reader of the SCIENCE AND INVENTION Magazine is always superior to his fellow friends.

AMAZING STORIES
IN OUR MARCH ISSUE:
THE GREEN SPLOTCHES, by T. S. Stribling. A perfect story for our pages must be really amazing and must be scientific. This story is, without a question, a classic of scientific fiction, one of the most amazing tales it has ever been our good fortune to read.

UNDER THE KNIFE, by H. G. Wells. Here is an extraordinary imaginative story by the great author, a story of such audacity that you will read it breathlessly from start to finish. While gruesome to an extent, it is the weird experiences of the patient that stand out rather than the gruesomeness.

THE PEOPLE OF THE PIT, by A. Merritt. Here is an exceedingly clever story about intelligences which are absolutely incomprehensible to us—with almost invisible bodies floating through the air, yet possessing strange powers. A weird story that will remain with you long after you have read it.

THE HAMMERING MAN, by Edwin Balmer and William B. MacHarg. Here the psychological detective with the help of his sphygmograph, lays bare a crime a generation old, thus solving many weird and mysterious problems. You will enjoy this story even more than the preceding stories by these clever authors.

THE LAND THAT TIME FORGOT, by Edgar Rice Burroughs (Part II). If you think it is impossible to maintain a high pitch of exciting interest in telling of thrilling episodes and adventures, read the second instalment of this story. The author continues to keep you on edge in a most amazing manner.

There are two things I don't like about your magazine and policy: (1) The long time between the issues; and (2) The blue colored letter you return with unaccepted manuscripts. I don't think that the latter is just on your part. I guess it is, though, for the big'uns; but I don't feel it is right for us, small folks who are just beginning life. Instead of sending a blue letter (curse it) you could write us telling the article was old stuff, or no good, or any reason, so that we might get better in the future. Don't you think so?

I also see that while you boast printing only new stuff, you have printed an age old article which is known and written in every book, twice, once in May 1926 and again in August 1926. This is the "Arc Light" on page 55 of the May and 334 of August issue, both by Conrad Ruppert. I wonder if this is from the "Finesse" of your intelligence? Let all of 'em pass. I frankly admit that I did not like Tarrano the Conqueror, serial. The reason is, not that it is a bad story, but the bad point is that we forget every time where we left off and what was going on in the previous issue, so we must reread the previous issue again.

I think that for a short article magazine like yours, short stories finishing in one issue would be best.

However, after all these slight faults SCIENCE AND INVENTION is the best scientific magazine on the market. Mr. I. Gernsback's editorial on the first page I like most of all.

By the way, don't you think you are printing too many airplane articles?

And last but not least, the Scientific Humor department prints dry jokes.

Wishing the best of success for a still better SCIENCE AND INVENTION Magazine.

G. NAZARETIAN,
Alexandria, Egypt.

(While we would like everyone to look at SCIENCE AND INVENTION Magazine as being 100% perfect, we can well understand that it is far from that. Different opinions from different portions of the globe indicate that what pleases one individual will greatly displease another. It is impossible for any scientific publication to boast of publishing only new stuff. Whenever possible however, we try to use new material. The editors will not knowingly republish old material, unless that old material presents an entirely new viewpoint, or it is presented from a new angle. Originally the blue slips with rejected manuscripts were so marked that the editors could check the reason for the return of various manuscripts. Unfortunately, this condition entailed a much greater amount of work and when thousands of manuscripts were pouring in constantly, it made the method impractical. Each and every manuscript which arrives at the offices of this publication is considered carefully before it is rejected or accepted. If our readers would try to send material more in the class of that published in this journal, we could assure them that their manuscripts will be looked upon with a greater degree of favor.

In every issue of this publication, the synopsis of Tarrano The Conqueror appeared. In a very brief form the story told in the previous installments was again placed before the reader and served to refresh his memory. Many of our readers prefer to have an exceptional serial in SCIENCE AND INVENTION Magazine than short stories claiming that they can get all the scientific short stories they want from AMAZING STORIES Magazine, another of our publications.

The editor does not like to publish dry scientific jokes any more than the reader cares to read them, but what are you going to do when our contributors will not send in scientific jokes and when they do submit scientific jokes, a few of them are dry, and most of them are old? Let us hope that the influx of jokes will all be scientific and that they will all be very humorous.—EDITOR)

In every issue of this publication, the synopsis of Tarrano The Conqueror appeared. In a very brief form the story told in the previous installments was again placed before the reader and served to refresh his memory. Many of our readers prefer to have an exceptional serial in SCIENCE AND INVENTION Magazine than short stories claiming that they can get all the scientific short stories they want from AMAZING STORIES Magazine, another of our publications.

SHORT STORIES NOT NECESSARY.

Editor SCIENCE AND INVENTION:

In your note to Mr. Kissinger's letter you said that you would appreciate hearing from your readers about the short story, so here goes.

I think that if all of your serials are as good as Tarrano The Conqueror, a short story will not be necessary, especially since you are printing AMAZING STORIES.

JOHN BUDDHUE,
Milwaukee, Wis.

(Mr. Kissinger wanted to know why SCIENCE AND INVENTION Magazine could not publish short stories in addition to the serial. We explained that most of our readers are satisfied with but one story in a scientific magazine, but we solicited the comments from other readers. This letter is typical of the many which we have received.—EDITOR.)

FIVE DIMENSIONS

Reading the first installment of Ray Cummings' fine new serial, "Into The Fourth Dimension," has suggested a new line of thought to me, which I hope will prove interesting to the readers of SCIENCE AND INVENTION Magazine who get as much of a thrill out of the story as I did.

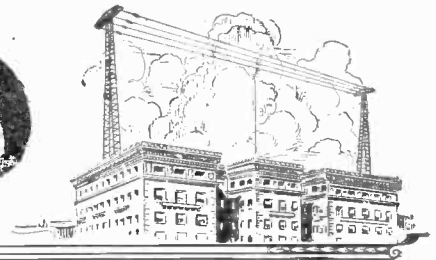
Speaking of the conception that time is the fourth dimension, the argument is that an object, besides having length, breadth, and thickness, must have duration, and that therefore time is as intrinsically necessary to the existence of an object, as are the three familiar dimensions. This is undoubtedly true, but does not necessarily prove that time is a dimension, for, dimension, in the strictest sense of the word, implies space. However, if we accept anything which is necessary to the existence of an object, as a dimension, then we must also accept location as a dimension, for an object might have length, breadth, thickness, and duration, and yet without location it could not exist unless it were infinite, and if it were, it could not be considered an object. However, if there were such a thing as an infinite object, still no definite section of it could exist without location, and if no section of it could exist, then it could not exist, for the whole is equal to all of its parts. Therefore, an infinite object, if it be considered an object, could not exist unless its parts; relative to each other, and the whole; had location, which leads us to the conclusion (following the concept that anything necessary to the existence of an object is a dimension) that there are five dimensions, viz.:

1. LENGTH, is the direction in which the object under consideration is extended the greatest distance.

(Continued on page 1060)



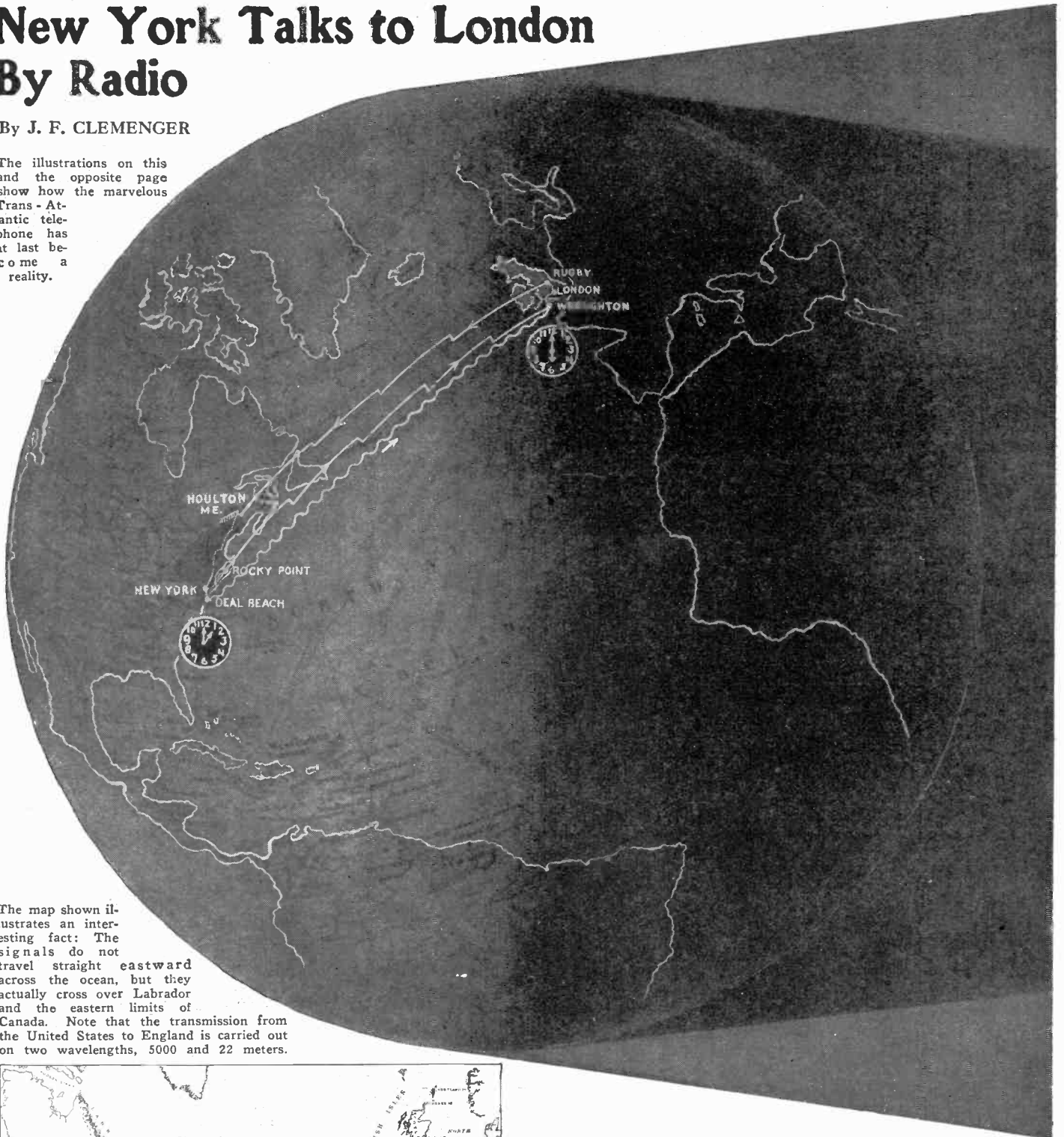
RADIO



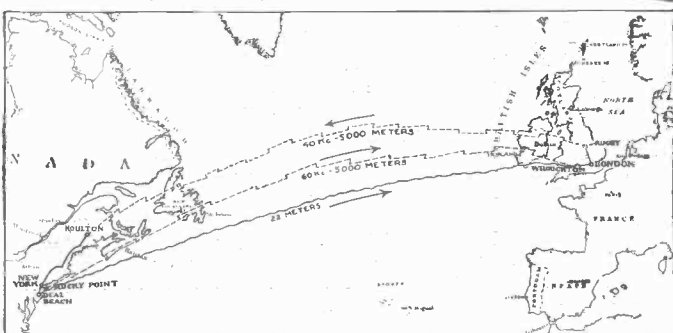
New York Talks to London By Radio

By J. F. CLEMENGER

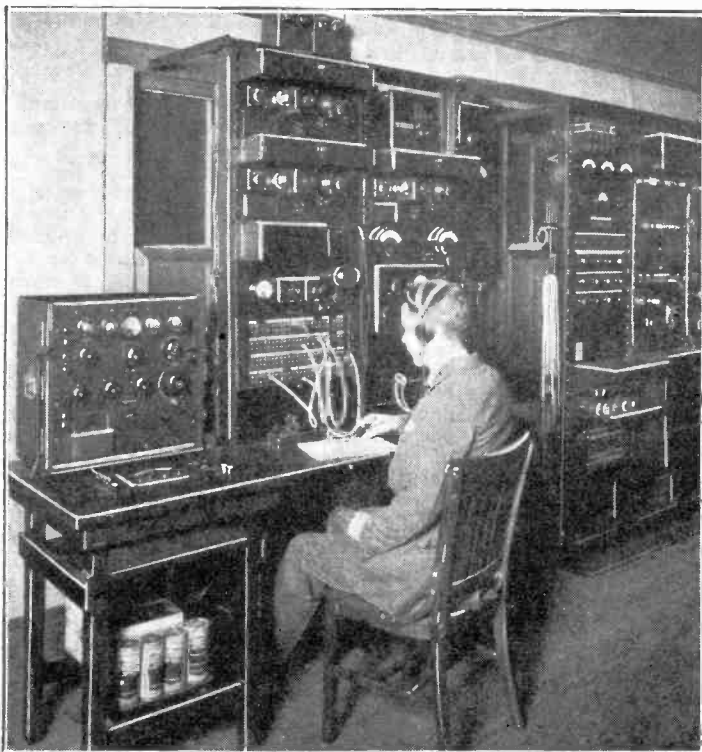
The illustrations on this and the opposite page show how the marvelous Trans-Atlantic telephone has at last become a reality.



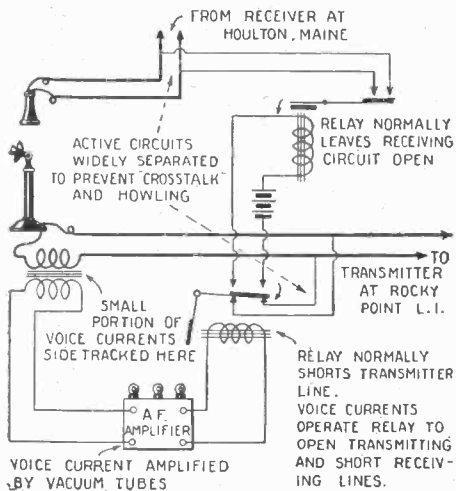
The map shown illustrates an interesting fact: The signals do not travel straight eastward across the ocean, but they actually cross over Labrador and the eastern limits of Canada. Note that the transmission from the United States to England is carried out on two wavelengths, 5000 and 22 meters.



The photograph above shows exactly how the radio waves traverse the ocean in their path from New York to London. The best time for transmission is that period when the entire path is in darkness, due to the fact that the medium which transmits the energy from the transmitting station to the receiver is ionized by the action of the sun's rays, thus causing it to become a less favorable conductor for high frequency impulses. Daylight hours must be used, as they conform to business schedules.

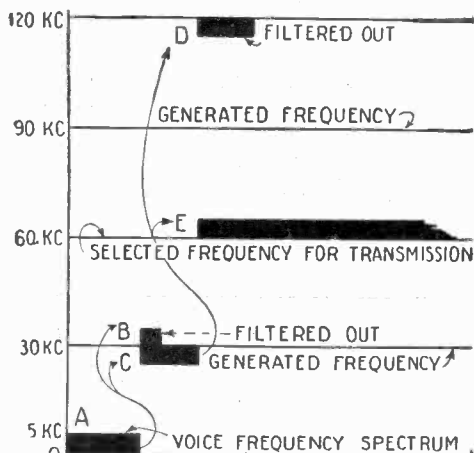


The receiving station on the American side is located at Houlton, Maine. The photograph above shows some of the complicated apparatus which is required to transform the incoming signal to an audible sound and to amplify this sound and introduce it into the land telephone lines.



The voice relay which is used to automatically arrange the circuits for simultaneous reception and transmission is shown and explained in the diagram given above. This is considered a highly ingenious mechanism.

An immense amount of power was required to carry the voice across the Atlantic. The total power used in the three stages of amplification at the Rocky Point station equals the sum total of 400 standard broadcast station installations. The new 10-kilowatt tubes are used, giving a total output of 200 kilowatts. On this page you will find photographs of the apparatus used.



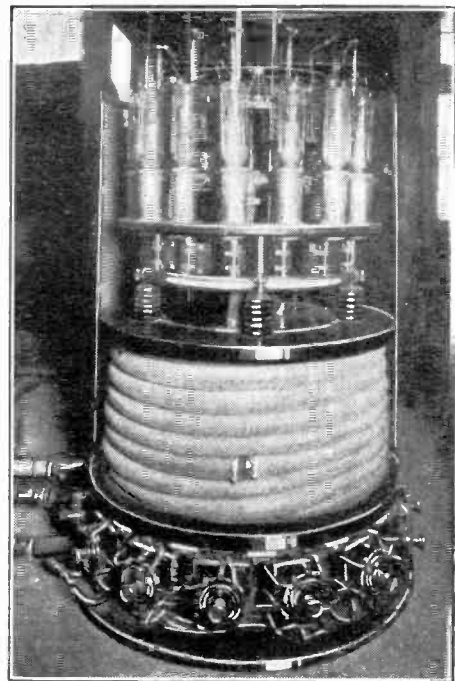
At the left. Two frequencies, 30 and 90 kc. (kilocycles) are generated by 250-watt tubes. The voice frequency from the land telephone lines, A, is used to modulate the 30 kc. frequency, producing two bands, B and C. B is filtered out, but C is again used to modulate the 90 kc. frequency, producing two bands, D and E. D is then filtered out, and E is amplified by three banks of super-power tubes and is emitted from the antenna system. Thus one complete side band is suppressed.

Single side-band transmission is accomplished by the system of modulation which is graphically illustrated in this diagram. This arrangement is used to permit efficient filtering of undesired frequencies, so that a selected band of frequencies will be the only ones transmitted.

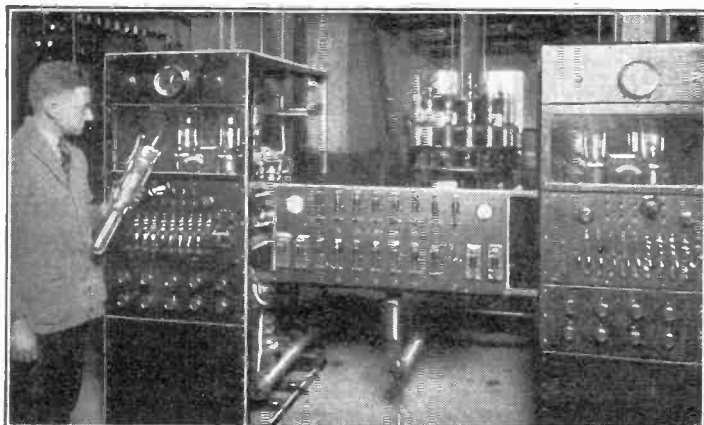
The British transmitting station at Rugby was installed by an English organization associated with the Western Electric Company.

'Phone Across Seas

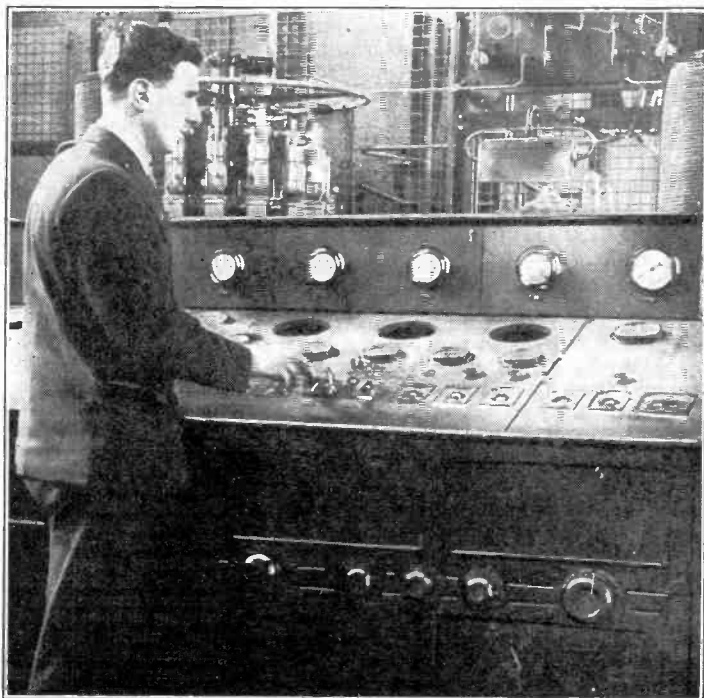
On Friday, the 14th of January, 1927, the Mayor of New York City, took down the receiver of his telephone and spoke directly to the Lord Mayor of London. This first conversation, linking up the two great centers of commerce and finance, was the culmination of a number of years of experimentation by the officials of the American Telephone and Telegraph Company, and it opened a new system of communication which has already proved to be of immense value. It has been predicted that this is only the first of a series of such around the world telephonic communication systems.



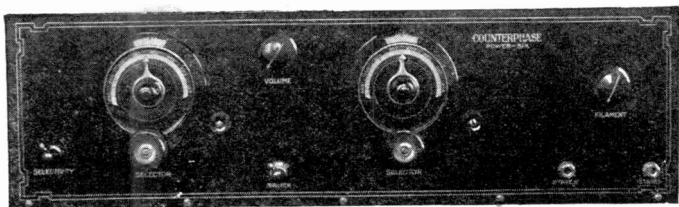
The last bank of super-power amplifiers at the Rocky Point Station consists of fifteen ten-kilowatt water-cooled tubes. They are grouped in one unit shown above.



Although the transmitting outfit at Rocky Point is by far the most powerful thus far developed, it does not take up much room nor does it appear very imposing. This is due to the fact that the tubes used generate five times as much energy as the tubes of the same size used in earlier trans-oceanic telephone experiments.



The Power Six Receiver



The new Power Six receiver is a modification and improvement upon the circuit published in the April, 1926, issue of this magazine. The new set has been tested out and found highly selective, with good sensitivity and excellent tone quality.

IF you use the same high quality parts throughout, including high grade audio transformers, you should have a receiver that will not be surpassed in tone quality, selectivity and sensitivity. All the important features of construction are thoroughly covered by diagrams and instructions in this article. We have attempted to give you herewith all the details and suggestions which our experience with this circuit during the past two years has shown to be necessary to its best construction. You will be amply repaid for the care you employ in assembling your receiver. Its performance will be governed to a certain extent by the skill and judgment you employ in its construction.

While these instructions are as complete as possible, you will find upon reading them over that they are not as complicated as they might seem at first glance.

We suggest that the instructions be read over completely, in order that you obtain a general idea of the plan of construction before taking up the matter step by step.

The Power-Six Receiver employs three stages of tuned radio frequency amplification, a detector and two stages of audio frequency amplification.

STAGES

The detector tube is the fundamental unit of all receivers. If the antenna were connected to the detector coil and the phones placed in the plate circuit, signals could be tuned in, just as in a standard one-tube set. In order to make these signals louder two stages of audio frequency amplification are added. A jack is inserted in each stage to permit use of either one or two stages of audio amplification. To still further strengthen the signal and secure sharper selection, three stages of tuned radio frequency amplification are employed ahead of the detector. Each radio frequency stage and the detector requires a tuning condenser and coil; in all, four coils and four condensers. However, two condensers are attached to each shaft in order to simplify the tuning.

PREVENTING OSCILLATION

When the tuned radio frequency stages of a receiver are tuned to the same frequency, there is a tendency to oscillate. In this set oscillation is prevented by a separate counterphase circuit in each stage. This is a special feature covered by patents. Each counterphase circuit is permanently adjusted by means of a balancing condenser to suit the tube used. The 1500-ohm resistance in series with the grid of each tube is used to keep the set equally sensitive over the broadcast band. Normally, with the ordinary connections for transformer-coupled radio frequency amplification, there is a marked variation in the sensitivity of the set from the lower to the higher wavelengths. This is due mainly to the fact that the set tends to oscillate most readily at the higher frequencies (lower wavelengths). The 1500-ohm resistance in combination with the series-variable resistance of 500,000-ohms in the B-battery lead, tends to hold the amplification practically constant over the range of

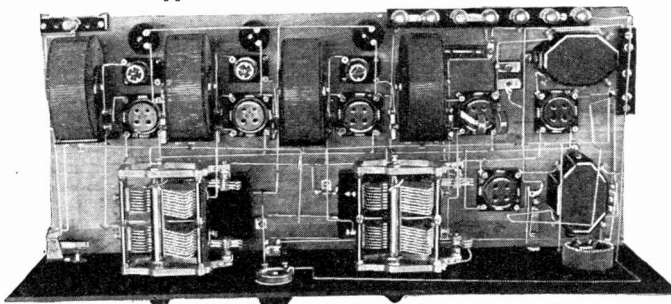
this receiver. The 500,000-ohm variable resistance is used to control volume.

Two degrees of antenna coupling are provided in order that the operator may adjust his set to the selectivity and sensitivity requirements of his own individual locality and antenna. This switch controls the amount of energy fed from the antenna into the set.

A "C" battery is used on both the radio frequency and audio frequency stages of this receiver. This materially lengthens the life of the B-batteries and improves the all around performance of the receiver.

BASEBOARD LAYOUT

Parts which mount on the baseboard should be placed according to photograph of baseboard, and small holes started for all mounting screws. All parts may now be mounted. Examine each carefully, making certain that all apparatus is in perfect condition before



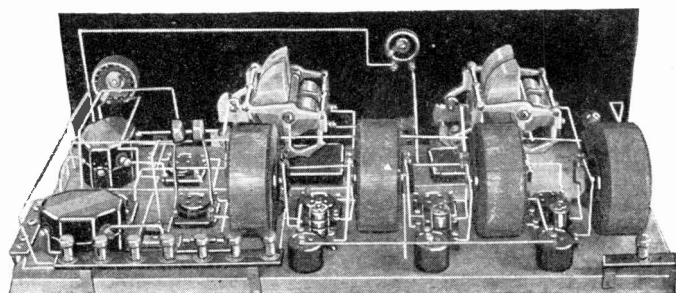
A top view of the completed set. Note that the wiring in this case was done with square bus bar, although other types may be used. The parts used in this set were furnished to us by the manufacturer, who provides them in kit form for the benefit of experimenters.

proceeding to wire. Mount the coils last. The first steps of wiring may be more easily accomplished by removing the panel from baseboard.

WIRING

In wiring the set, No. 14 tinned round bus wire should be used for best appearance and results. Acid fluxes or acid-core solder almost invariably result in corrosion and should be avoided by the amateur set builder. Rosin-core solder should be used throughout. The secret of good soldering is in using a well-tinned soldering iron which is kept sufficiently hot to vaporize the rosin and yet not hot enough to cause the rosin to carbonize. The tip of a dirty iron should be filed clean and tinned with a thin coating of solder. (Remember that it is almost impossible to solder two corroded surfaces—scrape surfaces clean.) In soldering first touch the hot iron to the connection to be soldered and then touch the junction of the iron and connection with a piece of rosin core soldering wire. If the apparatus is clean and the iron at the

A view from the rear of the Power Six receiver. The small, round cylinders in front of the toroidal coils, are radio frequency chokes. Directly behind these are the balancing condensers for neutralizing the radio frequency stages. At the left are the two audio frequency transformers, embodying a new type of design, which improves reproduction considerably. The condensers are arranged in gangs.



right temperature the solder will flow on the joint and the rosin will pass off as vapor leaving a neat, clean connection.

Before wiring the jacks, spread the terminals as far apart as possible in order to eliminate the possibility of solder running in between the springs. Soldering lugs should be used throughout the set in making connections to all pieces of apparatus on which binding posts are used. This makes possible a much neater appearance and eliminates the possibility of heating the terminals too hot and thereby disconnecting wires which may be soldered to them from the inside. Terminals are furnished with the kit for this purpose. Either binding posts or some type of plug-in connections may be used to provide the battery connections.

"C" BATTERY

It is preferable to place the "C" battery inside the cabinet or immediately outside if there is not sufficient room. Either flexible leads or separate posts may be used to provide for these connections.

CHECK WIRING CAREFULLY

Before connecting the batteries to the completed set, carefully check over all connections and then in order to be sure that no mistake has been made which would burn out the tubes, make the following test. Connect one side of the "A" battery to the terminal minus "B" and then, with the tubes in their sockets and the filament switch turned on, connect the other side of the "A" battery to each of the plus "B" binding posts or connections, one at a time. The tubes should not light; if by any chance they do light, carefully check over the circuit and locate the short or wrong connection between the "A" and "B" circuit before proceeding any further.

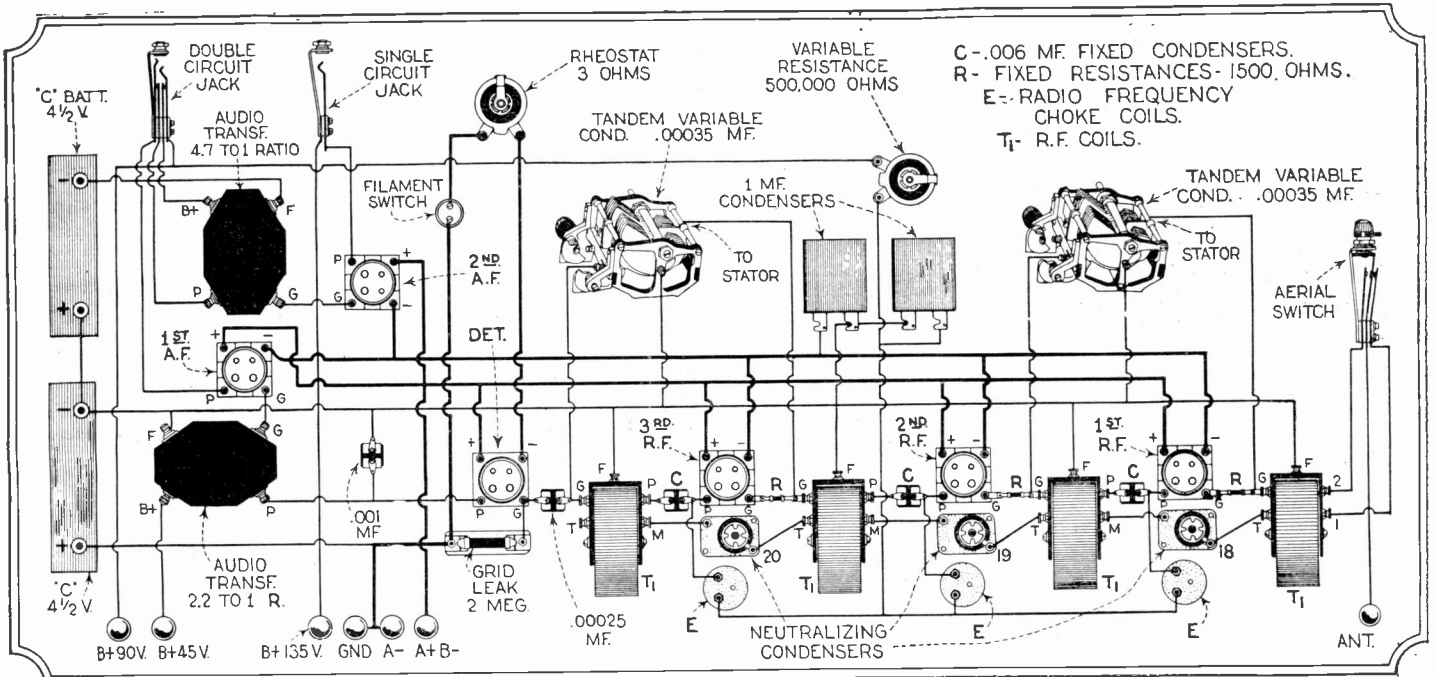
The set is now ready for preliminary tests and adjustments of the balancing condensers. Connect all the batteries properly and insert one of the tubes. Turn switch on—if tube lights properly insert all tubes. With the tubes turned on, the antenna and speaker connected, you should be able to tune in stations provided all connections have been properly made and no defective apparatus has been used.

It is well to test all the condensers and coils before and after the set is hooked up. To do this connect one end of the phones to a battery of four to six volts, and connect the other end to one of the binding posts of the coil or condenser. The other terminal of the battery should now be touched to the other binding post.

SOLDERING SUGGESTIONS

Do not use acids for soldering. Use rosin core solder or dissolve a small amount of powdered rosin in alcohol to the consistency of a paste, and apply light coating to joint. Clean all parts thoroughly by scraping if they are not already tinned.

Clean the point of soldering copper by fil-



A picture diagram of the Power Six receiver circuit. The apparatus is arranged in approximately the position each component occupies in the completed set. The gang condensers, resistance units, two switches, and jacks are mounted on the panel, all the other apparatus being fastened to

the wooden base. The constants given in the diagram above are those used by the manufacturer in the kit set, and reference to this diagram and the one given below should furnish the experimenter with enough information to enable him to assemble the set from the kit or odd parts.

ing. Rub point with solder and salammoniac or soldering acid to secure a clean coating of solder. Soldering copper must always be hot enough to melt solder instantly. Solder connections by picking up a drop of solder on the point of copper and touching the copper to point of contact just sufficiently long to flow the solder thoroughly into point.

The essentials of soldering are: First, a clean thoroughly tinned point; second, a clean or tinned contact, with a small amount of rosin flux, and third, a hot copper. The copper must not be hot enough to burn the solder coating off the point.

Do not attempt to rush or hurry wiring. Careful and thorough work will insure immediate results, while hurried or slipshod work will destroy your apparatus, and make best results impossible. Cleanliness is of utmost importance. Do not permit so-called non-acid soldering pastes or flux to spread on apparatus. Do not apply too much heat to screws or terminal posts, or you may melt the soldered connections from inside of post; a hot iron quickly applied will avoid this danger.

ADJUSTMENT OF BALANCING CONDENSERS

Adjust all balancing condensers so that the "piston" of each is about halfway down in the glass cylinder. Tune in a station of mod-

erate volume to exact resonance, that is, to exact tuning using trimmers—see "Tuning."

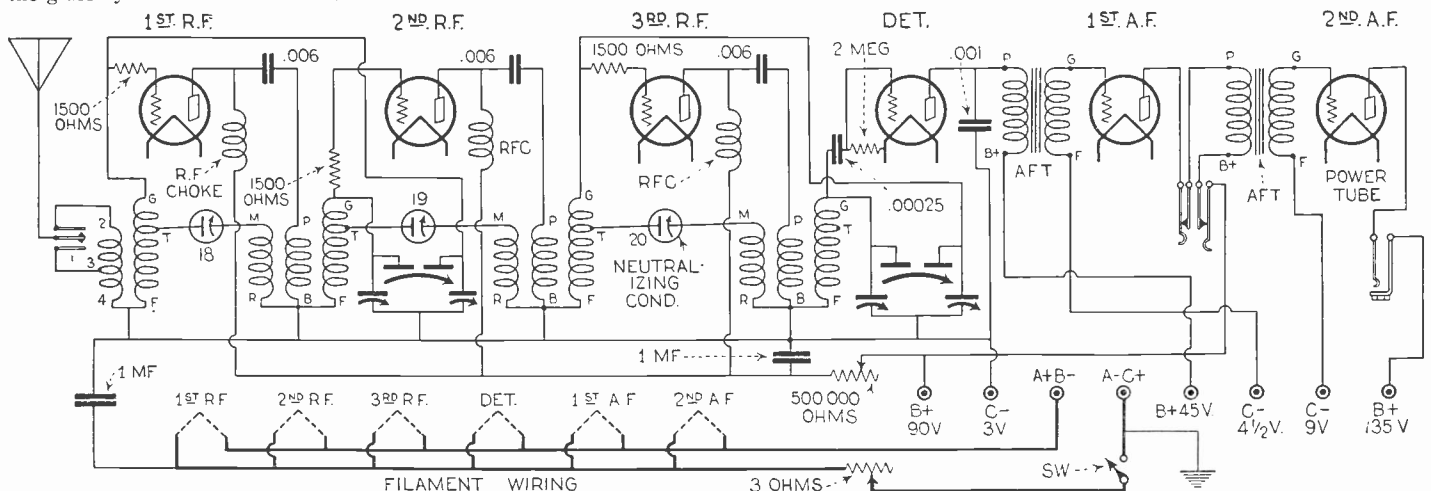
In the April, 1926, issue of SCIENCE AND INVENTION magazine we published an article on the design and construction of a six-tube radio-frequency set, which is supplied in kit form to experimenters who desire to assemble a receiving set of high efficiency at a moderate cost. Many of our readers built this set, called the "Counterphase," and from the testimony of our correspondence it would seem that the set is even more satisfactory than anticipated. The designers of the original Counterphase set have recently announced the completion of an improved modification of this set, which is also to be supplied in kit form to those who desire to build it up at home.

We have tested the new "Power Six" receiver after assembly in our own laboratory and have found it highly selective and comparable in results to any of the commercially manufactured tuned radio-frequency sets now on the market. On the accompanying pages, you will find complete instructions, with photographs and diagram, which will enable you to construct this receiver and wire it within the space of three or four hours of pleasant work.

Adjust volume control to greatest volume without oscillation. That is, greatest volume giving a clear signal and no whistle or beat when dial is rotated back and forth across signal. Disconnect either +A or -A filament connection to socket of tube No. 3 (the third R.F. tube): The signal should still be heard.

Now turn adjustment screw of the third balancing condenser No. 20 carefully and note that signal becomes weaker or disappears at a certain adjustment of it—this point is near the correct setting. Now retune right hand dial for loudest signal. Also rotate "trimmer" condenser to exact resonance. Again adjust balancing condenser to the setting which gives weakest signal or at which signal disappears. If signal remains weak or disappears over a setting of several turns, adjust to the middle of this weak or silent band. This setting is the proper permanent adjustment for this balancer. Replace the filament connection to tube No. 3. Retune the signal carefully using "trimmers."

Remove either +A or -A filament connection to socket of tube No. 2 and determine setting of the second balancing condenser No. 19 exactly as before. Retune both dials carefully before making final adjustment balancer. Signal may remain weak or disappear over a band of one or more turns of (Continued on page 1067)



The circuit employed in the Power Six receiver. In this diagram the filament wiring is indicated separately, to make the wiring job easier. Note the way that the trimming condensers are arranged, also the method of

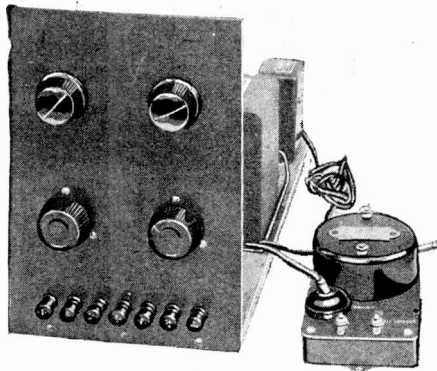
neutralization and balancing used. A switch is arranged to vary the turns of wire in the antenna circuit for greater or less coupling. One rheostat is used to control all the tubes, no fine variation being necessary.

An A-B and C Battery Eliminator

The Unit Described Supplies "B" and "C" Current and Furnishes a Source for Experimentation With "A" Elimination

By A. P. PECK, Assoc. I.R.E.

THERE is no question about it, but that the "B" battery eliminator is here to stay as an integral part of radio. True, it will never entirely replace the "B" battery, because there are thousands of homes unequipped with electric light. However, there are so many other



Front view of the complete eliminator. The automatic relay for the control of the A.C. supply and the trickle charger is at the right of the unit.

thousands that are so provided, that the "B" battery eliminator has made a permanent place for itself in the scheme of radio as it is today.

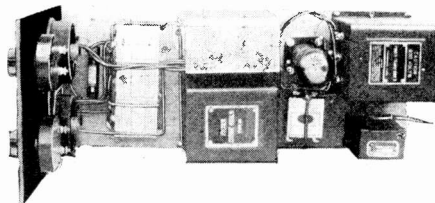
With the coming of the "B" battery eliminator, there also came an increase in the number of tubes employed in receivers. No longer was there the trouble of run down "B" batteries. Then came power amplifiers with tubes such as the UX 171 and the UX 210. Here more trouble was experienced because the eliminators that were available would not supply sufficient current to operate these tubes satisfactorily, and furthermore, a standard "B" battery had to be purchased anyway as it had to be used for supplying the grid bias to the power amplifier. Now we have with us the Raytheon BH tube,* a jack and connect the antenna and ground. Set double wave rectifier that will handle up to 85 milliamperes at 350 volts, and which provides the logical solution for the current supply to a power amplifier.

The writer has done considerable experimental work with this new type of tube and has found it to be a tube of exceptional characteristics. One of the greatest advantages and one that cannot be stressed too heavily because of its importance, is that the voltage drop through the tube does not vary when the load is changed. In other words, the only variable feature in a "B" eliminator using the type BH tube is the voltage regulation of the transformers. With a good transformer, the voltage supply to the various tubes in the receiver will be constant whether only 15 milliamperes or 85 are being drawn from the circuit. Furthermore, there is so much current available with this new tube, that with proper transformers, choke coils and filter condensers, there is the option of employing the rectified and filtered current for the operation of tubes of the UX 199 type with the filaments connected in series. You will undoubtedly hear more of this at an early date. For the present moment we will concern ourselves only with the "B" and "C" battery elimination feature.

The writer does not wish to convey the impression that all of the "C" batteries are eliminated with this unit. This is not correct, as a 4½ to 9 volt "C" battery must be used for biasing the first or the first and second

audio amplifiers, as the case may be. However, this particular arrangement does eliminate the high voltage biasing battery of 40 to 45 volts, which is necessary for the correct operation of a tube of the UX 171 type. This bias voltage is obtained in what we consider to be a rather unique method. A variable resistor is connected from the negative "B" post to another binding post which also connects to the negative out-put side of the rectifier and filter circuit. The voltage drop across this resistor becomes the biasing voltage for the power amplifier tube. This particular resistance is designated by R2 in the diagram shown in Fig. 1. The value of it will be found in the list of parts. In certain "A" elimination possibilities no "C" battery at all is necessary.

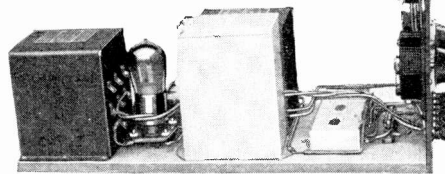
Further reference to the diagram in Fig. 1 will show that a potentiometer is used across the secondary transformer winding which supplies the current to the filament of the power amplifier tube. This potentiometer



Top view of the completed unit. Note that the circuit breaker is mounted in an upright position.

is an absolute necessity, and it must not be slighted. It is in the circuit for the purpose of balancing the alternating current supply and eliminating any possibility of hum, which might be present if the grid return through the filament and negative

Left side view. The position of the tube eliminates the necessity of long, high voltage leads from the transformer to the socket. Twisted pair leads from low voltage tap to amplifier filament.



"B" wires were to connect directly to one side of the filament supply winding. The adjustment of this potentiometer is not critical or difficult. It is merely set to the position of least hum, which will be about midway between the two end terminals, and it is left in that position.

The variable "B" voltages for the detector and radio frequency amplifier are obtained by means of the variable resistances R and R3. These should be of a well made type such as those shown in the illustrations, and must be ones that will not change in value according to any rise in temperature which may be generated by the surge of the "B" battery current. These variable resistances and also that controlling the "C" battery biasing voltage, are rather critical and must be adjusted very carefully if the best of results are to be obtained. In order to arrive at the proper adjustment, a milliammeter "A" in Fig. 1 is a necessity. When the "C" battery voltage is correct for the "B" voltage that is being applied to the audio frequency amplifying tubes, the needle of the meter "A" will not show a very great fluctuation with changes in signal strength. When the

resistance, R2, is not correctly adjusted, the needle will show violent fluctuation either up or down, according to the value of the resistance, R2.

Since it is possible that those who are interested in this particular type of eliminator, may at some time desire to experiment with an "A" eliminator, it is suggested that a milliammeter of some standard make be obtained. This meter should have a full scale of from 0 to 100 milliamperes. This will take care of all work which may be done at a later date with "A" eliminators.

Since the maximum "B" voltage delivered by an eliminator of this nature is somewhat high for the operation of the first stage audio frequency amplifier, it is suggested that the plate circuit of this latter mentioned tube be connected to the binding post marked "Plus B Intermediate." This same point will also supply the voltage for the radio frequency amplifier tubes. Then the maximum "B" voltage may be applied to the last tube power amplifier. In case three stages of audio frequency amplification such as resistance coupled or one transformer and two choke coil coupled are used, the "Plus B Intermediate" voltage should be applied to the plates of the first two audio tubes, leaving the "Plus B Maximum" voltage for application to the last or power amplifier tube.

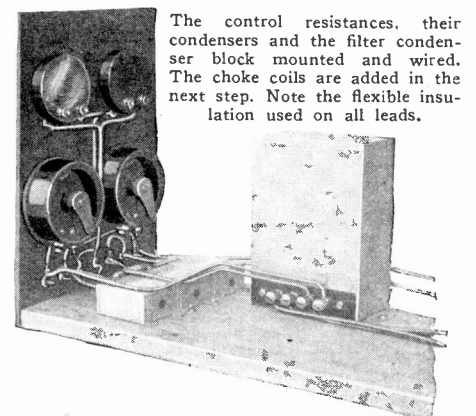
In the particular eliminator which the writer designed and constructed and which is shown in the various photographs accompanying this article, a special high voltage transformer whose secondary windings are indicated by S and S1 in Fig. 1 was employed.

The transformer used in the writer's unit had three secondary windings, one supplying in excess of 300 volts, and second the 5.5 volts for the operation of the filament of a UX 171 tube. There is also a third winding which is not used in this particular unit and which supplies 7.5 volts for heating the filament of a power amplifier tube of the UX 210 type. This of course, will be employed instead of the 5.5 volt winding when the UX 210 tube is used as the power amplifier.

The choke coils, CH and CH1, are, in the apparatus used, incorporated in a single housing and provided with convenient terminals for connecting in the filter circuit.

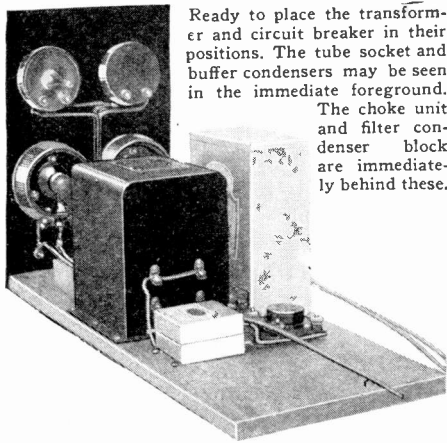
The filter condensers C2, C3 and C4 are housed in a block of the familiar type. This block has four terminals, one common, one connected to a 6-mf. condenser, and the other two connected to two 4-mf. condensers. This completes the filter system which is incorporated in only two units, thereby greatly simplifying the wiring over the older type of layout wherein separate condensers and two choke coils had to be employed.

The condensers C5, C6 and C7 have a



The control resistances, their condensers and the filter condenser block mounted and wired. The choke coils are added in the next step. Note the flexible insulation used on all leads.

*Schicklering or other filament-less tube is adaptable.



Ready to place the transformer and circuit breaker in their positions. The tube socket and buffer condensers may be seen in the immediate foreground. The choke unit and filter condenser block are immediately behind these.

capacity of 1-mf., and also assist in the filtering action. Therefore they should be of a high grade type capable of withstanding the maximum voltage found in the eliminator unit.

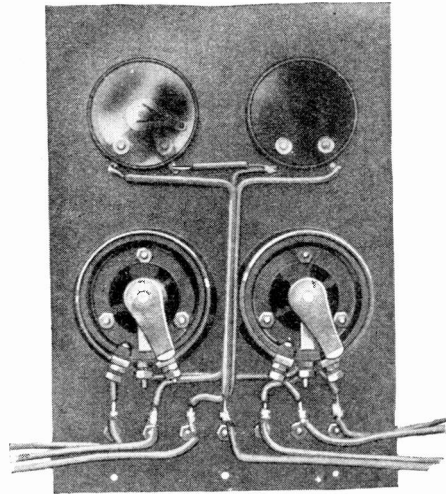
The writer believes that the layout for apparatus shown in the various photographs is about the simplest and most compact that can be employed. The baseboard is long and narrow, thereby adapting itself in an excellent manner to incorporation in a receiver that is already mounted in a console cabinet. This unit will easily fit into the battery cabinet of practically any console that is on the market today. It will be noted that the milliammeter mentioned above was not incorporated in the unit because it is a handy little instrument that is always in demand in the experimental laboratory. Therefore, it can best be mounted on a small block and provided with two flexible leads so that it will be instantly available for test purposes either on this eliminator or on any other apparatus upon which work is being done. Furthermore, these meters are rather expensive, and the average experimenter does not have more than one available.

When approaching the assembly of a comparatively compact unit of this type, it is advisable to work out the procedure beforehand. The writer found that it was best, for ease in wiring, to mount the parts on the base in the order of use in progress of wiring, rather than to mount them all in position and then proceed. The photographs illustrate the method very well. The control panel was first drilled and the variable resistances and the binding posts mounted on it. These were wired as shown in the rear view of the panel. This was then fastened to the base with wood screws and the 1-mf. condensers and the fixed resistor mounted in place. The wires from the panel were extended to these parts and soldered in their proper places. Then the filter condenser block was mounted and wired. The chokes in their unit case came next; then the buffer condensers and the socket and finally the transformer and the automatic cut-out.

Because of the fact that an eliminator of this or any other type has wires carrying high voltages, it is not advisable to use bare wire in hooking it up. Rather, rubber covered wire, about number 16 in size should be employed.

It is obvious that trouble can arise if connections from the eliminator to the set become mixed up. Therefore, it is strongly recommended that engraved binding posts only be used. They should be of the type from which the heads cannot be removed because if these are not employed, there is a possibility that some of the tops may be taken off when attaching wires, and then become mixed up when replaced. It is little precautions of this nature that make it possible to avoid disastrous accidents when working with power apparatus.

A word must be said about the automatic circuit breaker indicated by "X" in the diagram in Fig. 1. The incorporation of this little unit in any battery eliminator is an advantageous feature. It does away with the necessity of protective fuses, and at the same time can be used as a manually operated switch. It has the advantages of both the circuit breaker and the switch. Set to release at 3 amperes current flow, it will im-



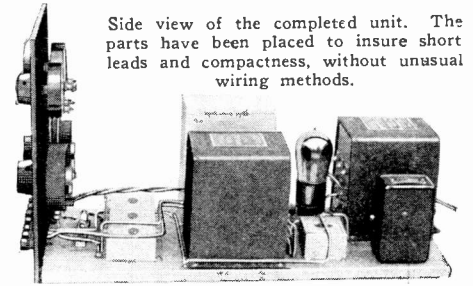
Back view of the control panel. The values of the variable resistances are given in the text. The binding posts provide for all the connections to the set.

mediately open the AC circuit if anything should go wrong in the eliminator. Thus it not only prevents any accident in the circuit, but also protects the fuses in the house lighting circuit. When this circuit breaker flips open due to an overload, investigate immediately and when the trouble has been detected and fixed, it is only necessary to press a small button on the side of the circuit-breaker and resume operation. Pressing the button on the opposite side of this little instrument causes it to actuate a

switch and open the circuit of the AC line.

A list of the parts used in the writer's eliminator follows. Those who desire more specific information or a list of the names of the manufacturers will be supplied with such upon request.

X—Circuit Breaker.



Side view of the completed unit. The parts have been placed to insure short leads and compactness, without unusual wiring methods.

- P, S & SI—Special in-put transformer.
- C & C1—1-mf. buffer condensers.
- RT—Type BH Raytheon tube.
- CH & CH1—Double choke coils in single housing.
- C2, C3 & C4—4-mf., 4-mf. and 6-mf. respectively, in single block.
- R—0 to 100,000-ohm variable resistor.
- R1—10,000-ohm fixed resistor.
- R2—400-ohm potentiometer.
- R3—0 to 50,000-ohm resistor.
- R4—400-ohm potentiometer.
- C5, C6 & C7—1-mf. fixed condensers.

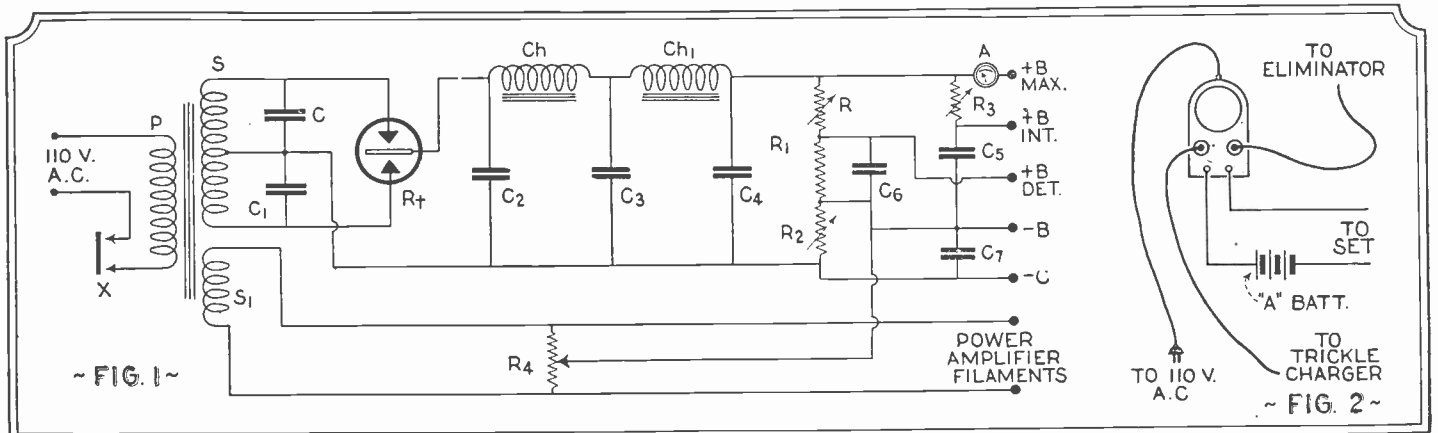
The other parts necessary for the construction of this eliminator are a baseboard, a small panel for mounting the various instruments, any type of cabinet desired for housing the unit, a quantity of No. 14 or No. 16 soft rubber covered wire, and the necessary machine screws, wood screws, lugs and solder.

It must be noted in the construction of this eliminator, that all of the instruments are shielded from each other by the metal cases. These cases should all be connected together and connected to the negative "B" battery wire.

In the photograph of the front panel of the eliminator, a relay device is shown. This is for the purpose of automatically controlling the "B" eliminator and a trickle charger for the storage battery. With an instrument of this type, no special switches are necessary. It is hooked up as shown in Fig. 2 and when the filament switch on the set is closed, the relay connects the eliminator to the AC line and disconnects the trickle charger. When the regular filament switch is opened, the eliminator is disconnected from the line and the trickle charger goes into action.

TOOL LIST

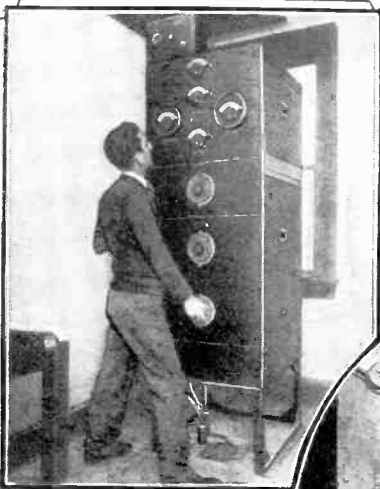
- Screw Drivers, several sizes. Reamer for panel holes. Pliers, several kinds. Hand Drill. Twist Drills, several sizes. Hammer. Center-Punch. Scriber. Hack-Saw. Soldering iron (Electric preferred.) Wire Solder, self-fluxing or other kind. Files, several.



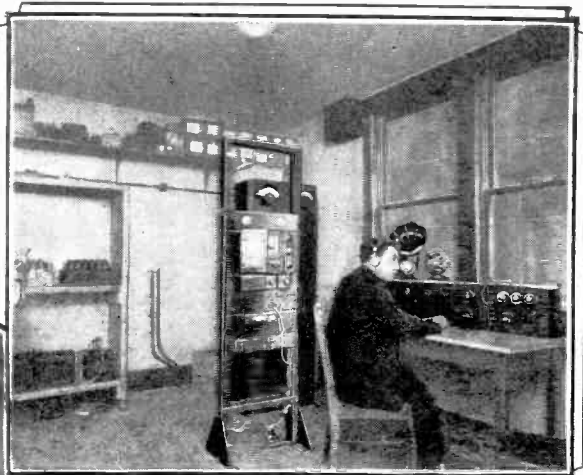
The circuit given here was designed essentially for use with the Raytheon tube, but any one of the similar types on the market, such as the Schickering, may be employed if desired. The circuit is standard except for

the power amplifier filament arrangement, which is explained in detail in the text of this article. High resistance voltmeters are needed in testing this or similar types of eliminators for output.

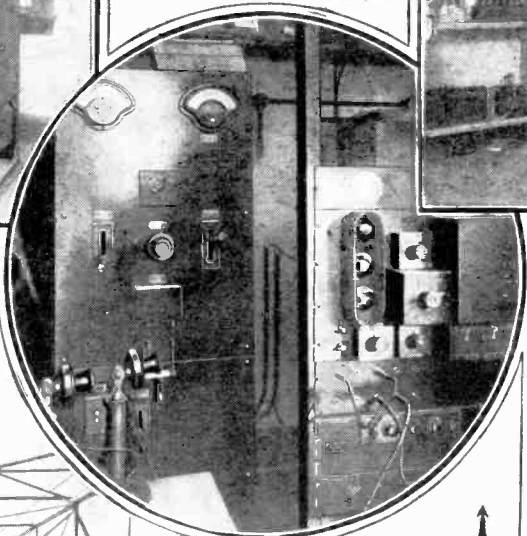
WRNY's New Transmitting Station



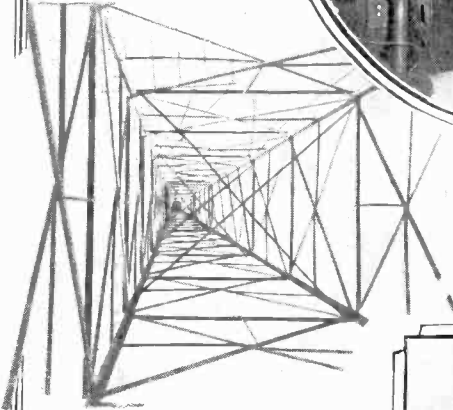
The remote-control station shown here, in interior and exterior views, is located at Coytesville, N. J., opposite the upper end of Manhattan Island. Programs are received by land-line from the studio in New York. At the right is the receiver for detecting "SOS" calls. This watch is always maintained during transmission periods.



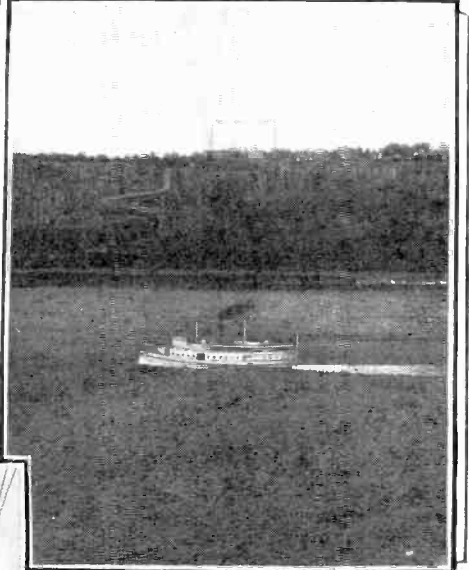
One of WRNY's operators is shown making a preliminary adjustment upon the transmitter. The wavelength of this is varied by the condenser and variometer controls shown.



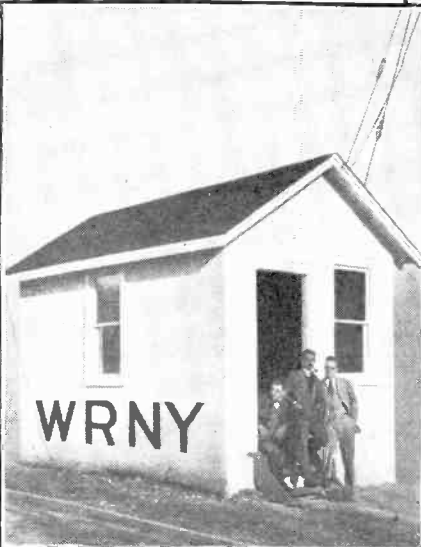
Above, at the left, appears the control panel for the motor-generator set, which furnishes power for the transmitting tubes; while at the right is a close-up view of the speech-amplifier panel.



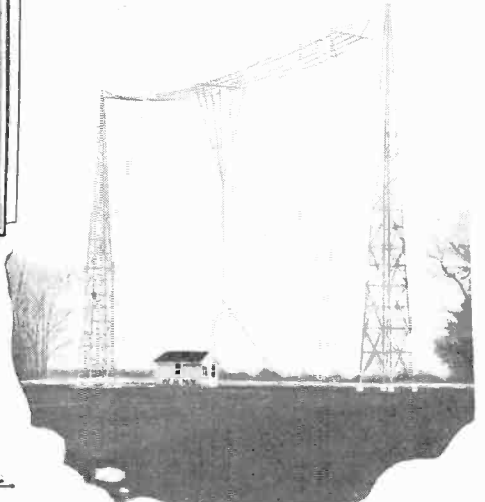
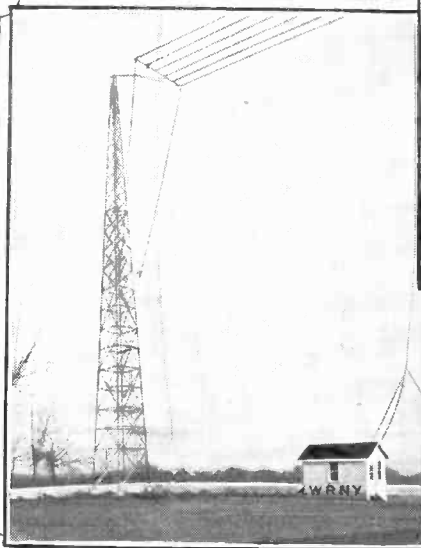
This steel spider web is what you would see on looking up the interior of one of WRNY's masts, which are 127 feet high; they are of the latest type of construction and braced to withstand high winds, because of their exposed position on top of the Palisades.



The WRNY antenna as it appears from the New York side of the Hudson River. The cliffs are about 425 feet high, thus bringing the aerial to about 550 feet above the water level.

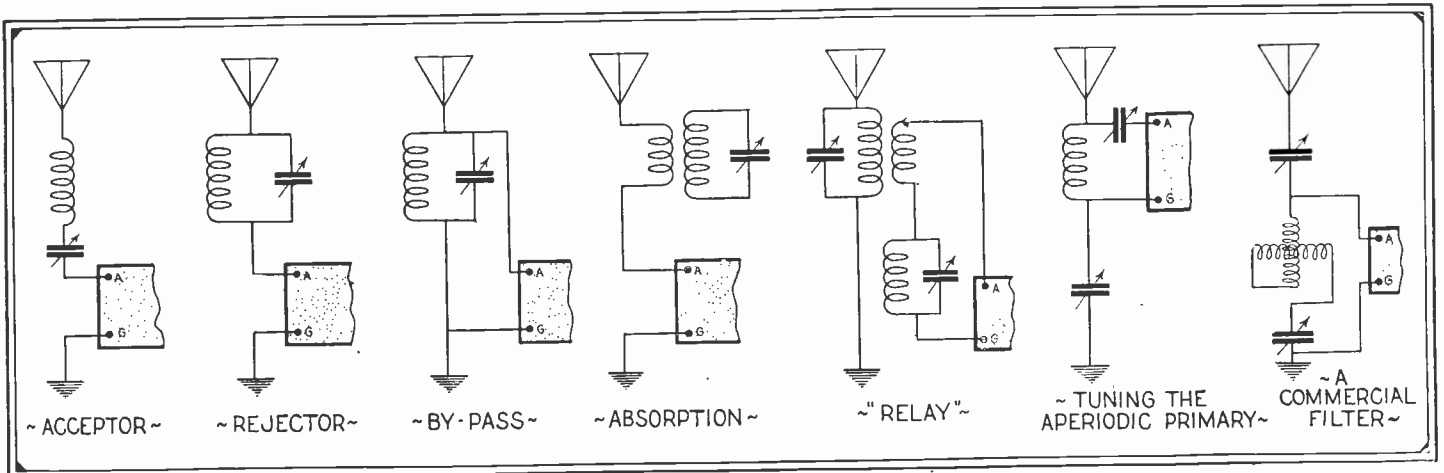


Above, in the doorway of the "shack," is the station force of WRNY. The other two views of the antenna and station, at the right and left, show the manner of suspension of the flat-top aerial and the lead-in. This antenna installation is the highest one in the New York Metropolitan district, and some remarkable reception has been reported by foreign listeners since the change.



RADIO ORACLE

In this department we publish questions and answers which we feel are of interest to the novice and amateur. Letters addressed to this department cannot be answered free. A charge of 50c. is made for all questions where a personal answer is desired.



The seven circuits illustrated in the diagram above cover the basic principles used in the design of interference eliminators or wavetraps. It will be found that each type is best suited to a condition, and a judicious selection is

possible only after a reasonable amount of experimentation. In most cases the absorption filter will be found sufficiently practical for use in all but the most congested localities.

ANOTHER B BATTERY TRANSMITTER

(527) C. Ferber, Santa Monica, Calif., asks: Q. 1. Will you please recommend a radio telephone circuit using receiving tubes and dry cell B batteries?

A. 1. You will find on this page a circuit diagram of a type of transmitter which has been tested and found very satisfactory for the medium wavelengths. We do not recommend this circuit for short-wave work, and we find a modified Reinartz circuit to be best for the new short-wave experiments. You will notice that the transmitter uses two of the 210 type tubes, which are rated at about 7½ watts output. You will find these tubes of about equal efficiency to the 5 watt tubes formerly used. In the diagram, the modulation transformer, M, may be any one of the commercial makes, or it may be simply a telephone induction coil connected as shown. The choke coil indicated at X need not necessarily have a value of exactly 6 henries, but it should not be smaller than this figure. The oscillator system, consisting of Coil L₂ and Condenser C₂, of the simplest design practical, and the constants of these parts depend entirely upon the wavelength range over which the set is intended to operate. The same is true of the coil L₁, and the variable condenser C₁, used to tune the antenna circuit. As the circuit is arranged here, a tap on the C battery is taken for the microphone circuit. You may find that an electromagnetic pick-up will work better than a carbon microphone in this case. Such a pick-up may be improvised by connecting a cone loud talker through an audio-frequency amplifier to the input side of a modulation transformer, such as that used in this diagram.

ELIMINATOR TRANSFORMER

(528) Mr. Edwin Thompson of Wichita, Kansas, asks:

Q. 1. For the dimensions of form and winding required for B-battery eliminator, Transformers and Filter chokes.

A. 1. Core built up of L-strips in shape of square. Outside dimensions 2½"x3½", inside ¾"x1¾". Winding on one leg. Core ¼-inch square.

Primary 1140 turns No. 28 enamelled copper wire. Tap at 910 turns.

Secondary 4200 turns No. 31 enamelled copper wire. Tap at center.

Wound in layers with .0015 in. paper between layers.

Electrostatic shield between primary and secondary (.005 copper).

Core material is Apollo special electrical steel No. 29 gauge. Laminations are assembled to give staggered air gaps.

Primary d.c. resistance is approximately 25 ohms.

Secondary d.c. resistance is approximately 300 ohms, total.

Two halves of secondary should be balanced for voltage output at full load output within two per cent.

Choke Coils. Core ¼ in. square.

5800 turns No. 28 enamelled copper wire on each coil.

D. C. resistance of each coil is approximately 190 ohms.

Laminations are assembled to form a butt joint, with .003 in. insulated air gap.

Two choke coils required for each eliminator circuit.

B-BATTERY ELIMINATOR

(529) E. B. Lupton, San Francisco, Calif., asks: Q. 1. For technical information concerning the "B" battery eliminator described in the May, 1925 issue of this publication.

A. 1. The following data is correct for the various instruments to be used in the construction of the "B" battery eliminator that you mention.

The core of the transformer is constructed of silicon steel strips .014 inches thick by 1½ inches wide. The outside dimensions of the core are 5 inches square and the legs should be built up to 1½ inches high.

The 110 volt primary consists of 384 turns of No. 22 D.C.C. wire, wound 48 turns per layer in 8 layers. The secondary consists of 980 turns of No. 26 D.C.C. wire, wound 65 turns per layer in 15 layers. A center tap is brought out at the 490th turn to be connected as shown in the diagram in this magazine. In the above data, space is allowed at the ends of the windings for supports for the same. Both coils should be well insulated from the core and may be wound on opposite legs.

The electrodes of the rectifier are made of lead and aluminum plates as indicated in the article. They may be 1 inch wide by 3 inches long with an additional length allowed for projection above the surface of the liquid. The latter may consist of a saturated solution of ammonium phosphate or borax in water. The surface should be covered with a ¼-inch thick film of mineral or paraffin oil to prevent evaporation. The electrodes should be thoroughly sandpapered before being placed in the solution.

The 2-mf. condenser may be purchased from any radio or telephone supply house or possibly from your local telephone company.

INTERFERENCE ELIMINATION

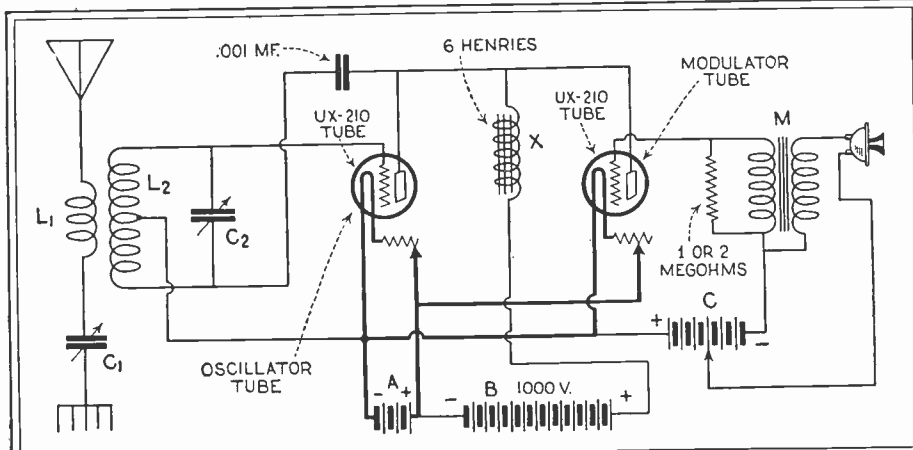
(530) Q. 1. Mr. A. L. Brown, New York, N. Y., writes us for information regarding the elimination of interference in the congested districts of the metropolitan area.

A. 1. At the head of this page is shown a series of diagrams illustrating the best approved methods of eliminating undesired signals. The first diagram shows an "Acceptor" circuit, where the auxiliary coil and condenser are tuned to the wanted signal, thus tending to raise it above the interference level. The second coil and condenser in parallel "reject" the undesired signal by trapping it and preventing it from energizing the antenna circuit of the set. The third circuit by passes the undesired signal to the ground, while the primary circuit of the set may tap off any desired frequency. The fourth, "Absorption" circuit, utilizes the principle of the fourth circuit in the Cockaday set, in vogue a year or so ago. The fifth is a "Relay" circuit, where the antenna is tuned and an intermediate trap is used between the receiver and antenna circuit. The sixth circuit illustrates one of the most efficient methods of tuning a set which is equipped with an aperiodic primary. The seventh circuit is that employed by the designers of a commercial filter called the "Filterola." The makers claim that the signal is amplified, with the usual elimination of undesired frequencies. For the broadcast wave lengths the coil and condenser used in these trap circuits may conform in each case to the following specifications: The coil, 55 turns of No. 26 double silk covered wire on a 3-inch form; the condenser, .00035 or .0005 mfd. low-loss variable. The better the construction of the coil and condenser, the better the results to be expected.

RECTIFIER SOLUTION

(531) Q. 1. Mr. George Smith, Philadelphia, Pa., inquires for the proper method of preparing the solution for an electrolytic rectifier of the lead-aluminum type.

A. 1. The solution used in the type of cell you mention is generally specified as a "Saturated Solution of Borax in Water." In the first place, a "saturated" solution is one in which the greatest possible amount of solid material has been dissolved. In this case it is done as follows: A quantity of water is heated to a temperature somewhat below boiling. To this water is added borax (obtainable at any grocery store) until the excess of borax begins to collect at the bottom of the container in the form of a white powder. The solution must be stirred constantly to insure the dissolving of as much borax as possible. The solution should be allowed to stand over a period of time necessary to dissolve as much borax as possible. This gives a saturated solution. After all the solid has settled, the liquid should be siphoned or decanted off and used in the rectifier cell. Due to evaporation, the liquid will have to be replaced occasionally.



Compact low power transmitters seem to interest a large number of our readers, so we are publishing another diagram suitable for this type of work above. Note that a B battery voltage of 1000 is used. This is the maximum for the 210 type tube, but less may be used if desired.

Scientific Humor

NOT DUNNINGER

JIM: "Wasn't it funny last night the way that magician fired the pieces of your watch from his pistol and then found the whole watch in my pocket."

WILL: "No, it wasn't funny. He hasn't given my watch back yet."—*John H. Spicer.*

HORSE SENSE

VISITOR: "What are you drawing? Old top."

ARTIST: "A horse and buggy."

VISITOR: "I see the horse but where's the buggy?"

ARTIST: "Oh well! The horse has to draw that."—*E. L. Bruce.*

ECONOMY PLUS



VICTIM: "You've pulled three teeth! I only wanted one pulled."

DENTIST: "Yes, I kno-o-o-w. You see, we gave you a bit too much gas and it would have been a shame to have wasted it."—*Robert W. Heaney.*

FENDERS NEEDED

SLUSH: "Walking near the curb this kind of weather is risky business."

SLOSH: "Yes, you have to be constantly on your mudguard!"—*Henry A. Courtney.*

A FISHY GROWTH

TOMMY: "Do fish grow very fast?"

BILLY: "I should say! Father caught one once and it grows about six inches every time he mentions it."—*Erne Benn.*

AN ECONOMICAL SCOTCHMAN

Recently a Scotchman was walking through Detroit carrying a pair of pants on his arm. A policeman, well known for his alertness, noticed him scanning the buildings on both sides of the street and seeing the individual acting so suspiciously, the policeman called, "What are you prowling around here for, with those pants on your arm?"

The Scotchman replied indignantly, "I'm looking for the DETROIT FREE PRESS."—*Harold F. Reed.*

BOILING BOYLES

SCIENCE TEACHER: "We have some dumb Doras in our Chemistry Class."

PRINCIPAL: "Why do you say that?"

SCIENCE TEACHER: "One girl is so dumb that she thinks Boyle's Law is a new method of cooking."—*Russell D. Miller.*

First Prize \$3.00
DAMP AND DANGEROUS

Mrs. Pryde told the cook that her husband had gone to Canada to study hydro-dynamics.

"And what may that be?" asked the honest and ignorant cook.

"It is the science of moving liquids," explained Mrs. Pryde.

"Sure and there's many a good man in jail today for knowin' too much about that science," asserted the cook.

—*H. M. Strong.*

WE receive daily from one to two hundred contributions to this department. Of these only one or two are available. We desire to publish only scientific humor and all contributions should be original if possible. Do not copy jokes from old books or other publications as they have little or no chance here. By scientific humor we mean only such jokes as contain something of a scientific nature. Note our prize winners. Write each joke on a separate sheet and sign your name and address to it. Write only on one side of sheet. We cannot return unaccepted jokes. Please do not enclose return postage.

All jokes published here are paid for at the rate of one dollar each, besides the first prize of three dollars for the best joke submitted each month. In the event that two people send in the same joke so as to tie for the prize, then the sum of three dollars in cash will be paid to each one.

THEY MIGHT TRY THEM ON LEAGUE BASEBALLS



JACK: "Do you know that 16,842 elephants were used to make billiard balls last year?"

SMACK: "You don't say! My Gosh! Isn't it wonderful how such big beasts can be taught such exacting work?"—*Max Hammerman.*

SCIENY SIMON, SCIENTIST!

TAP IT AND SEE!

A stranger in town was inquiring about various things, when he spied a sign reading: "Tap and Die Factory."

"What could possibly be manufactured there?" he asked.

The Village Wit replied, "Why Dynamite, of course."

A TWISTED PROPOSITION

PEGGY: "See that fellow going down the street? Well he cleaned up a big fortune in crooked dough."

REGGIE: "What, Bootlegging?"

PEGGY: "No, pretzel manufacturing."—*Joseph Wallace.*

BASS TONES

ANSWERS TO CORRESPONDENCE EDITOR:

"Here's a fellow who wants to know what instrument produces foot notes."

SPORT EDITOR: "Tell him a shoe horn."—*James Gray.*



REACTION

"They poured acid down the villain's throat, They poured it down his face, But he neutralized it to a salt, The villain was so base."—*Jack Weiland.*

ELEMENTARY

CHEMISTRY PROF: "Henry, can you tell the class what Barium is?"

HENRY (sleepily): "Sure, Barium is an undertaker's motto."—*Clelland J. Ball.*

START YE?

The Professor had been talking to the Botany class on the manufacture and storage of foods in plants.

"Now, Mr. Green," he asked, "can you tell me the name of a common plant that stores starch, and where it is stored?"

Freshman Green awake: "Why—er—A laundry plant, sir, stores starch in collars and cuffs."

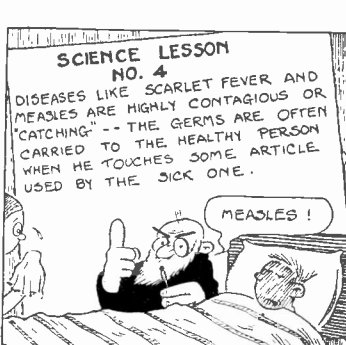
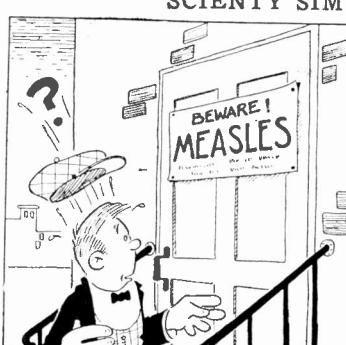
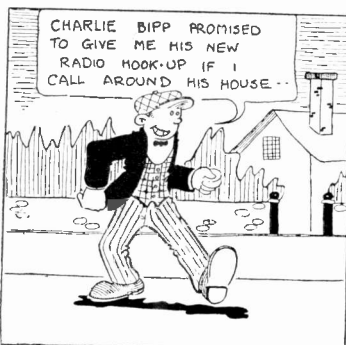
To make a long story short, the Professor collared the boy, gave him a cuff, and said, "Watch out how you starch ya (start your) funny stuff."—*Henry Baker.*



MATHEMATICALLY SPEAKING

SECOND COOK: "Did you expect me to scrape those fish you just disemboweled?"

FIRST COOK: "Sure, they are drawn to scale."—*James Gray.*

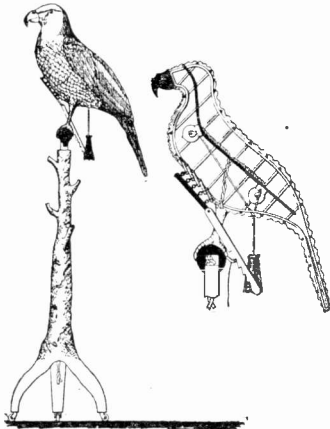




LATEST PATENTS

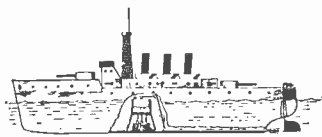


FLOOR LAMP DESIGN



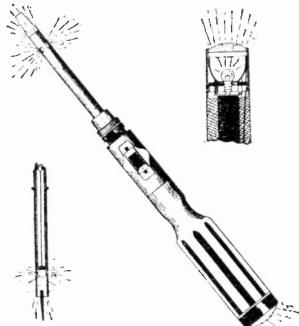
1,606,354 issued to J. N. Fillion. The lamp design illustrated above is arranged so that a series of shutters may be opened or closed to permit more or less light to be emitted from the lamps placed within the body of the bird. This control of light makes proper illumination for reading purposes very easy to obtain. The patent does not limit the design of the shade to that shown here.

TOY STEAMBOAT



1,607,670 issued to L. Gennusa. This patent covers the design of a toy which should appeal to every child with mechanical inclinations. Steam, generated by heating water in a small boiler over a solidified alcohol flame, is caused to propel the boat forward by reacting against the water at the stern of the boat.

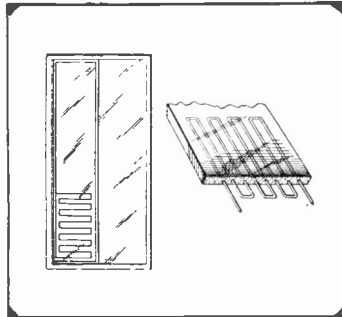
ILLUMINATED SCREW DRIVER



1,603,985 issued to J. Rosenberg. The screw driver illustrated above is arranged with two separately controllable lights, one of which illuminates the area about the tip of the screw driver, the other light being in the end of the handle for use in lighting up the field of operation. The battery is contained in the handle.

SLEET-PROOF WINDSHIELD

1,606,526 issued to W. D. Graham. A coil of wire moulded into the glass of an automobile windshield, to heat it so that sleet and snow will not collect, but will be melted so that the driver's vision will not be interfered with.



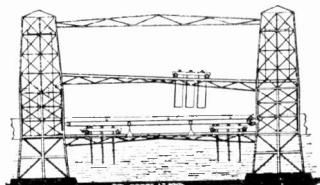
EXERCISING APPARATUS

1,585,748 issued to A. C. Wendelken. For those who are sufficiently interested in physical culture to turn on the radio for the 6:30 A. M. setting up exercises, the device illustrated below should prove a boon. The victim is expected to stand on a table which is free to move in any direction that fancy dictates, while he hangs to the loops above him and gyrates ecstatically in all directions. If some such apparatus as this is used, space is conserved.

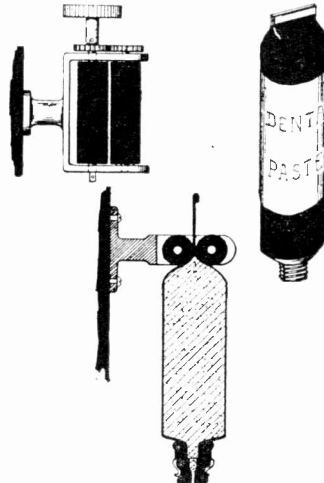


WATER POWER GENERATOR

1,608,373 issued to N. Dell. A very clever idea for utilizing the power of running water to generate electrical energy is illustrated below. A number of cars are caused to move back and forth across the stream by reversing vanes suspended in the water.

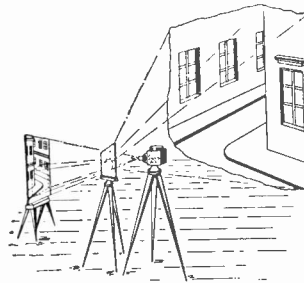


TUBE SQUEEZER



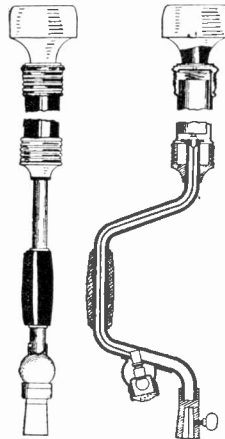
1,605,914 issued to M. R. Bishop. There are a number of devices filling this need now on the market, but it is hard to remove the emptied tube from all of them. This is the first one we have seen which seems to be practical.

TRICK MOVIES



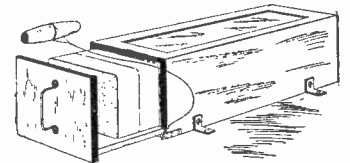
1,606,483 issued to E. Schufftan. The effects obtained by clever photographers are a source of wonder to most movie fans. Here is one of the methods used in a well-known European studio to produce a special effect by photographing the images of a painting and a full-sized scene in one mirror.

ILLUMINATED BRACE



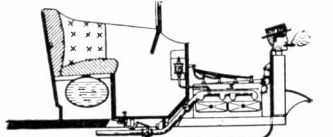
1,606,986 issued to J. Rosenberg. The brace illustrated at the end of the foregoing column has an electric light fastened to one side of the arm so that the bit will be illuminated when drilling in dark corners. It is sometimes quite desirable to have the working space well lit up to prevent making errors in drilling holes which must register.

CHEESE SLICING MACHINE



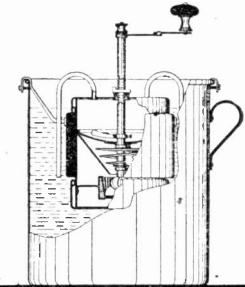
1,595,097 issued to C. H. Howell. This device is adaptable to use in cutting butter, cheese or any similar material. A wire is fastened to one side of the base, and is caused to cut the material by pulling upon the handle at the free end. Perhaps this method could also be used for cutting bread.

ADVERTISING DEVICE



1,607,336 issued to G. H. Conners. This patent takes the form of a head or other more or less decorative device used as a radiator cap ornament, with a pipe or imitation cigar connected to the exhaust pipe. The idea, of course, is to attract the attention to a slogan.

COFFEE MAKER



1,604,058 issued to H. Mager. The drawing above illustrates a machine for preparing coffee from the bean. The coffee is first ground in an inner cylinder, roasted by dry heat obtained from electrical coils, and then boiled or percolated in an outer chamber. The vapors given off in the roasting process are introduced into the boiling chamber, where they are combined with the liquid coffee to add an aroma otherwise lacking.

NOTICE TO READERS. The above illustrated and described devices have recently been issued patent protection but are not as yet to our knowledge available on the market. We regret to advise that it is impossible to supply the names and addresses of inventors of the above devices to any of our readers. The only records available, and they are at

the Patent Office at Washington, D. C., give only the addresses of the inventors at the time of application for a patent. Many months have elapsed since that time, and those records are necessarily inaccurate. Therefore, kindly do not request such information. —EDITOR.



THE ORACLE



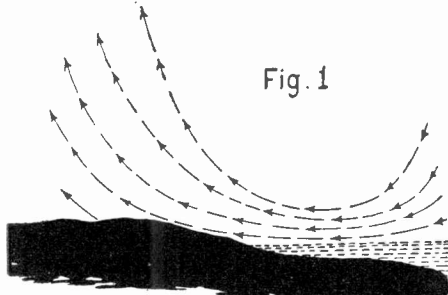
The "Oracle" is for the sole benefit of all scientific students. Questions will be answered here for the benefit of all but only matter of sufficient interest will be published. Rules under which questions will be answered:

1. Only three questions can be submitted to be answered.
2. Only one side of sheet to be written on; matter must be typewritten or else written in ink; no penciled matter considered.

3. Sketches, diagrams, etc., must be on separate sheets. Questions addressed to this department cannot be answered by mail free of charge.
4. If a quick answer is desired by mail, a nominal charge of 50 cents is made for each question. If the questions entail considerable research work or intricate calculations, a special rate will be charged. Correspondents will be informed as to the fee before such questions are answered.

LAKE AND SEA BREEZES

(2157) Mr. Theodore Weaver, Chapel Hill, N. C., asks:
Q. 1. Please explain the cause and effect of lake and sea breezes.



The action of convection currents in causing air movements from the water to the land is illustrated by the drawing above.

A. 1. To account for these breezes the causes for the movement of air need to be recalled. One cause is the difference in temperature. When air is expanded by heating, it becomes lighter; that is, a cubic foot of it weighs less, because the amount of air that occupied a cubic foot of space before it was heated has expanded. If next to the warm air there is a quantity of colder and heavier air, this colder air will tend to flow in under the warm air and lift it up. This is what happens in the vicinity of a stove or radiator, where the cool air is continually flowing toward the stove, where it is warmed and in turn displaced by the other cool air, thus making a continuous current.

The same thing occurs along a shore. In summer the land is much hotter than the water, at least while the sun is shining. Like the stove, the land heats the air which is over it until this air becomes so light that the heavier air above the water begins to flow out over the land, crowding the warm air upward (see Fig. 1). The air from the water becomes heated as it flows across the land, and rises as it is displaced by more air from the lake. Thus there is a continuous flow of air across the shore line from water to land as long as the land is hotter than the water, excepting when local breezes are counteracted by stronger and more general movements of the air. The breeze gets well started about the middle of the forenoon, the time the land ordinarily becomes heated. During the night the land may be cooler than in the daytime; sometimes so much cooler than the water that the air flows from the land to the water, but this land breeze is much less noticeable than the water breeze.

The more rapid heating of the land is due, first, to the fact that it is not transparent. All the heat of the sun is received on the surface of the land, and the upper few inches are very rapidly heated, while the lower parts receive the heat slowly. Indeed, so slowly is heat transmitted to the deeper layers of the soil that at a depth of a comparatively few feet the temperature does not change either in summer or winter. On the other hand, the sun's rays penetrate into the water to a considerable depth (see Fig. 2) the exact distance depending on the clearness of the water. If the water is clouded by sediment, the rays of the sun do not penetrate very far. A second reason is that since a greater proportion of the sun's rays are reflected from the water than from the land, much of the heat is reflected also and does not actually enter the water. A third reason lies in the fact that water moves easily. Waves and currents mix the warm surface waters with the cool deeper layers, thus scattering the heat widely. For these reasons, although as much heat will be received upon a square foot of water as of land, the water is not heated so highly.

The fourth and most important reason is found in the effect of a given amount of heat upon different substances. If a kettle of water and a flatiron are placed on the kitchen range at the same time, the iron will be heated more rapidly than the water. If a pound of iron and a pound of water are placed on the stove and exposed equally to the heating surface, it will be found after a short time that the iron is much hotter

Science and Invention

CORRESPONDENT REPORTER'S IDENTIFICATION

NO. 10000

L. H. Shackner

THE BEARER OF THIS CARD IS AN AUTHORIZED CORRESPONDENT-REPORTER OF SCIENCE and INVENTION MAGAZINE THE PUBLISHERS OF SCIENCE and INVENTION WILL APPRECIATE ANY COURTESY EXTENDED THEIR REPRESENTATIVE.

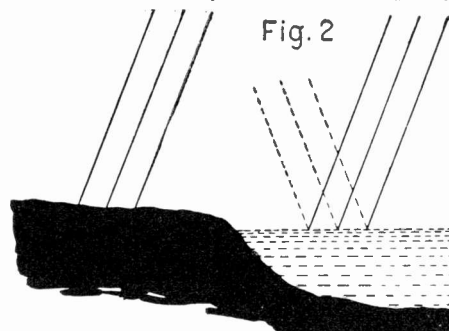
EXPERIMENTER PUBLISHING CO.

Hiram C. Ball, PRESIDENT

IN ORDER to present to the public the very latest scientific details, SCIENCE and INVENTION maintains a large staff of held reporters. Any one of our readers is eligible to join this staff and, upon request, a reporter's card will be forwarded, together with complete instructions for gathering material. The reporter's card is illustrated above, and its use will gain admittance to many places that would otherwise be closed to the ordinary person. You need not have any special ability to obtain one of these cards other than a desire to help others to gain knowledge.

Address Field Editor, SCIENCE and INVENTION.
Submitted manuscripts cannot be returned unless accompanied by postage.

than the water. The same amount of heat has much less effect on the water than on the iron, so far as raising its temperature is concerned. The



A great portion of the sun's rays falling on water is reflected at the surface and causes but little heating.

amount of heat which will warm a pound of iron 1° C. will warm a pound of water only 0.11 of 1° C.; that is, it takes over nine times as much heat to produce a given temperature in the same weight of water. There are so many kinds of soil that if we were to use soil instead of iron for this experiment, the results would vary widely.

The land cools more rapidly than the water. As it is necessary to put more heat into water than into land in order to raise its temperature a given amount, so the water gives off this larger amount of heat when it cools. Furthermore, as water cools it gives off its heat slowly, and since much of the heat is in the deeper parts of the water, it is not readily given off. We may therefore expect that any body of water will be cooler in summer than the neighboring land, at least during the day time and while the sun is shining, and that breezes from water to land may remain much warmer than the land.

MAXIM SILENCER

(2158) Joe E. Tell, Eagle Pass, Texas, asks:

Q. 1. Please give an explanation of the operation of a Maxim silencer to be used on small fire-arms.

A. 1. In general, the principle underlying the operation of a Maxim silencer such as used for rifles or revolvers is as follows. The device consists of a series of circular plates through the centers of which holes are pierced, large enough to

allow the passage of the bullet. There are also other holes pierced through the peripheries of the rings and the plates are so located that they impart a whirling motion to the gases. The latter are then retarded in their progress and do not burst from the barrel of the gun with the rapidity that they do when no silencer is used. In other words, after the bullet has reached a certain place in its travel, that is, some point in the silencer itself, the explosive force of the gases is reduced by means of this whirling motion and therefore the noise that would otherwise be generated is also reduced.

RECLAIMING OIL

(2159) James J. Williams, Dunlap, Mo., asks:

Q. 1. Can you give me a method of reclaiming crank-case oil by the use of sodium silicate?

A. 1. Relative to your query in regard to details of the process of the reclamation of crank-case oil by sodium silicate, we would refer you to a well-known American concern, who are the largest producers of sodium silicate (water glass) in this country, and who have a particularly developed brand of silicate for use in reclamation. Name furnished on request.

We understand they have recently issued a pamphlet on the process and its details. In general the oil is mixed with the silicate and heated to 80 deg. Cent. and agitated. The particles of impurities, sludge, etc., mix with the silicate solution and settle with it to the bottom, leaving the clean oil at the top.

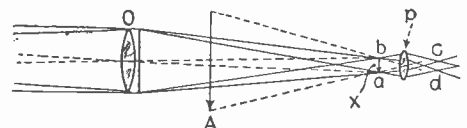
THE TELESCOPE

(2160) John S. Hart, Brooklyn, N. Y., asks:

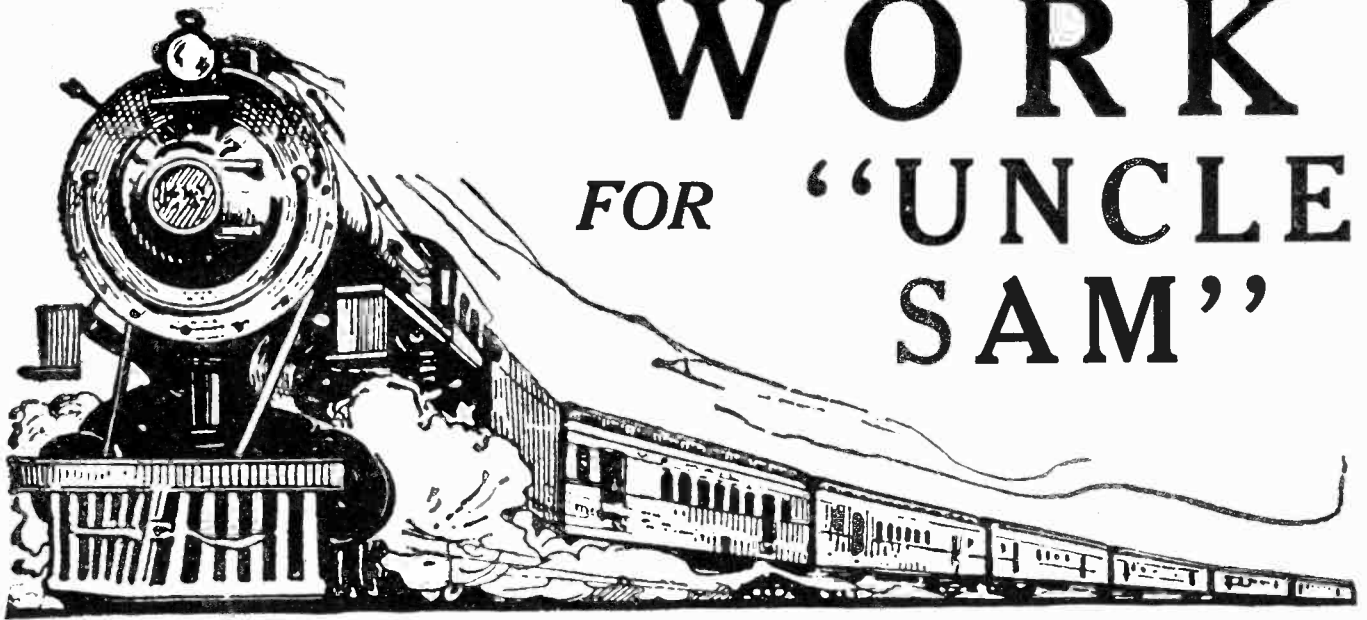
Q. 1. Please explain by means of a diagram, the action of a refracting astronomical telescope in magnifying distant images.

A. 1. The essential part of a telescope comprises two lenses,—a long-focus, large diameter achromatic convex lens, turned toward the object in view and therefore known as the objective, O, and a smaller convex lens, p, (or a set of lenses) called the eyepiece. The object here viewed is supposed to be an arrow, very far away, but so large that in spite of distance it subtends an angle of only a degree or so. If this conception seems too artificial, we may think of the point of the arrow as representing one star, the butt another. Wavefronts are not indicated, but lines are drawn to show the course, through the instrument, of the cone of light from each end of the arrow. Dotted lines show the undeviated rays for each lens.

A real inverted image of the object is formed in the focal plane of the objective, from which the waves continue on, diverging from this image exactly as if it were a material object, except that the light is limited to a comparatively small cone. This light falls upon the eyepiece, which forms with it a second image, really an image of an image. Since the rays that form any point of the first image are limited to the cone that comes through the objective, it may well happen that the undeviated ray drawn from this point through the center of the eyepiece lies outside the cone and therefore does not exist as a real ray. But the position of the second image must certainly be independent of the diameter of the objective, and therefore we are at liberty in such a case to find that position by drawing fictitious undeviated rays just as if they really did exist. The figure is drawn for such a case. The position of the second image depends of course upon the location of the eyepiece, which is mounted so that the observer can slide it at will through a short distance toward or away from the objective. Most observers place it so that the first image lies a little within its principal focus. Then the second image, the one which the eye sees, is virtual, still inverted, and on the same side as the first image, but farther away. This is shown by A in the figure. If the principal focus were placed just at the real image ab, as it is sometimes done by persons of far-sighted or normal vision, A would be thrown back to infinity, like the original object, but would still subtend a much greater angle than the latter.



The diagram above shows the path of light rays through the lenses of a refracting astronomical telescope.



WORK FOR "UNCLE SAM"

RAILWAY POSTAL CLERKS TRAVEL ON GOVERNMENT PAY COMMENCE \$1900 YEAR QUICK RAISE TO BIG PAY

Many other U. S. Government Jobs open to Men and Women 18 up.

POST OFFICE CLERKS
INCOME TAX AUDITORS

CITY MAIL CARRIERS
GENERAL CLERKS

STEADY POSITIONS

These are steady positions. Strikes, poor business conditions, lockouts or politics will not affect each month. \$79.16 each pay day. Their pay is quickly increased, the maximum being \$2,700 year. \$112.50 each pay day. They get extra allowance for hotel expenses when away from home.



RAILWAY POSTAL CLERKS

Railway Postal Clerks now get \$1,900 the first year, being paid on the first and fifteenth of each month. \$79.16 each pay day. Their pay is quickly increased, the maximum being \$2,700 a year. \$112.50 each pay day. They get extra allowance for hotel expenses when away from home.

PAID VACATIONS

Railway Postal Clerks, like all Government employees, are given a yearly vacation of 15 working days (about 18 days). On runs they usually work three days and have three days off duty or in the same proportion. During this off duty and vacation their pay continues just as though they were working. When they grow old, they are retired with a pension. As Railway Postal Clerks are continually traveling, they have an excellent chance to see the country. They are furnished with a railroad pass.

CITY MAIL CARRIERS—POST OFFICE CLERKS

Clerks and Carriers get \$1,700 the first year regular and automatically increase \$100 a year to \$2,100 for further increase to \$2,300. They also have 15 days vacation. Examinations are frequently held in large cities. City residence is unnecessary.

GENERAL CLERKS

(Open to men or women 18 or over)
Salary \$1,140 to \$1,860 a year. Pleasant clerical work in the various departments and offices at Washington, D. C., and large cities throughout the country.



WHAT WILL YOU EARN FIVE YEARS FROM NOW?

Compare these conditions with your present or your prospective condition. Perhaps changing positions frequently, kicking around from post to pillar, no chance in sight for PERMANENT employment; frequently out of a position and the year's average salary very low. DO YOU EARN \$1,900 EVERY YEAR? HAVE YOU ANY ASSURANCE THAT A FEW YEARS FROM NOW YOU WILL GET \$2,700 OR MORE A YEAR, EVERY YEAR?

GET FREE LIST OF POSITIONS

Fill out the coupon. Tear it off and mail it today—now, at once. DO IT NOW—This investment of two cents for a postage stamp may result in you getting a lifetime U. S. Government Job.

FRANKLIN INSTITUTE
Dept. G178, Rochester, N.Y.

Rush to me entirely free of charge (1) A full description of the position checked below; (2) Free copy of 32-page illustrated book, "U. S. Government Positions and How to Get Them"; (3) A list of the U. S. Government Jobs now obtainable and full particulars.

- Railway Postal Clerk (\$1900-\$2700)
- Post Office Clerk (\$1700-\$2300)
- City Mail Carrier (\$1700-\$2100)
- Rural Mail Carrier (\$2100-\$3300)
- General Clerk (\$1140-\$1860)
- Income Tax Auditor (\$2040-\$3000)

MAIL COUPON TODAY

Name

Address

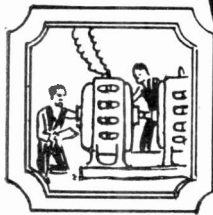
Use This Coupon Before You Mislaid It—Write or Print Plainly.

Be An Electrical Expert

Come to
New York

See this wonderful
city while learning
a high pay profession

ACTUAL
EXPERIENCE



PRACTICAL
LESSONS



Enjoy the Wonders of New York the modern Bagdad while learning Electricity

OUR GRADUATES IN DEMAND.

Graduates of the NEW YORK ELECTRICAL SCHOOL are in demand by all the big electrical companies. Or, if you prefer the independence of a business of your own, there are thousands of opportunities for efficient, dependable men to become electrical contractors. When you are your own boss the money you can make is limited only by your own energy and ability.

PERSONAL INSTRUCTION.

The NEW YORK ELECTRICAL SCHOOL is not a correspondence school. You learn by doing—by personal instruction on full size standard electrical equipment under the personal supervision of trained instructors.

At N. Y. E. S. you train your hands and mind at the same time. You learn the theories of electricity—and then you are shown how to put the theories into actual practice by solving the problems with your own hands.

The man who has learned electricity by actually doing electrical work under intelligent personal instructors can go to any part of the world and be sure of a good living. There are N. Y. E. S. graduates in all the countries of the world.

Write today for the 48-page booklet giving full information about the N. Y. E. S. Course and showing pictures of the equipment available for your personal use in our two seven-story buildings. IT IS ABSOLUTELY FREE TO YOU.

The NEW YORK ELECTRICAL SCHOOL
29 W. 17th St., New York

MAIL TODAY

The New York Electrical School
29 W. 17th Street, New York.

Please send me FREE your 48-page booklet. It is understood that this request puts me under no obligation.

Name

Address

Play the HAWAIIAN GUITAR
Just as the Natives Do

FREE when you enroll
\$15 HAWAIIAN GUITAR and Case

Only 4 Motions used in playing this fascinating instrument. Our native Hawaiian instructors teach you to master them quickly. Pictures show how. Everything explained clearly.

Easy Lessons

Even if you don't know one note from another, the 62 printed lessons and the clear pictures make it easy to learn quickly. Pay as you play.

Write at Once

You'll never be lonesome with this beautiful Hawaiian Guitar. Write for Special Offer and easy terms. A postcard will do. ACT!

Free Guitar and Outfit in Genuine Seal Grain Fabrikoid Case as soon as you enroll. Nothing to buy—everything furnished. No delay.

OTHER COURSES: 1 Tenor Banjo, Violin, Tiple, Tenor Guitar, Ukulele, Banjo Ukulele—under well-known instructors.

FIRST HAWAIIAN CONSERVATORY OF MUSIC, Inc.
9th Floor, Woolworth Bldg., Dept. 140 New York, N. Y.
Approved as a Correspondence School Under the Laws of the State of New York

PREPARE FOR AN ART CAREER

—thru the *only* school operated as a department of a large art organization. Commercial Artists trained the "Meyer Both Way" earn as high as \$10,000 per year. We today have hundreds of students who had previously studied in other art schools. Why? Because your instruction is based upon our everyday experience in meeting the art needs of leading advertisers. Home study instruction. Write for illustrated book telling of the success of our students.

MEYER BOTH COMPANY
Michigan Ave. at 20th St. (Dept. 64) Chicago, Ill.

Insure your copy reaching you each month. Subscribe to **RADIO NEWS** — \$2.50 a year. Experimenter Publishing Co., 53 Park Pl., N. Y. C.

Into the Fourth Dimension

BY RAY CUMMINGS

(Continued from page 1005)

of a placid, measured Time—the delay seemed dangerous. He was impatient; anxious to do something. But there was nothing which of himself he could do; and Thone was an Intelligence very keen. Will decided that upon Thone he must rely.

They went back to the home globe, to rest and to wait for my possible arrival. Will in a way was glad of the inactivity, for he remembered that of Thone's plans he knew almost nothing. He would learn all he could; and with something definitely arranged, they could act to better purpose.

Will felt the pangs of hunger. They brought a glowing brazier wherein something smoldered. He ate—inhaled, there is no word for it. Satisfied his pangs; and drank of the silver mist which came flowing into the globe at a word of command. . . . And slept; lost consciousness, to find himself in blackness with Time wholly gone.

But still I did not come back to the Big-City. There were times when with Thone, Will journeyed about the city streets, gazing at this strange life. He saw thought-

Station
WRNY
NEW YORK

373.8 Meters - 802 kilocycles
is owned and operated by the publishers of this magazine
Our Editors will talk to you several times every week—
See your Newspaper for details

TUNE IN ON WRNY

workers, as I had seen them in Brutar's encampment. Saw the water being created; saw the thought-matter moulded and spun into new globes—moulded to all the diverse purposes of this Ego-life.

He slept again; several times; and ministered to the slight wants of his tenuous body. A great length of time seemed passing; and still I did not arrive.

There were many talks that Will had with Thone. Ahla and Bee were generally there, sitting or reclining in silence as befitted those of their sex.

Sex? It was interesting to Will. The creation of the individual Ego of this strange realm, so different an existence, and yet in fundamental conception so like his own. Already he believed that the same Creator governed both. With strange ways that we mortals so little understand, over all the realms, the states of existence, the Universes that possibly could exist—only one Creator held sway. The Thought-Divine; there could be but One.

Will said, "You once spoke, Thone, of yourself as Ahla's parent. And the necessity of the Divine Thought to the creation of Ego life. Will you explain that? In our world we have two sexes. Have you also?"

"Yes," said Thone. "In the higher forms of life—we humans, as you would say—there are, like yours, two sexes. Call me a man—and Ahla a woman. The difference is one of mental capacity; mental qualities, inherent perhaps to the Soul-Ego. I call it

(Continued on page 1044)

LUMINOUS PAINT

Make Your Watches, Clocks, Etc., Visible by Night

The latest discovery in the scientific world. Hitherto, practically unobtainable except at an exorbitant price, we have at last succeeded in producing this remarkable LUMINOUS PAINT, which, applied to the surface of any article, emits rays of white light, rendering it perfectly visible in the dark. THE DARKER THE NIGHT, THE MORE BRILLIANT IT SHINES. Quite simple to use. Anyone—you can do it. A little applied to the dial of your watch or clock will enable you to tell the time by night. You can coat the push buttons or switch plates of your electric lights, match boxes, and innumerable other articles; make your own Luminous Crucifixes, Luminous Rosaries, etc. Bottle containing sufficient to coat several small articles. Price 25c. Larger size 50c and \$1 postpaid. Johnson Smith & Co., Dept. 357 Racine, Wis.

The "Little Giant" Typewriter

A First Class Writing Machine For \$1.50

A perfect little typewriter for \$1.50. There are thousands of persons who would like to use a typewriter, but whose needs and business do not warrant the expense attached to the purchase and use of a fifty or seventy-five dollar machine. To such persons we confidently recommend our Little Giant. It is strongly made, but simple in construction, so that anyone can quickly learn to operate it, and write as rapidly as they would with pen and ink. The letters of the alphabet are so arranged that the numerals 1 to 10, and the punctuation marks being together. With this machine you can send your best girl typists love letters, address envelopes, make out bills, and do almost any kind of work not requiring a large, expensive machine. With each typewriter we send a tube of ink and full printed instructions for using the machine. Price complete \$1.50 by mail postpaid in any address in the world.

Every Boy His Own Toy Maker

Greatest boys' book written. Tells how to make a Pinhole Camera, a Canoe, Model Railroad, a Telephone, Boomerang, Telegraph Instrument, Box Kite, Talking Machine, Microscope, Electric Motor, Electric Door Bell, Water Wheel, Paddle Boat, a pair of Skis, a Dog Sled, Bird House, Rabbit Yard, etc. 64 pages, 150 illustrations. PRICE, 20c postpaid; 3 for 25c.

GOLD TEETH
You know how fashionable it is to have gold crowns—if you can afford it. These gold-finished shells fasten over your real teeth and look like very wealthy dentures. Can be slipped on and off in an instant. Get some and surprise your friends. PRICE 10c Each; 3 for 15c, or 50c for 1 doz. postpaid.

REAL PISTOL Miniature Watch Charm Pistol

Exact reproduction of a real pistol; actually fires REAL BLANK CARTRIDGES of miniature size. Illustration is actual size. 1 1/4 inches long. With ring to attach to watch chain. Looks like a regular pistol. Pull the trigger and it goes off with a loud bang. Pistol in break-open type; illustration shows position for loading. Made entirely of high grade steel, nickel plated, case. Price \$1.75. Also furnished with pearl handles, \$2.50. BLANK CARTRIDGES, 50c per box of 25.

BOYS! BOYS! BOYS! THROW YOUR VOICE

Into a trunk, under the bed or anywhere. Lots of fun fooling the teacher, policeman or friends.

THE VENTRILO
a little instrument, fits in the mouth out of sight, used with above for Bird Calls, etc. Anyone can use it.

Never Fails. A 16-page Course on ventriloquism, and the Ventrilo, ALL FOR 10c postpaid.

MIDGET BIBLE GREAT CURIOSITY
Smallest Bible in the world. Size of a postage stamp. 200 Pages. Said to bring good luck to its owner. A genuine work of art. Must be seen to be appreciated. Make good money selling them to friends, church acquaintances, etc. PRICE 15c each, 3 for 40c, 12 for \$1.35, 100 for \$7.50. Also obtainable in Leather Binding, with gold edges. Price 50c each, 3 for \$1.25, \$4.50 per doz. Magnifying Glass for use with Midget Bible, 15c.

KU KLUX KLAN

Everything about the Ku Klux Klan told in a clear, fearless manner. Book tells all how it started and was suppressed in 1871—The New Ku Klux Klan—How organized—How members are admitted—Creed—Objects of the Order—Obedience—Fidelity—Pledge of Loyalty—Ku Klux Klan and the Masons—The Jews—The Masons—Real and the Negro Ku Klux Klan, etc., etc. Latest and most complete book on the Klan published. Price, 35c, postpaid.

Female SEX Indicator

Hold the MAGIC INDICATOR over a woman's hand and it moves in a straight line, backward and forward. Hold it over a woman's hand and it describes a complete and continuous circle. The same action can be obtained over a letter written by a man or woman, etc. It is fascinating; baffling. We have never been able to figure out how it's done—but we've never seen it fail. Many novel and entertaining feats may be performed with the Sex Indicator. For example, similar results can be obtained with animals, cats, dogs, rabbits, over birds, chickens, canaries, etc. Also used to predetermine the sex of chickens and birds, etc., in fact it is sold as a patented egg tester in Europe. Price 25c, or 3 for 50c, postpaid.

A DeLuxe Edition of our new 1927 CATALOG made on receipt of 25c. Handsome cloth binding. Only book of its kind. 550 pages of all the latest tricks in magic, the newest novelties, puzzles, games, sporting goods, interesting books, curiosities in seeds and plants, etc. Vastly desirable elsewhere.

STAGE MONEY

With a bunch of these bills, it is easy for each person of limited means to appear in a raffle by flashing a roll of these bills at the proper time and peeling off a genuine bill or two from the outside of the roll. The effect created will be found to be all that can be desired. Prices, postpaid: 40 Bills 20c, 120 for 50c, or \$3.50 thousand postpaid.

Wonderful X-Ray Tube

A wonderful little instrument producing optical illusions both surprising and startling. With it you can see what is appearing in the bones of your fingers, the lead in a lead pencil, the interior opening in a pipe stem, and many other similar illusions. A mystery that no one has been able to satisfactorily explain. Price 10c, 3 for 25c, 1 doz. 75c. Johnson Smith & Co.

Good Luck Ring

Quaint and Novel Design

A VERY striking and uncommon ring. Silver finish, skull and crossbones design, with two brilliant, flashing gems sparkling out of the eyes. Said by many to bring Good Luck to its wearer, hence its name, Good Luck Ring. Very unique ring that you will take a pride in wearing. ONLY 25 CENTS.

Exploding Cigarettes

JUST LIKE ORDINARY CIGARETTES. BUT SUCH REAL STARTLERS! The box contains ten genuine cigarettes of excellent quality. They appear so real, but when each cigarette is smoked, the victim gets a very great surprise as it goes off with a loud BANG! A great mischief provoker yet entirely harmless. Price 25c per box.

Popular Watch Charms

ONLY 3 for 40c; \$1.35 doz.

CIGARETTE MAKER

Roll your own and save money. Makes them better and quicker besides saving more than half. Use your favorite brand of tobacco. Not useful and handy. Pocket size, weighs 1/2 oz. Made entirely of metal, nickel-plated. Price 25c postpaid.

MAGIC FLUTE

Wonderfully Sweet Toned and Musical

The Magic Flute, or Human-tone, is a unique and novel musical instrument that is played with nose and mouth combined. There is just a little knack in playing it which, when once acquired after a little practice will enable you to produce very sweet music that somewhat resembles a flute. There is no fingering, and once mastered it can play all kinds of music with facility and ease. When played as an accompaniment to a piano or any other musical instrument, the effect is as charming as it is surprising.

Novelty Badges

Raising Permit 10c, Garter Inspector 10c

Two very novel metal badges, nickel plated, that you can wear, giving you fun and amusement in proportion to the trifling cost, 10c, each badge, 3 for 25c, or 75c per doz. p.p.d.

BLANK CARTRIDGE PISTOL

Price \$1.00 Postpaid

This well made and effective Pistol is modeled on the pattern of the latest type of Revolver, the appearance of which alone is enough to scare a burglar, whilst, when loaded, it will probably prove just as effective as a revolver with real bullets, without the danger to life. It takes the standard .22 Calibre Blank Cartridges, that are obtainable most everywhere. Even the most timid women can use it with perfect safety and frighten a thief without risk to herself or anyone else. A Great Protection Against Burglars, Tramps and Dogs. You can have it lying about without the danger attached to other revolvers. We sell large numbers around the 4th of July. Well made of solid metal. PRICE ONLY \$1.00 Postpaid. Blank Cartridges 22c. shipped by express only, 50c per 100. Johnson Smith & Co., Dept. 367 Racine, Wis.

Sneezing Powder

Place a very small amount of this powder on the back of your hand and blow into the air, and everyone in the room or car will begin to sneeze without knowing the reason why. It is most amusing to hear the remark, as they never suspect the real source, but think they have caught it one from the other. Between you and your friends, it will be having the time of your life. For parties, political meetings, car rides, or any place at all where there is a gathering of people, it is the greatest joke out. Price 10c; 3 for 25c

Mystic Skeleton

Box contains 12 eggs. When lit with a match, each one gradually takes itself into a skeleton in a few seconds. Several feet long, with warts and twists about in a most lifelike manner. Price per box 10c p.p.d.

Microphone Transmitter Button

You can easily make a highly sensitive telephone by using this Transmitter Button to collect the sound waves. You can hear your own voice without buying expensive equipment. It is simple and inexpensive. You can install an outfit in your home and hear conversations being held all over the house. You can connect up different rooms of a hotel. This outfit was used by secret service operatives during the war. It is being used on the stage. It is ultra-sensitive and is the greatest invention in microphone. You can mount the button almost anywhere—card board boxes, stove pipes, stiff calendars, on the wall behind a picture frame, etc. Button is so light and small it cannot be detected. Persons can be overheard without suspecting it. You can listen in on conversations in another room. A deaf person in the audience can hear the speaker. Connected to phonograph, piano or other musical instrument, music can be heard hundreds of feet away. Button may be used to renew telephone transmitters; often makes an old line talk when nothing else will. The ideal microphone for radio use; carries heavy current and is extremely sensitive. Amplifies radio signals. Wireless operators will suggest themselves. Experimenters find the Button useful for hundreds of experiments along the lines of telephony, amplifiers, loud speakers, etc. Many fascinating stunts may be devised, such as holding the button against the throat of chess players and making them talk. \$5.00 is given to anyone who sends in a new suggestion for the use of the Button providing the manufacturer find it suitable for use in their literature. PRICE \$1.00 POSTPAID ANYWHERE.

ANARCHIST BOMBS

One of these glass vials dropped in a room full of people will cause more confusion than a limburger cheese. The small vial entirely disappears in a short time. 30c a Box, 3 Boxes for 25c

INVISIBLE INK

The most confidential messages can be written with this ink in a room full of people. It is invisible. It is available for many reasons. Keep your postals and other private communications safe from prying eyes. Great fun for playing practical jokes. Only 15c Bottle

ITCHING POWDER

This is another good practical joke; the intense discomfort of your victims to everyone but themselves is thoroughly gratifying. All that is necessary to start the ball rolling is to deposit a little of the powder on a person's hand and the powder can be relied upon to do the rest. The result is a vigorous scratch, then some more scratch, and still some more.

LOOK 35c Look

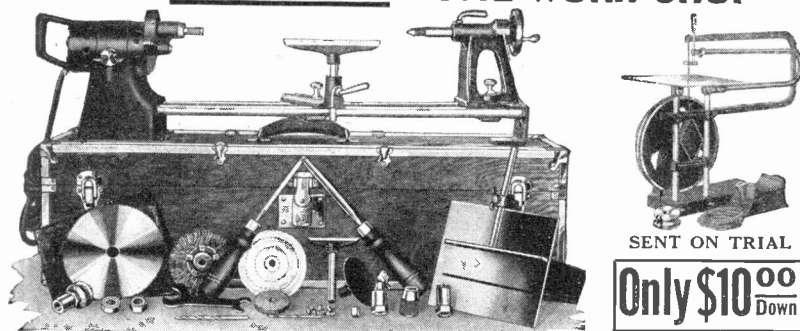
Wonderful Instrument. Greatest thing yet. Nine separate articles in one. Everybody delighted with it. Odd, curious and interesting. Lots of pleasure as well as very useful. It is a double microscope for examining the wonders of nature. It is also an Opera Glass, a Stereoscope, a Burning Lens, a Telescope, a Compass, a Pocket Mirror, and a Laryngoscope—for examining eye, ear, nose and throat. It is worth all the cost to locate even one painful cinder in the eye. Folds flat and fits the pocket. Something great—you need one. Don't miss it. Sent by mail, postpaid. Price, only 35c or 3 for \$1.00 postpaid.

RESURRECTION PLANT

One of the most wonderful plants known. Possesses the strange power of turning in a few minutes from an apparently lifeless, dry herb to a BEAUTIFUL LIVING FERN-LIKE PLANT. of a dark green color. Simply place the plant in saucer of water, it will open up and start to grow in 20 minutes. When taken out it will dry up and go to sleep until placed in water again. Fine house plant—summer or winter. 10 cents each or 3 for 25c, Agents Wanted postpaid.

ADDRESS ORDERS FOR ALL GOODS ON THIS PAGE TO **JOHNSON SMITH & CO. DEPT. 367, RACINE, WIS.** Postage Stamps Accepted

MAKE THE THINGS YOU WANT WITH THE RED JACKET HOME WORK SHOP



SENT ON TRIAL
Only \$10.00 Down

THE WACO PRECISION LATHE GENUINE ELECTRIC TOOLS (NOT-A-TOY)

A chest full of electric tools that make you an accomplished workman. Designed by a master for the private use of tool lovers and men who want to build, construct, invent and create at home. You will be able to make everything— attractive, odd furniture, toys, home and garden improvements, all around manufacturing and repairing.

Complete equipment consists of the powerful Red Jacket Motor, with direct drive to an accurate woodturning lathe (capacity 9 in. x 32 in.); a bench saw; scroll and jig saw; and all accessories for both portable and stationary power or drilling, buffing, grinding and cleaning. Attaches to light socket, and gives you complete private tool and machine shop.

Created for "handy" men. So compact, reliable and efficient that you can accomplish any job with it, and so inexpensive that anyone can own it. Unconditionally guaranteed. Our literature is interesting and fascinating, and explains everything. Don't delay. Learn all about the Red Jacket Home Work Bench now.

BUY ON YOUR OWN TERMS
Only \$10.00 Down—Liberal Cash Discounts, Ten and Twenty Payment Plans.

WACO TOOL WORKS, 2915 So. Wabash Ave. Chicago, Illinois. Manager, Dept. 203. Please send me particulars about 10-day free trial, free blue-prints and \$10 down payment.

FREE Blue-Prints

SPECIAL CRAFTS COURSE is free to owners. Two ounces of interesting, fascinating literature is sent free. Just send the coupon.

Name
Address

Into the Fourth Dimension

(Continued from page 1042)

the Soul, though we have no name for it. I mean that something—the Divine-spark, if you wish; since only the Creator can supply it—which makes each individual different from every other.

"The qualities inherent to the individual—the qualities of its Divine-spark—mould and form the mentality. Characterize thus, what we call its sex. The one sex is a complement to the other. An attraction exists between them—a desire for proximity so that of their own inherent force they will draw together. And the one mentality derives force—a mental life-force—from the other. An exchange—for it yields its own necessary qualities in return. Thus we have the mating—the basis of the family. Without it no complete mental health is possible. There is no mentality capable of existing in health by itself."

"And a birth?" Will suggested.

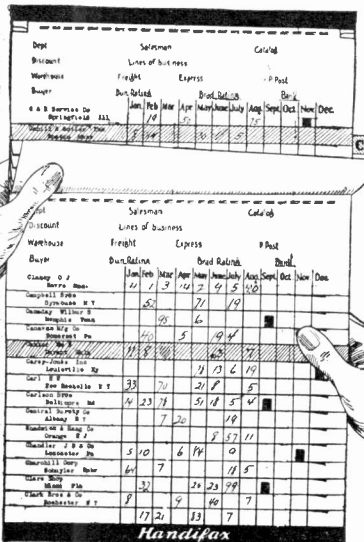
"Communion of thought. The desire, the longing of two closely interwoven mentalities of complementary qualities. When they combine with an intensity of longing, the

Articles In March "Radio News"

- First Link of British Radio Beam System, By A. Dinsdale
- Construction and Theory of Wavetraps, By James Wood, Jr.
- What Is the Best Loud Speaker and Why? By H. W. Secor
- The Samson R.F.C. Receiver, By Alfred J. Poté
- The Ultra-5 Receiver, By Theo. H. Nakken
- The Phasatrol Balanced T.R.F. Receiver, By J. F. Rider
- A Description of the Loftin-White Constant-Coupling System, By Robt. H. Marriott

SHEETS OF CARDS make Speedy Visible Records

Handifax -- A Wonderful Invention -- Helps Business



Visualizes recorded facts to executives. 50 Card-sheets show 1000 cards. Visible space on each card 1/2 or 1 inch. Easy to analyze graphic chart "picture." Color signals "flag" your attention. Cuts record-keeping costs 40%. Quick for use in reference or posting. As handy to use as a sheet of paper. Sheets of cards can be typewritten. Good for all kinds of records. Any size, 100, 1,000, 10,000, 1,000,000. Your present system can be used. Very low cost—very compact.

Send for **FREE** Samples

Ross-Gould Co. 404 N. Tenth Street, St. Louis, Mo.

Handifax

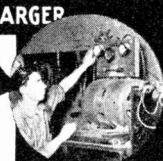
Sales Agents Wanted

\$150 to \$300 MONTHLY PROFIT WITH THIS ONE DAY BATTERY CHARGER

30 DAYS FREE TRIAL
ON ABSOLUTE MONEY BACK GUARANTEE

Start a Big Profit-Making Business of your own—"One Day Battery Charging." Requires small space and practically no investment. Anyone can successfully operate. Charges batteries in 1/3 the usual time at 1/2 the cost. Every car owner a customer. The HB One Day Battery Charger will pay for itself on easy monthly payment plan with practically no expense to you—and bring you a handsome profit besides. Write for full particulars in Bulletin M. NOW. HOBART BROS. CO. Box 537 TROY, OHIO

and it cost only \$16.50 monthly



New Improved SPORS Fountain Pen. 60 Day Trial. Money back if not pleased

AGENTS **65c** SELLS FOR **\$1.25**. Writes Like a \$7 Pen
SAMPLE **65c** Make \$10 Daily Easily

Comes in Red or Green
GUARANTEED 2 YEARS
Improved Point



FREE

New and unusual Mail Order Distributing Plans and Large Wholesale Specialty Catalog showing best sellers from all parts of the world. F. SPORS CO., 234 Anate St., LESUEUR CENTER, MINN.



ALL FREE

10 year guar. Watch with chain and ring, large Eastman Kodak Film Camera or 22 cal. Hamilton Rifle, yours for introducing finest assorted liquid perfume at 15c a bottle. Send for 20 bottles and choose gift as per offer in our catalog. We trust you—just write to **BELL PERFUME CO., Dep. E943 Chicago, Ill.**



thought-matter they mutually create brings into existence another, smaller shape like themselves. It is very small—very tenuous—scarce to be seen save by those two who have produced it. It lies inert. Almost formless, though they sit beside it and strive with their loving thoughts of what it should be—strive to give it form. It may continue to lie inert; and at last in spite of their efforts, it may dissolve, dissipate—be gone, back into Nothingness from whence they drew it. The Divine-thought was not within it; it never was anything then save a human longing unblest.

"Or again, the Divinity may be there. It lives. Grows ponderable. Moves of itself. Thinks of itself. Then it is something itself—something independent of all save its creator-divine . . . The little nourishment of its body is easily supplied; the mother-parent gives it lovingly the needed gentler nourishment of the mind; daily she adds to it the loving tendrils of her thought-matter so tenuous that to the sight it seems mere light.

"But if the spark is there, glowing brightly, the little Ego lives. Grows in size. Displays a growing mental capacity of its own. Its own mental qualities make themselves known, to identify it as a man-child, or a woman-child. And the Soul-Ego, developing, brings it to individuality. It is Itself;

(Continued on page 1046)

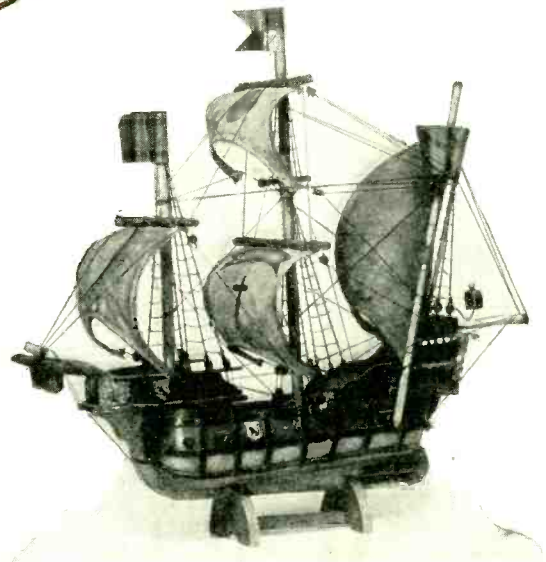
Build a \$100 SHIP MODEL for \$4.98 in a few hours



MAYFLOWER

THE SHIP THAT BROUGHT THE PILGRIMS TO AMERICA.

Size: Height, 25 in. Width, 9 in. Length, 27 in.



SANTA MARIA

THE FLAG SHIP OF COLUMBUS IN THE DISCOVERY OF AMERICA IN 1492.

Size: Height, 25 in. Width, 11 in. Length, 27 in.

ANY SCHOOL BOY CAN BUILD EITHER OF THESE BEAUTIFUL MODELS IN A FEW HOURS

The World's Largest Builders of Ship Models Will Help You Build Your Model

by supplying every part, all parts cut to fit and ready to put together, no tools are needed other than a small hammer. List of parts for Mayflower Model: Hull and keel, 3 pieces; rudder and rudder guard; 2 stern braces; stand, 3 pieces; decorated stern, 2 pieces; rigging channels, 4 pieces; port doors, 13 pieces; hause pipes, 6 pieces; side balconies, floors, railings and roof, 10 pieces; rear balcony, 4 pieces; crows nests, 3; gib boom, fore mast, main mast and mizzen mast; lateen sail yard arm; mizzen mast yard arm; top and main sail yard arms, 2 pieces; fore mast yard arm; fore mast top sail yard arm and gib boom yard arm; fore deck galley; fore deck; beak floor; beak railings; poop deck assembly and all railings; main deck railings; front deck railings; gib sail; top sail; fore sail; main sail; main top sail; lateen sail; mizzen top sail; 3 flags; iron anchor and line; brass name plate; shrouds enough for a complete boat; lines enough for a complete boat; pulleys or block and falls; wire for shaping sails; bumping strips; ladders; enough tacks, nails, brads, glue, in fact everything that is needed. With a full detailed diagram and instructions, showing every operation to complete the Model, including painting and rigging (we do not supply paint). Space does not permit describing the Santa Maria, but it is just as complete in every detail. Hull and parts are of wood. Shipping weight, 6 lbs. Canadian and foreign orders must be accompanied by Money Order for \$4.98, plus sufficient postage.

WE ALSO SELL PARTS

Anchors, Pulleys, Cannons, Brass Name Plates, Port Rings, Special Wood Glue, Sail Cloth, Parts Made to Order. What Do You Need to Finish That Ship Model? We Have It.

MINIATURE SHIP MODELS

3216 Baring Street, Philadelphia, Pa.

MINIATURE SHIP MODELS

3216 Baring Street Philadelphia, Pa.

Please send me the completed parts, cut to fit, and ready to put together for the Model
I will pay Postman \$4.98, plus postage (a few cents).

PLEASE PRINT NAME AND ADDRESS PLAINLY TO AVOID DELAY.

Name
Street or R. F. D.
City
State

Magic



Dr. Harlan Tarbell
Master of Magic who has mystified magicians as well as laymen with his marvelous tricks.

Astonish Your Friends—

Gain that magnetic popularity that makes you the center of any crowd. Business and social success is assured the man who can perform mystifying tricks. You can earn big money either on the side or as a professional, as well as being the most popular person in your crowd. Why envy others' skill? You can learn Magic yourself, quick and easy.

Earn \$250 to \$1000 a Month

Even sleight-of-hand, generally supposed to require long practice, is NOW made simple to learn. For Dr. Harlan Tarbell, one of the really Great Magicians, has finally opened up the secrets of his profession in a completely illustrated course offered at a merely nominal cost. Through the wonderful Tarbell System you will be able to mystify and entertain your friends with simple tricks taught in your very first lesson. After that Dr. Harlan Tarbell takes you through the entire maze of sleight-of-hand, card tricks and elaborate stage diversions. The apparently superhuman doings of the accomplished magician becomes as simple as ABC when you just know how.

Mail Coupon for Special Offer!

There is a tremendous demand for magic entertainment. Clubs, Lodges, Charity and Social affairs—all will pay high fees to the man who knows Magic. Dr. Harlan Tarbell really gets as high as \$250 for a half hour's work right now. Opportunity everywhere to make money aside from your regular occupation. Salesmen find it a tremendous asset. Find out all about this unprecedented opportunity to learn Magic. The coupon brings full details without any obligation. Mail it TODAY.

Tarbell System, Inc.

1926 Sunnyside Ave., Studio 14-23, Chicago

Tarbell System, Inc. Chicago

Tell me all about Dr. Tarbell's new and simple system by which I can learn the secrets of MAGIC. No obligation on my part.

Name.....

Address.....

Age.....

Into the Fourth Dimension

(Continued from page 1044)

unlike everyone else. The new Individual.

... That, my friend Will, is a birth."

Will thought a moment. "There is a beauty to it—divinity clothes it, undoubtedly."

"Divinity clothes everything," Ahla put in.

Bee said, "I don't quite understand—"

She gazed at Will, puzzled; and Will felt and understood her confusion. He said:

"Your explanation, Thone, seems to make Man differ from Woman only in qualities of the Soul and Mind. You do not speak of the body; yet to me, Ahla here appears of very different form from yourself."

Thone smiled. "You say, 'to me.' You have answered yourself, my friend. The physical aspect of everything is but the reflected image of it within our own mentality. The gentleness of Ahla—those qualities which make her what she is—are seen by you in the form of what you call a woman."

"But," protested Will, "does she not look the same to you?"

IMPORTANT

TO NEWSSTAND READERS

IN order to eliminate all waste and unsold copies it has become necessary to supply newsstand dealers only with the actual number of copies for which they have orders. This makes it advisable to place an order with your newsdealer, asking him to reserve a copy for you every month. Otherwise he will not be able to supply your copy. For your convenience, we are appending herewith a blank which we ask you to be good enough to fill in and hand to your newsdealer. He will then be in a position to supply copies to you regularly every month. If you are interested in receiving your copy every month, do not fail to sign this blank. It costs you nothing to do so.

To Newsdealer:

Address

Please reserve for me.....copies of SCIENCE & INVENTION every month until I notify you otherwise, and greatly oblige,

Name

Address

"That I do not know," he returned earnestly. "Nor do you. We can only see, think, imagine for ourselves. Our conscious universe is our own; it exists of our own creation, and what it is of itself apart from us, I do not know."

"We have on Earth," Will said, "a school of philosophical thinking which believes that nothing exists apart from the mentality perceiving it. Believes that without a consciousness of existence, nothing can exist."

"That may be so," Thone replied gravely.

Bee was still puzzled. She said to Thone, "Ahla, to me, looks different from you. She looks, as Will says, like a girl. Won't you tell us how she looks to you?"

He thought a moment. "She looks—like Ahla," he said slowly. "I think we mould our images from the individual itself—not upon a generality of sex. She looks to me like Ahla, as I know her to be. Very gentle. Very dutiful. Very keen of reasoning. Very quick—" He smiled. "Yet not always so very logical. She looks like the Ahla of my creation—mine and that other mentality whom you would call her mother—" His voice turned solemn, with a singular hush to it. "Her mother—who has long since gone into that realm of mystery—behind the veil we must not penetrate."

At other times they talked of practical subjects. Brutar's coming invasion of Earth; my own fate, since I still was missing, unheard from. And they talked of what could

(Continued on page 1048)

Anyone CAN LEARN!

No talent or experience necessary. Fascinating work. Pays big money. Complete instruction book TELLS ABOUT: Alphabets, Colors, HOW TO MIX PAINTS, Show Cards, Window Board and Wall Signs, Ready made letters, Gilding, TRICKS OF THE TRADE, also gives 100 Alphabets and Designs. Book bound in flexible imt. leather, gold edges, and four ball bearing Show Card Pens. Book and Pens sent postpaid for \$3.00, C. O. D. 10c extra. Ogilvie Pub. Co., 57 Roosevelt St., Dept 109 New York

How to Paint SIGNS and Show Cards \$3.00 COMPLETE

EARN MONEY IMMEDIATELY— WE FURNISH EQUIPMENT TO START



READY NOW Gigantic 192 page Spring Edition of RADIO LISTENERS' GUIDE

Complete list of broadcast stations. Latest, finest of new circuits completely described and illustrated. Many articles on care of Radio Sets and accessories. In all, this "Spring Edition" gives you more Radio Information than any book in Radio.

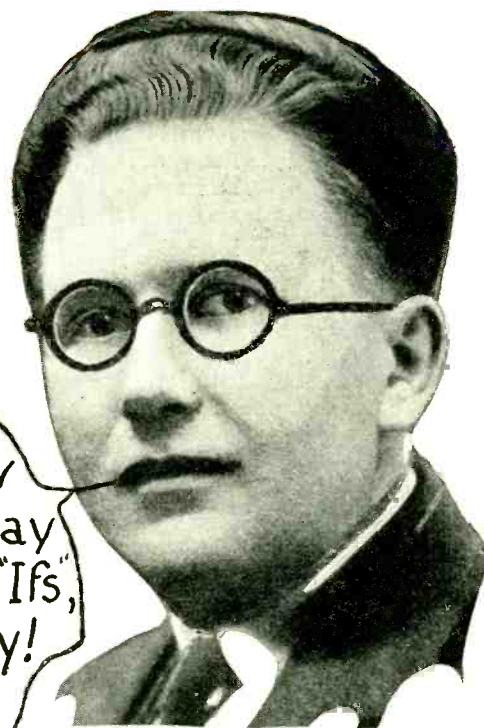
Large size 9x12 inches, handsome two-color cover.

50c — ON ALL NEWSSTANDS

If your newsdealer cannot supply you, order direct from

Experimenter Pub. Co., Inc.
53 Park Place, New York, N. Y.

To Men Getting Bald I Say!



No matter how fast your hair is falling out—no matter how much of it is already gone—I make this amazing guarantee! I'll end dandruff—stop falling hair—grow new hair in 30 days—or you don't pay me a cent! No strings attached! No "Ifs", "Ands" or "Maybes"! New hair or no pay! And you are the sole judge!

By **ALOIS MERKE**

Founder of the Merke Institute, 5th Avenue, New York

SAVE yourself from baldness! Stop falling hair! Grasp this "no risk" offer to grow new healthy hair in 30 days!

Here's My Contract!

If your hair is rapidly falling out—if your appearance is spoiled by approaching baldness—if you have tried countless expensive hair treatments unsuccessfully—it makes no difference. My contract stands! I'll grow new hair in thirty days—or the trial costs you NOTHING.

Here's My Secret

Years of training and research and day after day experience in treating thousands of cases of loss of hair at the famous Merke Institute, Fifth Avenue, N. Y., have taught me many valuable facts about the hair—and this, the most amazing of all—that in most cases of baldness the hair roots are not dead, but merely dormant—asleep!

You're wasting your time—you're throwing away money—when you try to reach these dormant roots with ordinary hair tonics, oils, massages and salves. For such measures treat only the surface skin and never even get to the roots, the real source of trouble. How could they ever possibly grow new hair?

My Method Reaches the Roots

It's no use trying to make a tree grow by rubbing "growing fluid" on the bark. You must get to the roots!

And that's just why my scientific treatment is so tremendously beneficial! It penetrates **below** the surface of the scalp. It quickly reaches the **cause** of the trouble—the dormant, starving hair roots. It awakens them. Hair begins to sprout again. It takes on new life and color. It becomes stronger and thicker. And in a surprisingly short time—sooner than you ever imagined possible—you have a new healthy growth of hair

—OR I PAY ALL COSTS OF THE TREATMENT MYSELF.

And best of all, my system is so simple that it can be used in any home where there is electricity without the slightest discomfort—and for just a few cents a day!

New Hair or No Cost!

Thousands claim seeming miracles for my treatment. I don't. I admit some cases of loss of hair are hopeless. Only remember this—these cases are so very rare and so many hundreds of others have regained luxuriant hair through my method, that I am willing to let you try it for 30 days—**AT MY RISK!**

Then if you are not absolutely delighted—say so.

And I'll mail you a check immediately—refunding every cent of your money—and the treatment will have cost you NOTHING.

Free Booklet Tells All

The very fact that you have read this announcement shows that you are anxious about the condition of your hair. So why not investigate? Find out for yourself. If you will merely fill in and mail the coupon I will gladly send you without cost or obligation a wonderfully interesting booklet, which describes in detail my successful system, which is growing new hair for thousands all over the country. In addition it tells all about my iron-clad guarantee which enables you to take my treatment without a penny's risk. Clip and mail the coupon today.

**Allied Merke
Institutes, Inc**
Dept. 463, 512
Fifth Avenue,
New York.



**Allied Merke Institutes, Inc.,
Dept. 463, 512 Fifth Avenue,
New York City.**

Please send me without cost or obligation a copy of your book, "The New Way to Grow Hair," describing the Merke System.

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

EVIDENCE!

Hair Coming Back

"Having Used your Thermocap Treatment for 30 days, I find a new growth of hair coming back on bald spot. It is growing in very fine. The Thermocap is a Treatment that every one who is losing his hair should buy."
G. H. P., Portland, Me.

Dandruff Leaves Entirely

"I want to tell you how wonderful your treatment is. The first week my dandruff left entirely, and by the third week a new growth of hair could be seen all over my head."

Mrs. H. S., Port Angeles, Wash.

Partly Bald for 10 Years

"I have been partly bald for the last 10 years and have used your treatment only four weeks to date, but I can already see a new crop of hair coming in."
A. K. Anderson, Ind.

\$100 a Week in this Fascinating Business



EARN big money as a cartoonist! Millions of dollars were spent last year on comic strips, political and sport cartoons, animated car-

toons, etc. Scores of good new cartoonists are needed now to meet the ever-increasing demand for this work. Never before have the opportunities in this fast-growing field been so many, so varied or so high-paying.

Easy to Learn CARTOONING at Home in Spare Time

Regardless of how little you know about cartooning now, you can easily be qualified for a position in this attractive high-salaried business. This home-study method starts you at the simplest fundamental principles of cartoon-making and takes you through every branch of humorous and serious cartooning. You will be amazed at how quickly it teaches you to draw salable work. Many students of this method began to sell their drawings before they were half through their courses. The training paid for itself long before they finished it.

Learn cartooning this easy way. Enjoy the fascinating life of a successful cartoonist—easy hours, freedom from routine, your own boss! Topnotch cartoonists earn from \$3,000 to \$15,000 a year or more for this work that is play!

Send for FREE BOOK

Learn more about the wonderful opportunities in Cartooning, and details about this remarkable home-study method. A handsomely illustrated booklet has just been prepared which, upon request, will be sent to you without the slightest obligation. This booklet gives a thorough outline of the cartooning field, and explains in detail this wonderful method of teaching Cartooning. Send for it today! Washington School of Cartooning, Room 263-E, 1113-15th St., N. W., Washington, D. C.



WASHINGTON SCHOOL OF CARTOONING
Room 263-E
1113-15th St., N. W., Washington, D. C.

Please send me, without obligation, your Free Booklet on Cartooning and full details of your home-study method of teaching Cartooning.

Name
(Print Name Plainly)

Address

City State.....
(If under 16, please give age.....)

Into the Fourth Dimension

(Continued from page 1046)

be done to overcome Brutar and his horde of followers.

Thone, it seemed to Will, had accomplished very little. He had learned of Brutar's purpose; and of the establishment of his realm. Thone had sent—by the aid of the lolos plant—an adventurer into the Borderland who had seen Brutar and some of his cohorts experimenting with the Earth-state. Then Ahla had gone into the Borderland; had met Will; had arranged to bring him, Bee and myself back to see her parent.

Little of accomplishment! A public meeting of protest, which we had attended; and which Brutar invaded. But now Thone was organizing his Thinkers—his army, as it might have been called on Earth. Their purpose was to seek out Brutar's realm by concerted effort of thought; to find it while Brutar's preparations were still incomplete; and to destroy it.

The very conception of warfare of this kind was difficult for Will to encompass. There were no weapons—nothing of the sort we on Earth would call weapons. Will showed Thone his broad belt, and the contents of its pouches. He drew out a revolver and a knife. Thone inspected them curiously—shadowy, glowing objects which almost floated when tossed into the air, so imponderable were they.

Will explained their Earthly uses. He said, a trifle shamefacedly, "I brought them—but

To Readers of "THE EXPERIMENTER"

You will find the best features of THE EXPERIMENTER preserved in SCIENCE & INVENTION, besides a brand new "Model Department". See the beautiful Silver Trophy cup for best model each month described elsewhere in this issue.

I felt they would be of no advantage here."

He pulled the trigger of the revolver. If it discharged, there was no result which his Ego-senses could perceive. Thone said, handing him the knife, "Strike me with it."

The action was instinctively revolting; yet Will drove the knife-blade into the semblance of Thone's arm. Thone said, "It seems to hurt."

To Will the knife might have been a feather he was thrusting against a pillow. He withdrew the blade; fancied he saw in Thone's arm an open gash. But if he did, the gash closed at once. The outlines of the arm were quivering, unreal, under Will's earnest gaze. And he knew that if he persisted in regarding it, the arm would turn formless to his sight.

He exclaimed, "Useless! Of course." And tossed the knife away. But Thone recovered it. "In the Borderland it would be more effective, Will. Keep it."

Thone explained how his army of Thinkers might destroy Brutar's encampment. The thought-matter, created, was held in substance only by continued mental effort. And this, withdrawn, at once the disintegrating forces of Nature would dissolve it into nothingness.

"So it is," Thone said, "when an Ego dies. The persistent, subconscious effort of mind during life is all that holds the shell of body in existence. Withdraw that—and you have dissolution."

"And with inorganic matter—" Will began. "With this globe, for instance," said Thone. "With everything we have created, a worker-mentality must guard it. Replenish it."

To Will that seemed not very strange. "On Earth," he said, "we must repair. Nature slowly but steadily tears down that which we have built."

(Continued on page 1053)



"There's the man for Bill Andrews' job"

"I've been watching his work ever since I heard he was studying an I. C. S. course. He certainly has come forward fast.

"He knows more about this business than any other man in his department, so I'm going to give him that new job we were talking about.

"He'll make good, too, because he's trained. I took up an I. C. S. course myself when I was his age and I know how it helps a man to handle bigger work."

Spare-time study with the I. C. S. is winning promotions for thousands of men and bringing happiness to thousands of homes all over the world. In offices, shops, stores, mines, mills and on railroads, I. C. S. trained men are stepping up to big jobs, over the heads of older men, past those whose only qualification is long service.

There is a job ahead of YOU

Some man is going to be picked for it. The Boss can't take chances. When he selects the one to hold it he is going to choose a trained man with sound, practical knowledge of the work. Get busy right now and put yourself in line for that promotion. You can do it in spare time in your own home through the International Correspondence Schools, just as thousands of other men have done in the last thirty-five years.

The first step these men took was to mark and mail this coupon. Make your start the same way—and make it right now.

Mail This Coupon for Free Booklet

INTERNATIONAL CORRESPONDENCE SCHOOLS
Box 6183-E, Scranton, Penna.

Without cost or obligation, please send me a copy of your booklet, "Who Wins and Why," and full particulars about the course before which I have marked X:

- | BUSINESS TRAINING COURSES | |
|---|--|
| <input type="checkbox"/> Business Management | <input type="checkbox"/> Salesmanship |
| <input type="checkbox"/> Industrial Management | <input type="checkbox"/> Advertising |
| <input type="checkbox"/> Personnel Organization | <input type="checkbox"/> Better Letters |
| <input type="checkbox"/> Traffic Management | <input type="checkbox"/> Show Card Lettering |
| <input type="checkbox"/> Business Law | <input type="checkbox"/> Stenography and Typing |
| <input type="checkbox"/> Banking and Banking Law | <input type="checkbox"/> English |
| <input type="checkbox"/> Accountancy (including C.P.A.) | <input type="checkbox"/> Civil Service |
| <input type="checkbox"/> Nicholson Cost Accounting | <input type="checkbox"/> Railway Mail Clerk |
| <input type="checkbox"/> Bookkeeping | <input type="checkbox"/> Common School Subjects |
| <input type="checkbox"/> Private Secretary | <input type="checkbox"/> High School Subjects |
| <input type="checkbox"/> Spanish | <input type="checkbox"/> Illustrating |
| <input type="checkbox"/> French | <input type="checkbox"/> Cartooning |
| TECHNICAL AND INDUSTRIAL COURSES | |
| <input type="checkbox"/> Electrical Engineering | <input type="checkbox"/> Architect |
| <input type="checkbox"/> Electric Lighting | <input type="checkbox"/> Architects' Blueprints |
| <input type="checkbox"/> Mechanical Engineer | <input type="checkbox"/> Contractor and Builder |
| <input type="checkbox"/> Mechanical Draftsman | <input type="checkbox"/> Architectural Draftsman |
| <input type="checkbox"/> Machine Shop Practice | <input type="checkbox"/> Concrete Builder |
| <input type="checkbox"/> Railroad Positions | <input type="checkbox"/> Structural Engineer |
| <input type="checkbox"/> Gas Engine Operating | <input type="checkbox"/> Chemistry <input type="checkbox"/> Pharmacy |
| <input type="checkbox"/> Civil Engineer | <input type="checkbox"/> Automobile Work |
| <input type="checkbox"/> Surveying and Mapping | <input type="checkbox"/> Airplane Engines |
| <input type="checkbox"/> Metallurgy <input type="checkbox"/> Mining | <input type="checkbox"/> Agriculture and Poultry |
| <input type="checkbox"/> Steam Engineering <input type="checkbox"/> Radio | <input type="checkbox"/> Mathematics |

Name.....

Street Address.....

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

Occupation.....

If you reside in Canada, send this coupon to the International Correspondence Schools Canadian, Limited, Montreal.

Opportunity

One of our clients with an exceptionally strong international selling organization wants a staple product or good specialty to manufacture and sell. They also develop patents and solicit contract work. Manufacturing facilities exceptionally good. Would take on selling end only of a good, live proposition.

OLSON & ENZINGER, Inc.,
801 Century Building,
Milwaukee, Wis.

Largest variety of Radio Parts!

1926
EDITION
No. 16

300
Illustrations

8-Page
log book of
all U. S.
Broadcast
Stations



THIS
68 PAGE
RADIO
CATALOGUE
FREE

75 HOOKUPS

BUY FROM RADIO'S OLDEST MAIL ORDER HOUSE

WE are the oldest established, exclusive radio mail order house in the country. Our motto is "Quick Shipment." All orders are shipped within 24 hours. Quick, prompt, courteous service. We carry a larger variety of radio parts and findings than any other radio house in the country.

"RASCO HAS IT"


If you are in need of certain small radio parts that other radio and mail order houses do not bother to carry, get the Rasco parts catalog, and you will find them there, anything from a screw to copper ribbon and telephone diaphragms, as well as thousands of other small radio findings. Just to mention a few:

Lugs, nuts, dials, vernier dial, jacks, plugs, every kind of knob, cords, panels, screws, sliders, washers, selenium, tinfoil, switches, crystals, cap nuts, Litz wire, cord tips, brass rods, resistances, name plates, spring binding posts, switch parts, metal ribbon, carbon balls, binding posts, all types, switch points, switch levers, lock washers, carbon grains, ground clamps, metal pointers, insulated tubing, low melting metal, antenna connectors, bus bar wire, as well as thousands of other articles.

We carry the Largest Variety of Small Radio Parts in the World.



THE NEW RASCO CATALOG No. 16 Contains the Following Hookups
All Armstrong Circuits: These important circuits are explained clearly, all values having been given. Just to name a few of the Vacuum Tube circuits: The V.T. as a detector and one-step amplifier; Super Regenerator; one-step radio frequency amplifier and detector; three-stage audio frequency amplifier; short wave regenerative circuits; 4-stage radio frequency amplifier; radio and audio frequency amplifier; inductively coupled amplifier; all Retlex Circuits. This catalog is crammed full of small parts and radio findings, literally thousands of them. In addition there is much useful information contained herein.

If you will paste this coupon on a post card and mail today, we will be pleased to send you our new Catalog at once. 

RADIO SPECIALTY CO., 96 Park Place, New York S.I. 3-27
 You may send me, without charge or obligation, your NEW CATALOG No. 16. (Write on margin if you desire.)
 Name
 Street
 P. O. State.....

RADIO SPECIALTY CO.
98 Park Place New York, N. Y.

U.S. PATENTS



SEND FOR THIS FORM

Don't Lose Your Rights

Before disclosing your invention to anyone send for blank form "Evidence of Conception" to be signed and witnessed. A sample form together with printed instructions will show you just how to work up your evidence and establish your rights before filing application for patent. As registered patent attorneys we represent hundreds of inventors all over the U. S. and Canada in the advancement of inventions. Our schedule of fees will be found reasonable. The form "Evidence of Conception" sample, instructions relating to obtaining of patent and schedule of fees sent upon request. Ask for them,—a post card will do.



Registered Patent Attorneys in U.S. and Canada
255 Ouray Bldg., Washington, D. C.
"Originators of form Evidence of Conception"

PATENTS

TO THE MAN WITH AN IDEA

I offer a comprehensive, experienced, efficient service for his prompt, legal protection and the development of his proposition.

Send sketch, or model and description, for advice as to cost, search through prior United States patents, etc. Preliminary advice gladly furnished without charge.

My experience and familiarity with various arts frequently enable me to accurately advise clients as to probable patentability before they go to any expense.

Booklet of valuable information and form for properly disclosing your idea, free on request. Write today.

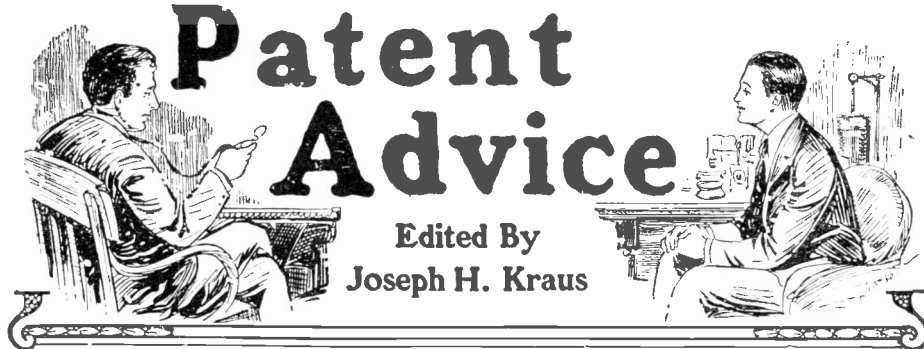
RICHARD B. OWEN, Patent Lawyer
164 Owen Building, Washington, D. C.
41V Park Row, New York City



PATENTS

As one of the oldest patent firms in America we give inventors at lowest consistent charge, a service noted for results, evidenced by many well known Patents of extraordinary value. Book, Patent-Sense, free.

Lacey & Lacey, 644 F St., Washington, D. C. Estab. 1869



In this Department we publish such matter as is of interest to inventors and particularly to those who are in doubt as to certain patent phases. Regular inquiries addressed to "Patent Advice" cannot be answered by mail free of charge. Such inquiries are published here for the benefit of all readers. If the idea is thought to be of importance, we make it a rule not to divulge all details, in order to protect the inventor as far as it is possible to do so.

Should advice be desired by mail a nominal charge of \$1.00 is made for each question. Sketches and descriptions must be clear and explicit. Only one side of sheet should be written on.

NOTE:—Before mailing your letter to this department, see to it that your name and address are upon the letter and envelope as well. Many letters are returned to us because either the name of the inquirer or his address is incorrectly given.

AIR OPERATED AUTO

(1001) Q. I. Warren Morton, Lebanon, Ore., submits specifications of an automobile which is to transform current supplied by storage batteries into power (operating an electric motor) and said power is employed for pumping air to a tank and the air in turn is used to operate an air engine which is connected to the wheels of the automobile.

A. 1. While we admit that the cost of keeping the battery charged, and oiling of the engine as well as replacement of the wearing parts would be the only expense in your air compression engine, we also would advise that the transmission is very inefficient, with the result that instead of obtaining all of the power from your battery and using this directly to drive the wheels of the automobile, you are first converting this into air pressure, then storing it into a tank, then using the air pressure to operate a motor and the wheels. Each one of these changes in transmission represents a loss, with the result that at the end of the entire system, the efficiency will be less than 50% of the energy secured from the storage battery. It is far better to couple electric motors directly to the wheels of the automobile than to resort to the various changes outlined in your description.

Insofar as charging up the storage battery from the generators on the car is concerned, we would advise that you cannot accomplish this because there are losses again incurred in running your generator and these losses cannot in any way compensate for the energy necessary to drive the mechanism. We do not suggest that you apply for a patent on the idea, it being absolutely impractical.

SAUSAGE SKIN SUBSTITUTE

(1002) Gustave Freund, Chicago, Ill., asks us what we think of an idea for an artificial sausage skin.

A. It is quite possible that your method of making artificial sausage casing would find a market and that it is probably patentable, but we do not see any reason for such a development.

At the present time one well-known brand of ham is not put in a natural casing, but is put in a cloth bag, and there are various other brands of sausages and bolognas which are wrapped in artificial coverings, as for example the popular cellulose covering for frankfurters.

If your particular casing is very resilient and possesses toughness, and yet at the same time may be easily removed from the sausage meat or be edible and if it is impervious to water and is airtight, and yet is as cheap or cheaper than regulation types of sausage casings, we believe that your invention might find a market.

We are inclined to urge extreme caution and much experimentation in patenting an idea of this nature.

"FOUNTAIN" SOLDERING IRON

(1003) Mr. L. A. Prashak, Portsmouth, N. H., asks our opinion of a soldering iron with a reservoir for the solder. An adjustable feed is provided.

A. We have carefully looked over your improvement on an electric soldering iron, and would advise that the idea seems sound, and we do not see why you could not make quite a salable article of this device, particularly if it were experimentally proven and then manufactured at a reasonable cost price.

It is obvious that the average radio experimenter would not care to pay a very large price for a soldering iron, when the only advantage he gains is the fact that he always has solder available for instant use, and it is questionable whether this solder, being constantly heated, would not tend to crystallize more quickly than the small amount which is usually needed to make a joint. Of course, we do not mean to imply that your iron should be limited to radio purposes only, but it has been found by manufacturers in the past that an electric soldering iron which would be suitable for the average radio experimenter does have a much greater sale than the more expensive irons of rather limited use.

We would certainly suggest that you get figures on the manufacturing cost.

We do not see the advantages of the sealing screw in your illustration, inasmuch as it must constantly be removed for supplying the extra quantity of solder necessary to keep the chamber quite full. This solder may melt in the vicinity of the screw and permanently solder it in place, making it necessary to heat the iron before the screw can be removed. It further produces a partial vacuum in the iron when in use and makes it necessary to handle a hot article whenever it is desired to replenish the supply of solder.

POLARIZED LIGHTS

(1004) Harry P. May, Los Angeles, Calif., submits a sketch for a system of headlights and windshield on cars which cause (by their interaction) a polarizing effect. This makes it impossible to see the glare of headlights of another car. He requests our advice.

A. Referring to your communication concerning patent advice on automobile headlights and windshields, we would advise that although the idea seems perfectly logical it is entirely too expensive to be worthy of further consideration. Your thin glass plates, serving as the lens of your headlight, are inclined at an angle, which makes the lens subject to breakage, not only from objects dropping down upon it, but also objects flying up from the road and striking the lens.

Incidentally, the angle of the headlight and the angle of the windshield must be set, and it would be necessary to regulate the angle by law. It is obvious that an ordinance must be passed necessitating the use of this type of a headlight and in view of the fact that, if patented, the idea could be developed by only one organization, and in this manner it would prevent competition, we doubt that you could ever persuade the legislatures of the various states to accede to your demands.

Your particular device also necessitates that the windshield be inclined at a certain definite angle, and that the windshield be constructed in the same manner as the headlights, namely of multiple sheets of glass. Here again we entail an expense, and insist that manufacturers build cars to accommodate a windshield inclined at a predetermined angle. Again competition would be prevented and a legal requirement would have to be made for the particular type and construction of a car, which we doubt if you can possibly foster.

We certainly do not advise that you apply for a patent on this suggestion.

(Continued on page 1052)

INVENTORS PROTECT YOUR IDEAS

Send for our Guide Book, HOW TO GET A PATENT, and Evidence of Invention Blank, sent Free on request. Tells our terms, methods, etc. Send model or sketch of your invention for INSPECTION and INSTRUCTIONS FREE. TERMS REASONABLE. BEST REFERENCES.

Name

Street

City

RANDOLPH & CO.
Dept. 172, WASHINGTON, D. C.

At the right is a view of my drafting and specification offices where a large staff of experienced experts are in my constant employ.



All drawings and specifications are prepared under my personal supervision.

PATENTS

My Patent Law Offices
Just Across Street
From
U.S. Pat. Office



Protect Your Ideas

Take the First Step Today—Action Counts

If you have a useful, practical, novel idea for any new article or for an improvement on an old one, you should communicate with a competent Registered Patent Attorney AT ONCE. Every year thousands of applications for patents are filed in the U. S. Patent Office. Frequently two or more applications are made for the same or substantially the same idea (even though the inventors may live in different sections of the country and be entirely unknown to one another). In such a case, the burden of proof rests upon the last application filed. Delays of even a few days in filing the application sometimes mean the loss of a patent. So lose no time. Get in touch with me at once by mailing the coupon below.

Prompt, Careful, Efficient Service

This large, experienced organization devotes its entire time and attention to patent and trademark cases. Our offices are directly across the street from the U. S. Patent Office. We understand the technicalities of patent law. We know the rules and requirements of the Patent Office. We can proceed in the quickest, safest and best ways in preparing an application for a patent covering your idea. Our success has been built on the strength of careful, efficient, satisfactory service to inventors and trademark owners located in every state in the Union.

Strict Secrecy Preserved—Write Me in Confidence

All communications, sketches, drawings, etc., are held in strictest confidence in strong, steel, fireproof files, which are accessible only to authorized members of my staff. Feel free to write me fully and frankly. Your case will have my personal attention. It is probable that I can help you. Highest references. But FIRST—clip the coupon and get my free book. Do THAT right now.

No Charge for Information On How to Proceed

The booklet shown here contains valuable information relating to patent procedure that every inventor should have. And with it I will send you my "Record of Invention" form, on which you can sketch your idea and establish its date before a witness. Such evidence may later prove valuable to you. Simply mail the coupon and I will send you the booklet, and the "Record of Invention" form, together with detailed information on how to proceed and the costs involved. Do this NOW. No need to lose a minute's time. The coupon will bring you complete information entirely without charge or obligation.

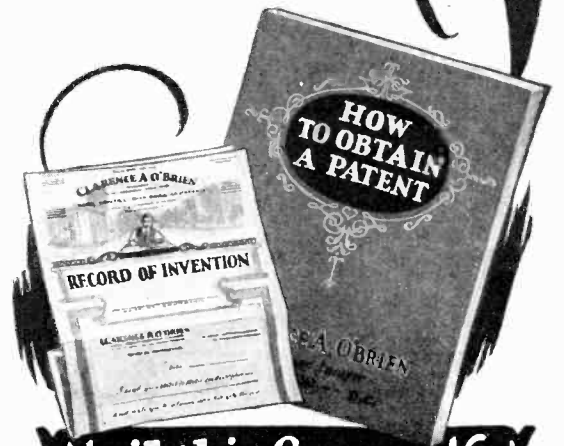
Clarence A. O'Brien

Registered Patent Attorney

Member of Bar of: Supreme Court of the United States; Court of Appeals, District of Columbia; Supreme Court, District of Columbia; United States Court of Claims.

PRACTICE CONFINED EXCLUSIVELY TO PATENTS, TRADEMARKS AND COPYRIGHTS

Inventors Write for these Free Books



Mail this Coupon Now

CLARENCE A. O'BRIEN

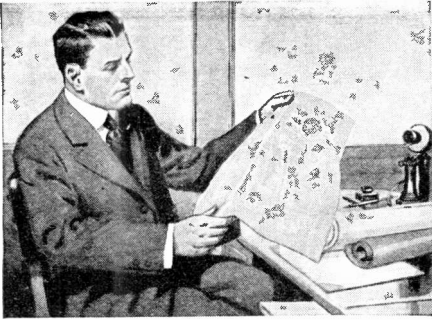
Registered Patent Attorney
53-V Security Savings & Commercial Bank Bldg.:
Washington, D. C.

Please send me your free book, "How to Obtain a Patent," and your "Record of Invention" form without any cost or obligation on my part.

Name

Address

(Important; Print or Write name clearly)



Mechanical Engineering

Learn at Home

MECHANICAL Engineering embraces the design, construction and operation of machines and machine tools.

It is a profession which offers almost unlimited opportunities to men who combine natural mechanical ability with technical training.

For this is The Age of Machinery. Almost every convenience, luxury or necessity which we enjoy depends on machinery for its production or adaptability to our needs. Every new invention multiplies the opportunities for competent designers, builders, erecting engineers, etc.

One of the best ways to train yourself to secure a position as a Mechanical Engineer is through the home-study courses of the International Correspondence Schools.

These courses are complete and up-to-date, and they are especially arranged to meet the needs of the student who studies at home.

They are particularly helpful because they are written by well-known mechanical engineers who have had years of practical experience in this field and who know the quickest, best way to solve every problem.

Just mark and mail the coupon and we'll gladly send you Free Booklets describing the I. C. S. courses in Mechanical Engineering or any other course in which you are interested.

Mail the Coupon for Free Booklet

INTERNATIONAL CORRESPONDENCE SCHOOLS
Box 6184-E, Scranton, Penna.

Without cost or obligation, please send me one of your booklets and tell me how I can qualify for the position or in the subject before which I have marked an X:

- | | |
|---|--|
| <input type="checkbox"/> Mechanical Engineering | <input type="checkbox"/> Toolmaking |
| <input type="checkbox"/> Mechanical Course | <input type="checkbox"/> Blacksmithing and Forging |
| <input type="checkbox"/> Drafting | <input type="checkbox"/> Patternmaking |
| <input type="checkbox"/> Mechanical Drawing | <input type="checkbox"/> Foundrywork |
| <input type="checkbox"/> Complete Shop Practice | <input type="checkbox"/> Machine Shop Practice |
| <input type="checkbox"/> Electrical Engineering | <input type="checkbox"/> Architects' Blueprints |
| <input type="checkbox"/> Electric Lighting | <input type="checkbox"/> Contractor and Builder |
| <input type="checkbox"/> Radio | <input type="checkbox"/> Architectural Draftsman |
| <input type="checkbox"/> Railroad Positions | <input type="checkbox"/> Concrete Builder |
| <input type="checkbox"/> Civil Engineer | <input type="checkbox"/> Structural Engineer |
| <input type="checkbox"/> Surveying and Mapping | <input type="checkbox"/> Chemistry <input type="checkbox"/> Pharmacy |
| <input type="checkbox"/> Metallurgy <input type="checkbox"/> Mining | <input type="checkbox"/> Airplane Engines |
| <input type="checkbox"/> Steam Engineering | <input type="checkbox"/> Agriculture and Poultry |
| <input type="checkbox"/> Architect | <input type="checkbox"/> Mathematics |

BUSINESS TRAINING COURSES

- | | |
|---|---|
| <input type="checkbox"/> Business Management | <input type="checkbox"/> Spanish |
| <input type="checkbox"/> Industrial Management | <input type="checkbox"/> French |
| <input type="checkbox"/> Personnel Organization | <input type="checkbox"/> Advertising |
| <input type="checkbox"/> Traffic Management | <input type="checkbox"/> Better Letters |
| <input type="checkbox"/> Business Law | <input type="checkbox"/> Show Card Lettering |
| <input type="checkbox"/> Banking and Banking Law | <input type="checkbox"/> Stenography and Typing |
| <input type="checkbox"/> Accountancy (including C. P. A.) | <input type="checkbox"/> Business English |
| <input type="checkbox"/> Nicholson Cost Accounting | <input type="checkbox"/> Civil Service |
| <input type="checkbox"/> Bookkeeping | <input type="checkbox"/> Railway Mail Clerk |
| <input type="checkbox"/> Private Secretary | <input type="checkbox"/> Common School Subjects |
| <input type="checkbox"/> Salesmanship | <input type="checkbox"/> High School Subjects |
| | <input type="checkbox"/> Illustrating |

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

1000 NEEDED INVENTIONS

Here is the most remarkable book ever offered to inventors. One Thousand needed inventions listed and described. Arranged as follows: General Problems; Automotive; Mechanical; Electrical; Chemical; Radio; Marine. Separate chapter on the Ten Most Needed Inventions. This book may give you one idea that will win you a fortune. Nothing else like it has ever been published. Compiled at enormous expense. Edited by Raymond Francis Yates, formerly Managing Editor of a leading scientific magazine. Over 100 pages durably bound. Send no money. Pay postman only \$1.00 plus postage on arrival. (Outside U. S. \$1.20, cash with order). Money back after 10 days' examination if desired. Limited edition. Write NOW.

BUREAU OF INVENTIVE SCIENCE
Dept. 73 Rochester, New York

Insure your copy reaching you each month. Subscribe to Science & Invention — \$2.50 a year. Experimenter Publishing Co., 53 Park Pl., N.Y.C.

STORM PROOF UMBRELLA

(1005) Walter Farbanish, Old Forge, Pa., asks our opinion of an umbrella which is provided with a system for permitting passage of air from the hollow side of the umbrella.

A. We believe that the stormproof umbrella which you have designed, even though basic in construction, would not be practical, and we would suggest that you build up one or two working models and try them out in a strong wind or rainstorm.

We do not believe that the openings at the top of your umbrella are sufficiently large to permit of a free passage of air, and so prevent the umbrella from turning inside out. Many umbrellas on exhibition in front of stores do have big holes cut in the cloth, and even these turn inside out in violent storms. At the same time you must remember that these umbrellas are free to swing around on a suspending pivot, so that the wind at all times is acting directly upon the top of the umbrella, rather than blowing into it from its under surface.

We do not advocate proceeding with a patent on the suggestion unless you are thoroughly assured that the device is practical.

PHONE COIN BOX

(1006) Leon A. Martin, Detroit, Mich., requests our opinion of a simple, cheap box to be attached to private telephones which is to serve as a gentle reminder that a fee of five cents is to be collected for any calls made by others than the subscriber.

A. The attachment of a small box to the telephone serving for the collection of the moneys for the telephone calls would not cause people using the phone to drop the money in this box. If the individual willingly forgets or even unconsciously forgets to pay the five-cent fee, this very gentle reminder would not cause him to do so.

The telephone companies object to the attachment of any devices or other articles to the telephone which are not parts of their equipment. Consequently such a box would be removed by every telephone company employee who inspects the telephone.

Should the box contain a few cents in change, it becomes a simple matter for a thief to remove the box from the telephone, by either breaking it off or unscrewing it or to tip the telephone upside-down and cause the money to fall out of the box or to open the hinged top or back.

We do not advocate securing a patent for this system as it is no better than a small box attached to the table top for the collection of the phone call fees and in our opinion it does not constitute a claim for a broad patent. The idea itself, as we have pointed out, is far from practical.

CONTRACT BEFORE EXAMINATION

(1007) Miss Mary Purdue, New York City, asks us where she could sell a nameless article. She claims a universal demand could be developed.

A. It is very difficult to tell you where to dispose of a device, the nature of which you do not give, but merely state that you believe a universal demand could be made for the system. We do not believe that any organization in the country will undertake to purchase your invention under the terms outlined in your communication, namely that you will not disclose your invention to anyone before you shall have assurance that you will be properly protected with regard to royalty. Anyone purchasing an invention of that nature could be likened to the individual paying for a cat in the bag. It is evident that any manufacturer desiring your invention would have to know what it is about, whether it will fit in with his line of business, whether there is enough demand for the system and whether he is in a position to force its sale. You might have an electrical washing machine and approach a manufacturer of stamped household articles.

We regret that we do not know where you could place your device on the market and would suggest that you look through a register of manufacturers most likely able to sell the article which you have designed.

NON-SINKABLE LIFE BOAT

(1008) Charles Morris, Maspeth, L. I., asks our opinion of a submarine-like non-sinkable life boat provided with a life saving basket for the purpose of catching anyone leaping from a ship. He wants our opinion of the system.

A. Undoubtedly you would be able to obtain a patent upon your proposed type of life saving boat, but we are very much of the opinion that you would encounter very great and serious difficulty in attempting to commercialize it successfully. To do this would probably require the investment of a large amount of capital in order to build working models and in order to promote the entire business.

We have had several very complicated non-sinkable life boats submitted to this department in the past and it seems that the opinion of ship-building companies in general is that such life boats are not feasible in actual practice.

Your device is more complicated than many and less practical than most of them.

We would, therefore, advise that even though you might be able to obtain this patent as mentioned above, you do not proceed further with it due to the many difficulties that you would encounter. These difficulties have been proven by the past experience of other inventors working along similar lines.

PATENTS

"Any claim which is broader than the described invention is void even where the invention is valid and could have supported a valuable claim."

—Walker on Patents

Making your patent claims exactly fit your invention is a task for a patent attorney of skill and experience.

MUNN & CO.

PATENT ATTORNEYS

Associated for 81 years with the Scientific American

1518 Scientific American Building
24 West 40th Street, New York City
525 Scientific American Bldg.,
Washington, D. C.

1314 Tower Building, Chicago, Ill.
522 Van Nuys Building, Los Angeles, Cal.
667 Hobart Building, San Francisco, Cal.

Ask for free copy of "Patents—A Book of Facts Every Inventor Should Know" and for "Inventor's Diary." Send for it NOW.

NEW YEAR - NEW IDEA
PATENT YOUR IDEAS
Call or send me a sketch of your invention. Phone Hanover 3662
FREE Inventors Recording Blank Confidential Advice
U. S. and Foreign Patents secured by
Z.H. POLACHEK Reg. Patent Attorney
Consult. Engineer
70 WALL ST., NEW YORK

PATENTS

BOOKLET FREE HIGHEST REFERENCES PROMPTNESS ASSURED BEST RESULTS

Send drawing or model for examination and report as to patentability

WATSON E. COLEMAN, Patent Lawyer
724 9th Street, N.W., Washington, D. C.

INVENTIONS
Commercialized
ON A CASH OR ROYALTY BASIS
PATENTED or UNPATENTED
In Business 25 Years - Complete Facilities - References.
Write **ADAM FISHER MFG. CO.**
205D Enright Ave. St. Louis, Mo.

C. L. PARKER

Ex-Examiner U. S. Patent Office
Attorney-at-Law and Solicitor of Patents
McGill Building, Washington, D. C.
Patents, Trade Mark and Copyright Law

BLUE BOOK ON PATENTS

and Priority Record blank gratis.
MONROE E. MILLER, PATENT LAWYER,
411-6 Ouray Building, WASHINGTON, D. C.
ELECTRICAL AND MECHANICAL EXPERT

Learn Photography at HOME

Earn \$3,000 to \$10,000 a year. Prepare quickly during spare time. Also earn while you learn. New easy method. Nothing else like it. Send at once for free book. "Opportunities in Modern Photography" and full particulars. Special offer open now.
AMERICAN SCHOOL OF PHOTOGRAPHY
Dept. 1423. 3601 Michigan Ave., Chicago, U. S. A.

Into the Fourth Dimension

(Continued from page 1048)

"Of course," Thone responded. "We will destroy Brutar's encampment, himself and all his followers. Rather should I say, we will force them to stop replenishing—and Nature will destroy."

Then Will said, "Let me ask this: I understand that if you, with your weaving of the net of thoughts, are quicker, more powerful than I, you will beat down my resistance. Entrap me; force my body to follow you."

"Or to depart from me," Thone added. "I could force you back—as far from me as I could spin the net."

"I was thinking—suppose we must fight them in the Borderland—"

"A combat at once physical and mental," Thone retorted. He smiled. "You think we are ill-prepared, Will? That is not so. My men of Science have studied this condition—experimented with it very fully. The Borderland—the transition into your Earth-state—all such things are new to us. But we are coming to understand them. And I think that Brutar's people know little of their subject . . ."

He paused in contemplation; then went on slowly. "We are not sure how permanent may be the transition by the lolos-blood into the state of your Earth-matter. Brutar may be mistaken in that—"

He paused again. His smile had a gleam of irony; and there came into his voice an ironic note. "I am not sure but that from the Borderland, our opposing thoughts might not reach your Earth-state. They might, perhaps, do strange things to those of Brutar's people who have reached there—who have taken with them what they may think are effective weapons."

That Thone had learned, or divined much of Brutar's purpose, and that he was prepared to combat it, was evident. But at the moment he chose to speak no further. He added abruptly, "My Thinkers are organized. Very soon they will be ready. The mind, my friend Will, grows strong only with use. Every moment that they can, they are developing the strength of battle . . . Come here and see."

They passed upward upon the side of the globe; and at once its opaque wall began to glow; become translucent; transparent, until through it Will saw the city. An open space, from this angle seemingly tilted on end, was nearby. Within it a horde of shapes were squatting. Figures which after a moment of inspection seemed men—gaunt of body, but with craniums distended. A horde—a myriad; Will could not have guessed at their number. Squatting in a giant spiral curving inward to its center point. From the heads of them all light was streaming. It spun in a band close over them; whirled, flashed with iridescent color. A spiral band of light, concentrating at the center point into a beam that shot away and was lost in the darkness.

The globe wall became again opaque; the scene vanished. Thone said softly, "There is much power for combat in mentalities like those. And very soon I will put them to searching for Brutar's realm—"

A cry from Ahla interrupted him. The girl had been seated as though in meditation; but now she flung herself erect.

"I can find this encampment of Brutar—I can lead you to it now!"

Thone stared.

"Are you getting thoughts from it?" Will demanded eagerly. And Bee gave a glad exclamation. She asked, "Is Rob there? Is he safe, Ahla? Can you take us to him?"

"I do not know if he is there, or safe. Oh, I cannot tell you those things! I only know I can take you to Brutar's realm!"

LEARN TO PAINT

CHOOSE DECORATING or SIGN PAINTING For Your Life Work

Highest Wages Steady Work.



A Profession That Has the Greatest Future o. All. Actual Figures Show Over 25,000 Men Short In These Trades.

\$10 to \$25 PER DAY

is what you can positively earn. More working hours per year than any other line of work at Highest Wages.

MEN IN DEMAND EVERYWHERE

Write Today For Full Information to

Mr. AVER, c/o CHICAGO PAINTING SCHOOL 132 W. AUSTIN AVENUE, CHICAGO

PATENTS TRADE-MARKS AND COPYRIGHTS

OUR OFFER: FOR THE PROTECTION OF YOUR INVENTION

YOUR FIRST STEP before disclosing an invention. The inventor should write for our blank form—"RECORD OF INVENTION." This should be signed, witnessed and returned to us together with model or sketch and description of the invention for INSPECTION and INSTRUCTIONS.

NO CHARGE FOR THE ABOVE INFORMATION Our Four Books Mailed Free to Inventors

Our Illustrated Guide Book

HOW TO OBTAIN A PATENT

Contains full instructions regarding U. S. Patents. Our Methods, Terms, and 100 Mechanical Movements illustrated and described.

OUR TRADE-MARK BOOK

Shows value and necessity of Trade-Mark Protection. Information regarding Trade-Marks and unfair competition in trade.

OUR FOREIGN BOOK

We have Direct Agencies in Foreign Countries and secure Foreign Patents in shortest time and lowest cost.

PROGRESS OF INVENTION

Description of World's Most Pressing Problems by Leading Scientists and Inventors. All Communications and Data Strictly Confidential. Interference and Infringement Suits Prosecuted.

IMPORTANT

TO MAKE YOUR CASE SPECIAL AND AVOID DELAY YOU SHOULD HAVE YOUR CASE MADE SPECIAL IN OUR OFFICE to secure protection, save correspondence and obtain early filing date in Patent Office. To secure special preparation of your case send \$25.00 on account with model or sketch and description of your invention.

Highest References—Prompt Attention—Reasonable Terms

WRITE TODAY

FREE COUPON VICTOR J. EVANS & CO., Patent Attorneys
Main Offices, 779 Ninth Street, Washington, D. C.

New York Offices, 1007 Woolworth Bldg.; Philadelphia Offices, 518-519 Liberty Bldg.; Pittsburgh Offices, 514 Empire Bldg.; Chicago Offices, 1114 Tacoma Bldg.; San Francisco Offices, Hobart Bldg.

Gentlemen: Please send me FREE OF CHARGE your books as described above.

Name
Address

FREE!

"How to Fly"

by Lieut. Walter Hinton
Pilot of the NC4



SEND today for your copy of this fascinating book on aviation absolutely free! Learn how YOU can enter this fast growing, big paying, adventurous profession.

Become a pilot, a skilled airplane mechanic, a designer, a rigger, inspector or an aeronautical engineer. There is big money in all branches of aviation. Big money for you.

Lieut. Walter Hinton, the famous pilot of the N.C.-4, the first man to fly across the Atlantic Ocean, teaches you in your own home!

Learn to fly in 5 hours Earn \$100 a Week and MORE

The most fascinating profession in the world—flying! Your earnings are almost limitless. Lieut. Walter Hinton teaches you in your spare time at home. Mail the coupon at once for full particulars and "How to Fly" by the famous pilot himself.

Aviator's Preparatory Institute,
Dept. 33
475 Fifth Avenue,
New York City

Aviator's Preparatory Institute, Dept. 33
475 Fifth Ave.,
New York City, N. Y.

I'd like to know how Lieut. Hinton can teach me Aviation. Send a copy of "How to Fly" without obligating me in any way.

Name

Address

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

"You feel no thoughts from there?" said Thone.

"No."
Thone was standing with the others. No delay now. He was ready. He said to Will, "It is the nameless power. Those only whom you call women have it."

"Intuition," Will supplied.
"We say, the nameless . . . You may try, Ahla. And if once you take me there—" A restrained, grave triumph was upon him. "Once I will have been there, with perfect sureness I can lead our Thinkers to the attack."

Again in the void . . . The power of woman's mentality—the nameless power; illogical, against all reason, all science; not to be explained. . . . But it was leading them . . . A rush through the darkness of vague, unreasoning woman's thought; a distance, a time felt, but unmeasurable; a direction not to be fathomed . . . And then, ahead of them as in a clinging group they followed Ahla, the glow of a poised realm became visible. They neared it; hovered in the void regarding it. And knew and saw that it was Brutar's realm—that great, tenuous globe hanging there like a gigantic bubble. They could see within it; see details as though by some magnification the details were close at hand.

The encampment was deserted! Abandoned! The lolos field was uprooted; its plants gone. The globes, the workshops, the streets, fields—all were deserted. And more than that, with the removal of all conscious, constructive, replenishing mentality, disintegration already was taking place. A leprous realm. Holes of Nothingness were visibly eating their way into everything. Rotting walls . . . rotting habitations . . .

Under the gaze of the watchers the whole realm was melting. Dissolving into slow-flowing viscosity; cesspools of putridity, rising into mists, vapors—a puff of Nothingness . . .

The realm was vanished. The void was black, empty and silent. The little group of apprehensive watchers turned away.

Brutar—presumably taking me with him—had already started his invasion of Earth!

(END OF PART 7—To Be Continued)

\$5,000 for Perpetual Motion

When SCIENCE AND INVENTION Magazine was still in its infancy, the editors denied the possibility of constructing a perpetual motion machine using those forces of nature as we now know them.

Since that time the editors have received thousands of different designs for perpetual motion devices, and have received hundreds of circular letters soliciting finances for the building of perpetual motion machines.

The editors know that if they receive these letters, there are thousands of others in this country who get similar letters and who fall for the claims made in the numerous prospectuses giving the earning capacities of the various machines.

Most of the shares of stock for these perpetual motion machines are being sold at a rate of \$1.00 per share, although some inventors are trying to sell shares of stock at \$100.00 per share.

Therefore the editors of this publication say, "Just come in and show us—merely SHOW us—a working model of a perpetual motion machine and we will give you \$5,000.00. But the machine must not be made to operate by tides, winds, water-power, natural evaporation or humidity. It must be perpetual motion."

LOFTIS

BROS. & CO. EST. 1858

DIAMONDS WATCHES

CASH or CREDIT

DIAMOND IMPORTERS
We import Diamonds direct from Europe and sell direct by mail—a great saving to you. Our Diamonds are "quality" gems, blue white, perfect-cut, personally inspected by our expert buyers.

SEND FOR CATALOG
Over 2,000 illustrations of Diamond-set Jewelry, Watches, Pearls, Mesh Bags, Silverware, etc. Sent prepaid for your Free Examination.

TERMS: Goods delivered on first payment of one-tenth of purchase price; balance in equal amounts, payable weekly, semi-monthly, or monthly, as convenient.

Satisfaction Guaranteed or Money Refunded

WEDDING RINGS
No. 824—The "Elite" 18-K white gold, \$7.50. Set with Three Diamonds, \$22.50; Five Diamonds, \$32.50; Seven Diamonds, \$42.50; Nine Diamonds, \$52.50; Twelve Diamonds, \$67.50.

Railroad Watches—Guaranteed to Pass Inspection
HAMILTON NO. 992, 21 Jewels, Adjusted to 5 Pos. \$55
Ione, Gold filled 25-Year Case

ELGIN LATES RAYMOND, 21 Jewels, 8 Adj. Runs 40 hours on winding. Gold filled 20-Yr. Case \$55

ILLINOIS "BUNN SPECIAL", 21 Jewels, Adjusted to 6 Positions. Gold filled 25-Year Case, \$50

HOWARD RAILROAD WATCH, 21 Jewels, 8 Adjustments, 25-Year Gold filled case \$80

All Railroad Watches sold on convenient credit terms.

LOFTIS THE NATIONAL JEWELERS
BROS. & CO. EST. 1858
DEPT. L-22
108 N. State St., Chicago, Ill.
Stores in Leading Cities

LIGHTING MATCHES WILL MAKE YOU

\$300 to \$2500 a Month

Amazing "Sure-Fire" Demonstration

Sells by thousands new automatic attachment that Sworn Public Tests prove makes Fords run 43.8 to 68 Miles on 1 Gallon

This simple, but sensational demonstration easily convinces and astonishes even the skeptical. Agents everywhere report wonderful results. Mr. R. K. Waite ordered 1000 devices in 1 month. Profit \$3000.00. Mr. Clyde B. Jones sold 63 devices in 1 day. Profit \$189.00. No experience needed—thrilling demonstration sells it for you. Guaranteed to increase mileage 50% to 100%.

Start Motor Instantly in any weather without use of choke, to eliminate carbon and save half oil. Also saves half repair bills.

1 Free To Introduce Also Free Blanche Plan that starts you in a real business without capital or previous experience. Start to make big money—beginning NOW! Write to-day without fail.

BLANCHE AUTO DEVICES CO.
Dept. 863-C
157 E. Erie St., Chicago, Ill.

STRONGEST GUARANTEE
in Automotive history backs sale of Blanche Controls.

SALES Guaranteed

\$15.00 a Day Guaranteed To Distributors

Magnified 225 Diameters

This is what the tip of a fly's leg is like when seen through the

ULTRALENS MICROSCOPE

At last a high powered microscope is within the means of all who wish to study, observe and experiment with the vast world of minute objects invisible to the naked eye. Such fun it is, as well as educational. No technical training required, yet hundreds of scientists and teachers are using this instrument. Gives enormous magnification and perfect definition. Send \$7.50 for complete outfit. Send for descriptive literature.

\$7.50 for Complete Outfit Prepaid

Scientific Apparatus Corp., Dept. 263, Milton, Pa.

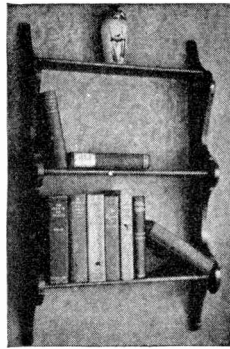
Our Spiritualistic Investigations
By DUNNINGER
(Continued from page 1006)

or there, which consisted only of conversation complimentary to the extraordinary power of our spirit worker. Finding, as I did, a rather refined-looking gathering of the waiters, and a large number of intelligent looking subjects, I gathered that the medium must be of unusually good deceptive ability. As I walked into her chamber of manifestations, I was impressed by the brilliant illumination of the room. Lamps galore, with bulbs of the brightest kinds, had quite a dazzling effect upon the eyes. It seemed that this unusual feature was of some strange significance. The real reason thereof did not present itself, however, for the moment. A stern, short, sickly looking figure was Madame Lowe. Without a smile, and apparently uninterested in her subject, she asked me to be seated alongside a small table, which stood directly in the center of the room. She, seated at the opposite side, directly facing me, was dressed entirely in black, the monotony thereof relieved only by an odd oriental pin, worn directly in the center of her bosom. She stared into my eyes, and started to question me. A sort of

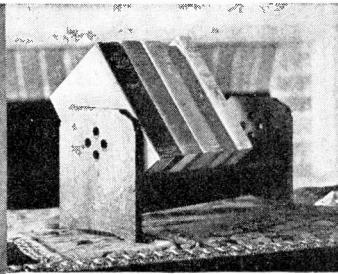
Radio Wrinkles Wanted!

The Radio Editor, Mr. J. Francis Clemenger, wants to hear from you, if you have a good idea or wrinkle. Make a pencil or pen and ink sketch of the contrivance, write 50 words or so of description, and mail to the Radio Editor, c/o this magazine.

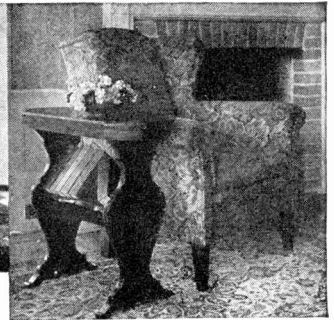
third degree followed. Her questions were direct, and she seemed merely anxious to satisfy herself as to whether or not, I was actually anxious to speak to some one in the spirit world, or merely an inquisitive visitor, desirous of experimenting with her ability. Her form of questioning seemed to assume almost an indignant manner. I informed the lady, in a manner as simple as possible, that I was a disbeliever in any psychical manifestation, and was anxious to be shown. Contrary to my expectations, she was not upset by my frankness, and merely requested her fee, before beginning her so-called performance. Why so many mediums have adopted the money-first plan, is still an unsolved mystery. The two dollars I promptly produced, and placed in her slender, bony fingers, which were extended to receive the money. She placed these bills in a large cash box, which stood in one corner on the table. As she did this, I caught a glimpse of a stack of green-backs, which would have been creditable to a small town banker's cashier window collection, on a busy mid-week closing sale. The studious looking gentleman had by this time re-entered the room, and placed a large slate directly in front of me, together with two or three pieces of chalk, which had been sharpened to fine points. Without much hesitance, Madame Lowe asked me to write the questions I was interested in, upon one of these slates, and sign the name of the person to whom the message was directed. I proceeded to do this, and wrote . . . "is Adeline happy . . . shall we meet again . . . what became of your will? . . . we cannot find it." As I wrote upon the slate, I watched the me-



Hanging Book Shelves



Book Trough



End Table

Attractive Furniture
you can make yourself

LE PAGE'S Craft Books
will show you how



Handiest Tool in your Work Shop

PERHAPS you have never thought of the special advantages of using LePage's Liquid Glue. It is always ready for immediate use. No weighing, soaking or heating is required. The quality is always the same. It "sets" slowly enough so that you have plenty of time to place the joints together exactly as they should go. Slow setting also allows LePage's to penetrate the wood, increasing the strength of the joint. LePage's Liquid Glue is equal in strength to any animal glue. Buy a can for your workshop. It is the easiest, quickest, handiest form of Glue. Insist on LePage's.

DESIGNED by an expert, attractive, artistic, useful and easy to make. This briefly describes the furniture pieces which LePage's NEW Craft Books will show you how to make in your home work shop.

"LePage's Work Shop Book" contains complete directions for making a taboret, footstool, hanging book shelves, book trough, end table with book trough, and a number of simple things which perhaps your boy would like to make. The printed directions for making, step by step, are supplemented by dimension drawings and illustrations made from photographs of the finished pieces of furniture.

LePage's "Practical Suggestions for the Home Work Shop" will help you come closer to equalling the skill of the trained cabinet-maker. It tells you how to make strong joints with glue, and with glue in its most convenient form—LePage's Liquid Glue.

This book also shows you how to cover up small defects in your craftsmanship. Now and then a tool will slip and an error is made. Or there are holes to be filled where nails or screws have been countersunk. Or the edges of a joint are not exactly even. A simple new way to repair these defects is with the use of LePage's Gesso instead of putty. LePage's Gesso will stick to any surface—wood, metal, glass, etc., and will stand 1000 lbs. breaking strain as explained in the books. It can be sand-papered, planed and painted or stained just like wood. We give you in the small panel below a simple formula for making LePage's Gesso, but of course we tell you more about it in the books themselves, together with practical information on decorating your finished articles with Gesso.

Send 10 cents for these NEW LePage's Books

The practical and useful help of these two books is yours for only 10 cents. Just write your name and address on the coupon below, tear the coupon out and mail it to us today with 10 cents in coin or stamps, and we will at once send you a copy of each, postage paid. Address LePage's Craft League, Dept. NN-5, Gloucester, Mass. Tear out the coupon now so you will not forget it.

Recipe for making LePage's Gesso

TO make one cup of LePage's Gesso, you need 1 full can of LE-PAGE'S GLUE, 1 1/2 cups whiting, 3 teaspoons linseed oil and 3 teaspoons varnish. Place whiting in mixing bowl and pour in slowly in this order, LE-PAGE'S GLUE, linseed oil, and varnish. Mix until smooth. All ingredients obtainable at nearest hardware store.

MAIL THIS COUPON

LE-PAGE'S CRAFT LEAGUE, Dept. NN-5, Gloucester, Mass.

Gentlemen:—Enclosed you will find 10 cents (coin or stamps) in payment for "LePage's Practical Suggestions for the Home Work Shop," and "LePage's Work Shop Book". Please send a copy of each to:

Name

Street

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

LE PAGE'S GLUE
Bottles, Tubes, Cans



How Otho Blake Learned to Draw at Home

—now a successful artist

OTHO BLAKE believed it was not possible for anyone to learn to draw by mail. Yet he proved himself wrong by taking the Washington School of Art course and then winning six first prizes and two second prizes at a recent art exhibit! What's more, he is now considered one of the most promising of the younger artists of today!

Just read what he says: "At the time I started the course I did not believe anyone could learn to draw by mail. But as I lived in the country away from any art teacher, I sent for the course.

"At a recent art exhibit I won six first prizes and two second prizes and my work has been reproduced in a number of magazines.

"At present I am doing Illustrating, Cartooning, Show Cards, and occasional chalk talks, besides teaching illustration, and find the life of an artist more fascinating, more full of fun and profit than I had ever dreamed."

Good news! For *you too* have the same opportunity to learn to draw pictures that sell through this remarkable home study method.

Send for FREE BOOK

Just printed—a new book which describes the developments and wonderful opportunities in Commercial Art, and gives full details of this quick, easy method of learning to draw. Tells all about our students—their successes—what they say—actual reproductions of their work—and how many earned big money even while learning. Write for this Free Book and details of our attractive offer. Mail postcard or letter *now*.

WASHINGTON SCHOOL OF ART, INC.,
Room 263E,

1115—15th St., N. W., Washington, D. C.

The Washington School of Art, Inc.,
Room 263E, 1115—15th St., N. W.,
Washington, D. C.

Please send me without cost or obligation on my part your free book, "Quick Easy Way to Become an Artist." Print name plainly.

Name (Mr., Mrs., Miss)

Address

City State

dium carefully, and was impressed by her indifference. Never for a moment did she glance in my direction. Her bearded assistant had left the room before I began to write, so I was quite sure that I alone was the only one familiar with the questions upon the slate.

All of this precaution, however, was useless. As I had completed the writing, the medium asked for the slate, and read out aloud what had been written upon it. This was entirely contrary to my expectations. I now sat back silently, and awaited developments. The medium asked me to concentrate upon these departed spirits. A moment or two elapsed, when the door opened, and the elderly gentleman again entered, with two or three additional slates, which he handed to Madame Lowe. The medium removed the uppermost slate off the stack, and proceeded to wash the surface thereof. First the one side, and then the other, was apparently cleaned with a moist sponge. She handed me the slate and asked me to assure myself that there was no record upon either side, and I was then instructed to place the slate flat upon the table top before me. Additional advice consisted of asking me to place my outstretched palms on top of the slate, and strengthen my concentration. Several moments more elapsed. I was asked to remove the slate from its present position, and look at the under surface. This I did, and found this message, quite legibly written, apparently with slate pencil, the script entirely covering the surface of the slate: "Dearest one. . . I am extremely happy. . . My spirit is at rest. . . It longs but for you. . . I am otherwise contented, and am looking forth to meeting you some day in this beautiful world. . . Look again. . . I am sure you will find the will. Adeline."

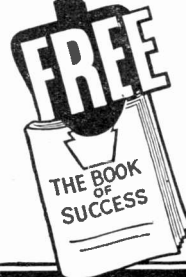
With the usual flow of conversation, such as is customarily offered as an exit speech, and with a look of conquering satisfaction upon the face of the medium, I was ushered out into the ante-room, and from there escorted to the outer door by the elderly gentleman. I was asked if I cared to make a future appointment with Madame Lowe, as unusual messages from the spirit world could be obtained from time to time, through the agency of her mediumship. No appointment was made, however, it is needless to state. The *modus operandi* resorted to was as follows:

The statement written upon the slate was secretly conveyed to the studious looking gentleman, who awaited the information in another room. A dictaphone was concealed in the séance room. As the medium read my writing out aloud, the gentleman at the receiving end of the apparatus prepared an answer to my question, upon the slate which he afterward brought to the medium. The well written and carefully worded apparent spirit message, he lightly scratched upon the slate, with a pencil, made of glass. The prepared side of the slate was carried downward, so as not to be visible, when the stack of slates was handed to the medium. The moistened sponge was passed over the writing, and made it temporarily quite invisible. It was, therefore, safe to hand me the slate for rapid inspection. The wet surface disguised the presence of the writing entirely. As the slate rested on the table and during the few moments the medium employed by conversation, the slate had ample time to dry, which brought the message quite legibly to the surface. The small cost of the slates, especially when purchased in wholesale quantity, compared to the fee charged for a sitting, naturally netted quite a profitable income on each and every one of these demonstrations.

Don't miss the description of a new single dial broadcast receiving set in the April issue.

It's Easy to Succeed When You Know How!

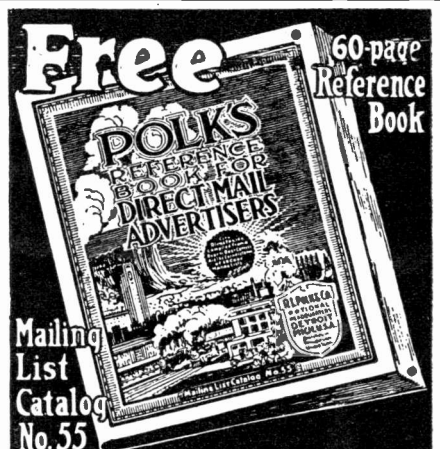
To many, perhaps to you yourself, success is elusive, intangible, unapproachable—meant only for the fortunate few. On the other hand, you see men and women achieving huge success, apparently endowed with no greater faculties than you possess. You wonder *how* they do it. But success is within the grasp of everyone who knows the secret of applying knowledge, intelligently, to every day problems. The Keystone Success System teaches you *how to do it*. By devoting a short time each day to studying this home course, you acquire the method, and, equipped with this powerful ally, you can and will succeed. Take the first step towards your success *now*.



Booklet FREE

Send for "The Book of Success." It's FREE to those seriously minded persons who have the *will* to achieve fame, but lack the equipment. Write today!

J. S. OGILVIE PUB. CO.
57 ROSE STREET
DEPT. 78 NEW YORK, N. Y.



Mailing List Catalog No. 55

Get Business by Mail

60 pages of vital business facts and figures. Who, where and how many your prospects are.

8,000 lines of business covered. Compiled by the Largest Directory Publishers in the world, thru information obtained by actual door-to-door canvass.

Write for your FREE copy.
R. L. POLK & CO., Detroit, Mich.

880 POLK DIRECTORY BLDG.
Branches in principal cities of U. S.

BETTER HANDWRITING

Quickly and easily learned by children and adults. Perfect penmanship assured. Write for information, or send price. 88c. today. VIC. HANSEN, WALLACE, IDAHO

GO INTO BUSINESS for Yourself

Establish and operate a "New System Specialty Candy Factory" in your community. We furnish everything. Money-making opportunity unlimited. Either men or women. Big Candy Book Free. Write for it today. Don't put it off!

W. HILLERY RAGSDALE, Drawer 261 EAST ORANGE, N. J.

Strout's New Farm Catalog

Money-saving guide to money-making equipped farms, summer places, village homes; 126 illus. pages covering many states. Copy free.

E. A. STROUT REALTY AGENCY, Inc., 255-WS Fourth Ave., New York or 7-MS South Dearborn St., Chicago.

Insure your copy reaching you each month. Subscribe to SCIENCE & INVENTION—\$2.50 a year. Experimenter Publishing Co., 53 Park Place, New York City.

Solving Metropolitan Traffic Congestion

BY HUGO GERNSBACK
Member American Physical Society
(Continued from page 1003)

mobile traffic congestion, by a rather simple and somewhat unique system.

It has already been proposed to run an elevated automobile speedway in a sort of belt line paralleling the Hudson River down to the Battery and thence up on the East Side. This speedway would be used only for express purposes, and, inasmuch as there would not be any cross traffic, high speeds anywhere from 35 miles per hour upwards could be maintained, and thus move the vehicles rapidly. This, of course, will help the congestion a great deal and will take a great many automobiles off the street.

At the present time, New York has, in the district below 53rd Street, four elevated railways, namely the 9th, 6th, 3rd and 2nd Avenue lines. The 6th Avenue elevated merges with the 9th Avenue line at 53rd Street and 9th Avenue. From that point on, we have only the 9th, 3rd and 2nd Avenue lines.

These lines threaten to become obsolete, for the main reason that they no longer seem to pay. Some of the lines have been in bankruptcy for some time, and it has been frequently proposed to tear down the structures entirely, for the reason that they are unsightly. This is, of course, admitted, and the scheme that I propose herein will not improve their appearance, but I believe that the growth of the city and the business of this city warrants drastic means in order to clear the traffic and keep the business of the city moving. I know that the scheme that I propose will not meet with favor from the property holders adjoining the elevated lines, but whether they like it or not, sooner or later a system such as I shall propose, must come into use, otherwise the property holders themselves may not derive any benefit from the very property in question.

In short, my plan is to place a roadway on top of the existing elevated structures, with approaches only at infrequent intervals. This elevated roadway would accommodate four automobiles abreast and would not interfere with the elevated railroads running underneath the automobile speedway. In my system there would not be any crossway traffic either, as no automobile would have occasion to make a left-hand turn. As the approaches are infrequent, being only, for instance, at Battery Park, 14th Street, somewhere in the 40's, 66th Street, and 125th Street, quick motion would be gained. The ramps would be constructed in such a way that they would be the width of only one single car, the ramps taking about two blocks to make the climb from underneath the elevated structure up to the speedway. These ramps would be placed only at such parts of the city where they would not go directly over a sidewalk, and would not take up any space of the street. The ramps would go down on an incline and not end at the side of the elevated railroad, but, rather, curve underneath the elevated railroad, where the start would be made.

The roadbed itself would, of course, be of steel, with a thin layer of asphalt or the like, and the weight, therefore, would not be prohibitive. By this system it is calculated that at least 50 per cent of the present automobiles could be removed bodily from the streets, and thus give much needed room. The elevated automobile speedway could, of course, be used not only for passenger cars, but for truck traffic as well, should this be desired in order to keep traffic moving.



5
big helps
to the
big-pay
job

In its new 1927 form the LIBRARY OF ELECTRICAL MAINTENANCE AND REPAIR is better than ever—a complete library of today's maintenance and repair information—the information you need for the big-pay jobs.

The Sure Way —to your big-pay job

If you want to push ahead to a big-pay job in electricity this year, get these five big helps for yourself right away.

The year is in front of you. Make the most of it. Don't scatter your efforts. Specialize! Specialize in electrical maintenance and repair work. Prepare yourself with

THE LIBRARY OF Electrical Maintenance and Repair

5 volumes—1750 pages—1800 illustrations—library binding

Only \$14.00, payable \$2.00 a month.

The Library in its new form includes Braymer's Armature Winding and Motor Repair, the new revised edition of Dudley's Connecting Induction Motors, Annett and Roe's Connecting and Testing D.C. Machines, Annett's Electrical Machinery, and Wiring Diagrams of Electrical Apparatus and Installations.

These books cover every phase of electrical maintenance and repair work, from armature winding to the correction of brush troubles. They include many things never before assembled in book form.

They not only tell you what to do in the case of electrical trouble, but they show you how to do it. And when it's done it will be done right! The methods outlined for you by the authors of these books have all been thoroughly tested out in actual practice.

Every chapter is written with the practical man's needs in mind. Instead of discussing the fundamentals involved in any method of working out a repair problem, the ACTUAL PROBLEM is discussed from a how-to-do-it standpoint.

Tells you everything you have to know

Fundamental laws and rules are discussed when necessary, but there is no hard-to-understand theory or discussion of design. All of the material presented in these five books has been obtained from actual experiences. The Library outlines the practical remedies that have been applied by repairmen all over the country in the solving of puzzling electrical problems. Everything the expert knows about maintenance and repair is given in the books. They prepare you for the big job—they make you well worth the big pay that goes with it. They make your promotion sure.

Send no money---Examine it free

You need not take our word for the value of these books. You may examine them yourself in your own home for ten days free. No obligation to purchase—no annoying follow-up—no agents—no red tape. We even pay return charges should you decide to return the set.

Mail This Coupon

McGraw-Hill Book Co., Inc.,
New York
370 Seventh Ave.,
New York

Gentlemen:
Send me the LIBRARY OF ELECTRICAL MAINTENANCE AND REPAIR (shipping charges prepaid) for 10 days' free examination. If satisfactory, I will send \$2 in ten days and \$2 per month until the special price of \$14 has been paid. If not wanted, I will write you for return shipping instructions.

Name
Address
Position
Company S. I. 3-1-27



6 WEEKS AGO he clipped the coupon

Other fellows had left him in the social background. Girls avoided him. He was missing all the modern fun. Then, one day, he read an advertisement. It held out a promise of popularity if he would only learn to play a

BUESCHER

True Tone Saxophone

He thought himself musically dumb. Still, the ad said it was easy. He mailed a coupon, and later sent for a Saxophone for 6 days' trial. Before the end of the week he was playing easy tunes. That was 6 weeks ago, and today he's "popularity" itself. Always welcome everywhere.

You Can Teach Yourself

If you can whistle a tune, if you can beat time, you can learn to play the Buescher Saxophone, Easily! You can teach yourself, at home, in a few evenings. Three simple lessons given on request with each new Saxophone start you. You learn scales in an hour and start playing tunes in a week. Your progress will astonish and delight you and surprise your friends.

Try Before Buying. Easy Terms

Take home with you any Buescher instrument, Trombone, Cornet, Trumpet, Saxophone for six days' trial. Test it. See what you can do with it. If you like it, pay a little each month. Play as you Pay. Satisfaction guaranteed. Send for beautiful free catalog of any instrument and details of trial and payment plans. No obligation. Do this today.

BUESCHER BAND INSTRUMENT CO.
Everything in Band and Orchestra Instruments
1953 Buescher Block Elkhart, Indiana



The Story of the SAXOPHONE

Gives complete history and tells why the Buescher is so easy to learn to play. In it you will find the first lesson chart. You must have this fine book.

Clip the Coupon NOW!

BUESCHER BAND INSTRUMENT CO. 304B
1953 Buescher Block, Elkhart, Indiana.
Gentlemen: Without obligating me in any way please send me your free literature. I am interested in the instrument checked below.
Saxophone Cornet Trumpet Trombone Tuba
Mention any other.....
Name.....
Address.....

I also propose that somewhere along the 40's a crosstown connection could be made, which would connect all of the elevated speedways together, in order that vehicles coming from the east could travel to the west, and those from the west to the east. So as not to take away the light in any now-existing street, I propose to run this crosstown connection bodily over houses in the middle of a block, wherever the conditions are such that the roadway would not have to be elevated to too great a height in order to make this possible. In the midtown sections, where there are no extremely high buildings, such a crosstown connection could be readily effected. Another such crosstown connection could be effected either above or below 125th Street, preferably somewhere near 126th Street, where there are no very high buildings.

A scheme of this kind is, of course, an expensive one. It will cost many millions of dollars to see it through, but there is a simple way to raise the money, on the following plan:

At the present time some of the railway companies are in not too healthy a financial condition. It is proposed to issue tickets, which can be bought anywhere in the City at the rate of 25 cents per ticket for the use of the roadway. No automobile could go on the elevated roadway unless the driver paid such a sum, or a sum to be decided upon. The enormous amount of traffic that would immediately revert to the new speedways would make the venture a highly profitable one for the elevated railroad companies, and would satisfy the present stock-and bond-holders, because the earnings, no doubt, would run very high in a short time.

There are no technical difficulties in a plan of this kind. It is more in the nature of a financial problem (to raise the money in order to build the structure and give the city relief). On the whole, it is a business proposition and will be worth untold millions in benefits to the city at large.

Corrosion-Proof Aluminum at Last

By DR. ALFRED GRADENWITZ
(Continued from page 996)

against the action of atmospheric agents and sea water. Coated aluminum sheets have been found to be an excellent substitute for tinsplate in connection with roofings.

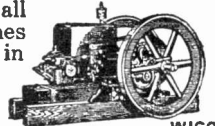
The electrical industry should likewise be benefitted by the new process, for coated aluminum is in many cases an excellent substitute for the much more expensive copper, and in connection with the construction of scientific instruments and apparatus, it will largely be used in the place of brass or copper. Chandeliers and other lamps made of aluminum with a coating of copper or some other heavy metal are particularly attractive; when made of silver or gold-coated aluminum, they look to all intents and purposes like solid silver or gold articles.

Other products which have already been made to advantage of "Sprencorized" aluminum (as the process is commercially termed) comprise table requisites, kitchen utensils, soldiers' flasks, hair-driers, bathroom outfits, wall pegs, door handles and fittings, radiators, etc.

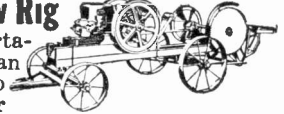
According to a series of stringent tests carried out at the *Chemische-Technische Reichsanstalt*, the German counterpart of the chemical section of the Bureau of Standards, the resistance of these coatings to atmospheric agents and salt water is most satisfactory and their adhesive strength remarkable. Various aluminum ware manufacturers are being licensed by the company controlling this invention.

WITTE ENGINES

200,000 all purpose, all fuel WITTE Engines from 1 1/2 to 30 H.P. in daily use. Sold all over the world, but to honest American farmers at Wholesale Magneto Equipped sale, **DIRECT Factory Price, Easy Terms and No Interest.**
The Standard Farm Power. Starts Easy; Cheap to Run; Most Durable, Practical Engine Made.



3-in-1 Saw Rig
With this portable rig you can drive down to the timber



and saw up pile after pile, moving as often as you must. When you are through, take off the sawing frame and you have a portable engine. Or remove engine and you have at once a stationary engine and a portable truck for use around farm or ranch.

Lifetime Guarantee

FREE Big New Illustrated Catalog just out — shows complete line Engines, Log and Tree Saw Outfits and **PUMPS** for every need — how to make money with WITTE Outfits. Solves all farm power problems. 67 years practical experience. Send name — no cost — no obligation.

3 Hour Shipping Service.

WITTE ENGINE WORKS

3753 Witte Building, Kansas City, Mo.
3753 Empire Building, Pittsburgh, Pa.
3753 Witte Bldg., San Francisco, Cal.

AJAX-WIRE

FOR WIREKRAFT



AJAX WIRE is a strong, rust proof, pliable wire. Each spool has a patented metal clip that holds wire close to spool as it unwinds. Wire cannot unravel. No fastening of end necessary.

SOLD IN SIZES

No.	16	18	20	22
Ft. per spool	22	45	60	90

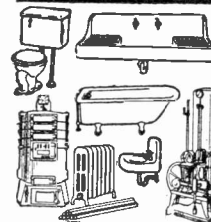
PRICE PER SPOOL

Copper	30c each
Brass	30c each
Galvanized	20c each

Other sizes and prices on request.

See your dealer or write direct to
RUSSELL FRASER WIRE CO.
Maspeth, N. Y.

PLUMBING - HEATING WATER SYSTEMS



SAVE UP TO 40%

Wonderful bargains — everything guaranteed. Full line of plumbing and heating supplies. Hot water, steam heating plants and fixtures and water systems at big savings.

Install Them Yourself

Finest materials all brand new and perfect. Tell us your wants and mail us a rough sketch of your rooms.

SEND FOR PRICE LIST

B. KAROL & SONS CO. 800 S. MEDWAY AVE. CHICAGO, ILL. Dept. 27

BE A DETECTIVE

Earn Big Money. Work home or travel. Make secret investigations. Fascinating work. Excellent opportunity. Experience unnecessary. Particulars free. Write **GEORGE WAGNER**, former Government Detective, 1968-J Broadway, New York.

Home Mechanics

WILLIAM M. BUTTERFIELD

(Continued from page 1016)

and screws fitted at this time also.
 F.—The trough consists of two 5/8 inch boards 34 inches long and 4 inches wide. One board is rabbeted to form a 5/8 inch lip to cover the lower edge of the other board. The two sit together at right angles so as to form a trough (as shown). The ends of the trough thus formed are secured in V-shaped grooves cut in the end pieces G. A bolt I, holds the ends in the grooves. The grooves should fit the ends of the trough tightly so that the joints can eventually be glued, and thus further secured. (See H.)

G.—End-boards or under-braces are made of 7/8 inch lumber and are 5 1/2 inches wide, with 1/2 inch tenons at each side or 4 1/2 inches between tenons, and 6 inches long. They are shaped as shown at G. A V-shaped groove and hole for rod I is cut and bored as before described. The center of the hole is 2 1/2 inches from the bottom end, and the lower angle of the grooves 2 3/4 inches above the bottom end. The rod thus sits into the angle of the trough 1/8 inch—a groove being cut at this angle for the purpose. Fig. H shows the trough, rod and end-board.

I.—In order to secure the trough ends in the end-boards, and to give strength to the table, a 1/4 inch iron rod with a head, two washers, and a nut is used. The rod is 3 1/8 inches long under the head. It extends through each end-board, with a washer under the head and a washer under the nut, and is bolted tight and firm. In order to hide the rod head and nut two buttons are turned and countersunk for the washers, then cut out to closely fit the head and nut. One is finally glued over the head and one over the nut to the outer sides of the end-boards, as illustrated at I and H. These buttons will prevent the nut or rod turning and thus becoming loose.

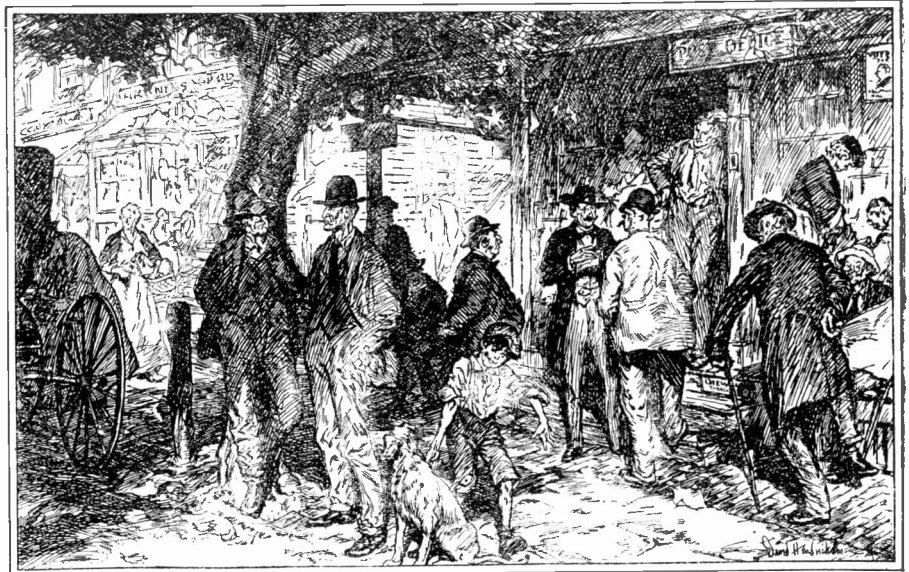
The table will properly stand a high finish. In order to obtain this it will be necessary to remove all scratches, dents or checks before staining the wood. An oil stain is best for staining any of the woods mentioned. When this is dry another careful smoothing down must be given to the table. Any filling that is required at any of the joints can now be done, using the stain to tint the filling material. The first coat of varnish is then put on, allowed to dry, and rubbed and smoothed down as directed by the makers of the varnish used. A second, and occasionally a third, coat is used, with the usual smoothing processes recommended between coats. It is rather a painstaking process to obtain a highly finished piece of furniture, yet the finish obtained is very gratifying and lasting.

The woods most often used are walnut and mahogany, although occasionally a maple or oak table is seen. The prices range from \$9 to \$30, the cheaper tables usually being in imitation mahogany and having an inferior finish. The materials and mill work should not exceed \$5.50 for any wood named.

TOOL LIST

The tools required for building the Book Trough End Table will vary with each mechanic perhaps, but he will find handy a good crosscut saw, small smoothing plane, compass or keyhole saw, large hand drill or brace and set of bits, several sizes of wood chisels, rabbeting plane, and sandpaper both fine and coarse.

Send us your ideas as to articles you would like to see described in this Department.



The Meeting Place

*An Advertisement of
 the American Telephone and Telegraph Company*



It is not so long ago since people met in town hall, store or at the village post-office, to talk over matters of importance to the community. Then came the telephone to enable men to discuss matters with one another without leaving their homes.

With the growing use of the telephone, new difficulties arose and improvements had to be sought. Many of the improvements concerned the physical telephone plant. Many of them had to do with the means of using the apparatus to speed the connection and enable people to talk more easily.

This need for improvement is continuous and, more than ever, is a problem today. Speed and

accuracy in completing seventy million calls daily depends upon the efficiency of Bell System employees

and equipment as well as upon the co-operation of persons calling and those called and numerous private operators.

It is not enough that the average connection is made in a fraction of a minute or that the number of errors has been reduced to a very small percentage.

The American Telephone and Telegraph Company and its associated Bell Telephone Laboratories have practically for their sole task the making of the telephone more serviceable and more satisfactory—as a means of conversing with anyone, anywhere, any time.



MARVELOUS UTILITY LIGHT!
 "Big Time Saver"

You do not realize your own ability until you've used a Speclight. Throws the light just where you are looking and leaves both hands free for use.

Invaluable for electricians, machinists, autoists, radio experimenters and craftsmen in all fields.

PRICE \$6 Complete with battery in case.

COMPREX OSCILLATOR CORP., 775 E. 143rd St., New York, N.Y.

Insure your copy reaching you each month. Subscribe to Science & Invention—\$2.50 a year. Experimenter Publishing Co., 53 Park Place, N. Y. C.



General Manager at 28

How Mr. Rohrschneider Won Success as an Electrical Expert

GENERAL MANAGER of his company at 28 years of age! His own boss—owns his home—married and happy and prosperous—that's the remarkable success achieved by Wallace H. Rohrschneider, now General Manager, Secretary and Treasurer of the Hustisford Light, Power and Manufacturing Company of Hustisford, Wis.

Mr. Rohrschneider got his start toward his quick and brilliant success at School of Engineering of Milwaukee. There he received the practical, intensive and specialized training that enabled him to make good in a big way.

Why Don't You Get Into This Big Pay Field

The same kind of training that put Mr. Rohrschneider into the ranks of the highly-paid Electrical Specialists will qualify you for brilliant success in this fascinating field of unlimited opportunities. Come to America's Foremost Institution of Practical Electrical Education. Learn by actual practice in our big laboratories with their magnificent equipment, including motors, dynamos, switchboards, ignition and lighting systems, etc. Over 25 recognized experts give you personal instruction every step of the way.

Earn Part of Your Way Through This Great College

You can earn money to help defray your expenses while you are learning. Our wonderful co-operative plan brings an Electrical Career within the reach of every ambitious man.

Our Free Employment Bureau secures positions for those students who wish to earn part of their expenses. In addition, the Department will help you get a good position in the Electrical industry when your training is completed.

BIG BOOK FREE Mail the coupon today for our big new illustrated catalog. Check the course that interests you most and we will send you special information. Read about the wonderful method of training of this great Electrical School that trains men for practical and quick success. See how easy it is for you to get the training that will enable you to step to a splendid position and a handsome income. Mail the coupon right now. No cost or obligation.

SCHOOL OF ENGINEERING of Milwaukee

Dept. SI-327, 163 Oneida St., Milwaukee, Wis.

----- MAIL COUPON NOW -----

School of Engineering of Milwaukee,

Dept. SI-327, 163 Oneida St., Milwaukee, Wis.

Please send me, without any cost or obligation,

full particulars of the electrical course I have

checked, and your big Free Book telling about

your institution and how it will fit me for a

big position in the electrical field. Also tell

me about your Earn-While-You-Learn Plan.

(Be sure to check courses interested in)

.... Electrical Engineering, B.S. Degree in 3

Years.

.... Commercial Electrical Engineering, 1 Year.

.... Junior Electrical Engineering, 1 to 2 Years.

.... Master Electrician, 6 Months.

.... A.C. and D.C. Armature Winding, 3

Months.

.... Light, Motor Wiring and Testing 3 Months.

.... Automotive Electricity, 3 Months.

.... Refrigeration, 3 Months.

.... Radio Sales and Services, 3 Months.

.... Home Laboratory Service.

.... I am interested in your "Earn-While-You-Learn" Plan.

Name

Address

City

Education

Readers Forum

(Continued from page 1029)

2. **THICKNESS**, is the direction at right angles to the length, which extends the smallest distance.

3. **BREADTH**, is the direction at right angles to both the length, and thickness.

4. **LOCATION**, is the position of an object, relative to the other objects in its effective sphere. It is determined by the distances separating this object from the other objects relative to it. It is apparent from this, that location is not fixed; location is comparative; an object can change its location without having entered a state of motion (since motion, as well as location, is comparative, motion is naturally entailed in a change of location, but what I mean is that an object can change its location, without any energy having been used by it in the process), because any change in the position of the objects relative to the object under consideration, would naturally change the distances, from these objects, of the object under consideration, and its location accordingly.

TIME, that is time as it effects any particular object, is wholly a state of mind, without which there would be chaos; it is that something which separates events and objects from each other, and makes existence possible. The time of any particular object, or event, is the particular point which this object, or event occupies, on the flow of this quality, known as—**TIME**.

SCOTT GRAHAM WILLIAMSON,
San Francisco, Calif.

(This is an interesting thought, and is worthy of publication on the Readers Forum page. It will undoubtedly stimulate thought and anything which stimulates the brain cells is worthy of publication. While we have no direct comments to make on the subject of location as a dimension, we certainly believe that the theory is infinite in its ramifications. What would be the location of an electron? What is the location of the planets in comparison with this earth, assuming the possibility, as at least plausible, of light rays being bent? What is this location with reference to the other stars in the heavens and what is the location of those stars with reference to other stars outside of the range of our telescope? If this entire conglomeration of stars forms a part of one great system, then what is the location of the system with reference to other systems outside of the sphere in which we live and which we can only conjecture. Think it over.—EDITOR)

MODEL DEPARTMENT BLUEPRINTS

Correct—Easy to Follow

Prints

- 1 Horizontal Steam Engine
 - 2 Engine detailsset \$1.00
 - 3 Boiler construction for
 - 4 aboveset \$1.00
 - 5 880 Ton Bark..... 50c
 - 6 Twin Cylinder Steam En-
 - 7 gine and Boiler.....set \$1.00
 - 8 Gasoline Fired Locomo-
 - 9 tiveset \$2.00
 - 10 U. S. S. Constitution,
 - 11 "Old Ironsides".....set \$1.00
 - 12 13th Century Man-of-War, 50c
 - 13 Chinese Junk, set 50c
 - 14
 - 15 Electrically driven auto-
 - 16 mobileset \$1.00
 - 17 Roman Ballista..... 50c
 - 20 Simple Steam Engine, set 50c
 - 21
 - 22 "Santa Maria"complete 50c
- How to Build a Reflecting Telescope 1.00

Send Orders to

MODEL DEPARTMENT
SCIENCE AND INVENTION
53 Park Place
New York City

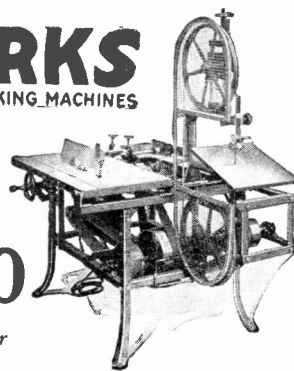
PARKS

WOODWORKING MACHINES

Cabinet
Shop
Special

\$290

with Motor



You ought to have this handy Parks in your shop. It is a compact, complete machine designed just like a big production outfit at one-fifth the cost. Includes 8-inch circular rip and cross cut saw with polished cast-steel saw table, 16-inch band saw with tilting table for bevel-sawing, 6-inch jointer, and motor operating from any light socket. Just plug in and go to work! Fits in a corner of your basement. Does any kind of cabinet and joinery work. Add lathe, shaper and other attachments any time at small cost. For the man who does "odd jobs" in his off time this Parks is a big money maker. Turn out as much as a four-man shop working by yourself.

Write for circular and Parks complete catalog of handy woodworking machinery.

The Parks Ball Bearing Machine Co.

1553 Knowlton Street Cincinnati, Ohio
Canadian Factory: 208 Notre Dame East, Montreal, Can.



World Radio Storage "B" Battery

12 Cell—24 Volt

275

Proved value. Thousands of users find reception almost magical. Clear, true power—instantly and unendingly. Wise economy. Sturdy construction—Solid Rubber Case protection. Recharged for almost nothing. Endorsed and listed as standard by famous Radio institutions including Pop. Radio Laboratories, Pop. Sci. Inst. Standards, Radio News Lab. Lefax, Inc., and other Radio authorities. What more need be said? Extra Offer: 4 Batteries in series (96 volts) \$10.50.

Send No Money Just state number wanted and we will ship same day order is received, by express C. O. D. Pay expressman after examining batteries. 5% discount for cash with order. Remember—you save 50% on World Batteries.

WORLD BATTERY COMPANY

1219 So. Wabash Ave. Dept. 83 Chicago, Ill.
Makers of the Famous World Radio "A" Storage Battery
Prices: 6-volt, 100 Amp. \$10.00; 120 Amp. \$12.00; 140 Amp. \$13.00.
All equipped with Solid Rubber Case.

Set your radio dials at 288.3 meters for the World Storage Battery Station WSB. Variety—New Talent—Always Interesting. JERRY SULLIVAN—Director and Announcer—"Chi-CA-W-go"

LEARN TO ENTERTAIN WITH **Master Magic**

The World's Largest Manufacturers OF TRICKS AND PUZZLES

Send 10cents for new illustrated catalogue. HUNDREDS OF TRICKS YOU CAN DO.

Dept. A "SHERMS" BRIDGEPORT, CONN.

FREE

64 page illustrated book by world-famous physical director. Secrets of health, strength, vitality. Become a muscular marvel—be a Pantherman. Rush name and address. No cost—no strings to this offer. TITUS, 105 East 13th St., Dept. 73, N. Y. City.

Ortho-Sol

Wonderful, new device, guides your hand; corrects your writing in few days. Big Improvement in three hours. No failures. Complete outline FREE. Write C. J. Ozment, Dept. 44 St. Louis, Mo.

Motor Hints

BY GEORGE A. LUERS

(Continued from page 1020)

REPAIRS TO A THREAD IN THE BASE OF THE ENGINE OF CAR

Many car owners, after changing the engine oil, have difficulty in replacing the plug in the base of the engine without crossing the thread. It is awkward to work under the car and before the damage can be detected, it is likely that the plug has been forced all the way in.

The dripping of oil at this location cannot be tolerated, for which reason an immediate repair is required.

To make the repair, without resort to machine shop equipment of special size of drill and tap and without making the drain plug a special size, the work proceeds as shown in the sketch on page 1020.

This consists in securing from the service station, two drain hole plugs.

One of these plugs is filed carefully, relieving the first two threads and forming flutes in the sides, corresponding to a tap with flutes.

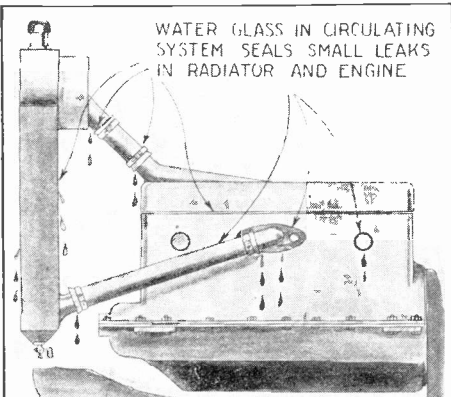
The improvised thread tap, is then case hardened by use of cyanide or bone dust, to carbonize, and quenching.

This plug tap is carefully entered in the broken thread and turned in as far as possible, or until the head shoulders against the crankcase.

The other plug is then used for the regular use as an oil retainer, but the old plug must not be entered in the hole again.

WATER GLASS IN RADIATOR LEAKS AND BROKEN ENGINE REPAIRS

The persistent drip from a small radiator leak or through a defect in the engine block is annoying and a source for constant attention to maintain the radiator filled. With the thermo syphon system, it is essential that the radiator be filled above the top hose level because the circulation will cease when the



One of the best means for sealing leaks in radiator and the water cooling system of automobile engines, is by the use of water glass or sodium silicate. Four to six ounces of the water glass dissolved in the radiator water is sufficient.

level is below this point and overheating will occur in less than a mile of driving.

Flaxseed meal, cornmeal, bran, mustard, oatmeal or the whites of eggs are used in many instances to stop these small leaks. Any of these can be placed in a hot radiator, except the whites of eggs, which must be dissolved in cold water.

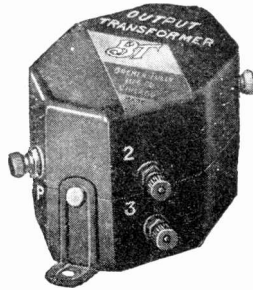
One of the best means for sealing leaks



B-POWER UNIT

No guess work about the voltages delivered by this Unit. There are no variable resistances, no knobs to turn.

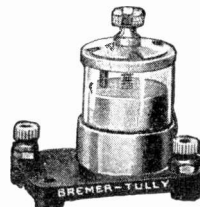
Built to insure satisfaction with the larger sets using power tubes. Capacity 150 volts at 60 mils.—Price \$49.50 complete.



OUTPUT TRANSFORMER

A new B-T product for use between the last audio stage and the speaker unit. It protects the speaker windings and usually results in better tone quality. Necessary when the 171 or equivalent tube is used.

Six terminals offer a selection of ratios—Price \$5.50.



MIKRO MIKE CONDENSER

Used in the Power-Six this highly accurate neutralizing or balancing condenser may be used in any set requiring a balancing condenser.

It cannot be short circuited and remains set where adjusted—Price \$1.00.

**Outstanding Value—
Giving the User More
Than He Expects**

Two reasons why each B-T product has been a success—

Willing to sacrifice the temporary popularity—the Bremer-Tully Company has steadfastly refused to offer for sale anything it believed to be "fads" or novelties.

Instead it has pursued what at first seemed a foolish policy—that of attempting to help radio fans to understand many things about radio thru advertising,—literature, but mostly thru a booklet—"BETTER TUNING."

Now after four years no one questions the standing of the B-T name in Radio. Each year B-T Condensers, Sockets, Kits, B-Power Units and sets offered more real value to the radio fan.

Our experience thru past years in studying radio problems and products gives us the courage to believe that you might value our present opinions.

You will find many interesting radio subjects in the 11th Edition of "Better Tuning."

Send for your copy today — Use Coupon.

POWER-SIX KIT

The essential parts for this new set are available in a kit. Price including a full size colored picture diagram, \$41.50.

Bremer-Tully Mfg. Co.

520 So. Canal St.

Chicago, Ill.

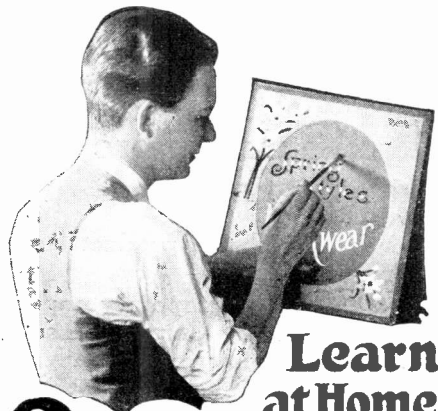
Please send me a copy of the 11th Edition Better Tuning—

I am interested in.....parts;kits;B-Power Unitsfactory built sets.

(please print name)

(address)

Insure your copy reaching you each month. Subscribe to Science & Invention—\$2.50 a year. Experimenter Publishing Co., 53 Park Place, N. Y. C.



Learn at Home to Make Clever Show Cards

A Profitable Business of Your Own for full or spare time. Earn \$25 to \$50 a week in spare time. Double your pay. Practical method of home instruction makes learning easy.

Why work for low pay? Clever "sales-increasing" display material is always needed by progressive business enterprises of every description. \$10 to \$20 is often paid for a single attractive show card. Skilled Show Card Writers command high salaries—right from the start.

Prepare now. No special ability needed. Learn at home in your spare time through a most complete and practical method. We develop your originality and teach you how to make attractive show cards, just like a professional. We give all of your work personal attention through the mail. Scores have learned Show Card Writing this quick, easy way and are now making more and more money each week. SO CAN YOU!

Take advantage of the wide range of money-making opportunities always open in the Show Card field. Make original Show Cards for your own employer or work for several merchants at the same time. Establish a profitable business of your own. Show Card experts earn up to \$110 a week—and more if you're ambitious.

Send for FREE Book

Get busy. Boost your pay. Don't delay your preparation for this uncrowded, lucrative profession. Write today for our big Free Book, full of illustrations. Gives complete details of our practical home-study course. Mail coupon now! WASHINGTON SHOW CARD SCHOOL, Dept. 263-E 1117-15th Street, N. W., Washington, D. C.

Washington Show Card School, Dept. 263-E 1117-15th Street, N. W., Washington, D. C.

Please send me FREE and without obligation, a copy of the new 32-page book, "Quick Success In Show Card Making."

Name
 Address
 City State.....

Aviation

Take a W. A. C. Course in Applied Airplane Engineering. Many men earn \$2000 to \$10,000 a year. Big Free outfit of airplane parts. Write for Free catalog.

WESTERN AIRPLANE CORPORATION
 Dept. S-3 Monadnock Bldg., Chicago, Ill.

MUSIC LESSONS FREE

You can read music like this quickly
 IN YOUR HOME. Write today for our FREE booklet. It tells how to learn to play Piano, Organ, Violin, Mandolin, Guitar, Banjo, etc. Beginners or advanced players. Your only expense about 2c per day for music and postage used. American School of Music, 57 Manhattan Bldg., Chicago

Insure your copy reaching you each month. Subscribe to Science & Invention — \$2.50 a year. Experimenter Publishing Co., 53 Park Pl., N.Y.C.

in the radiator, sand holes in the castings, small cracks in the engine head or leakage around the disc-shaped core hole covers in the side of the engine block is with water glass or silicate of sodium, which is the trade name.

From four to six ounces of this can be dissolved in the radiator water and it circulates through the system, seeping out at all openings.

At the places or points of seepage, it will harden on contact with air and forms a most effective seal.

Where a small break in a casting is repaired with a patch, a canvas gasket under the patch, coated with a thick solution of water glass, will form a most effective seal against leakage at this point.

The silicate of sodium is easily procured at a few cents' cost from any druggist.

OVERHEAD VALVES GROUND WITH TOOL FOR ATTACHING TO STEM

Some owners boast of the long periods they drive their cars without valve grinding or adjustment. The need of grinding them periodically is shown by the fact that neglected valves are cut and pitted on the valve face and cylinder seat, making it necessary to remove much metal with valve seating tools.

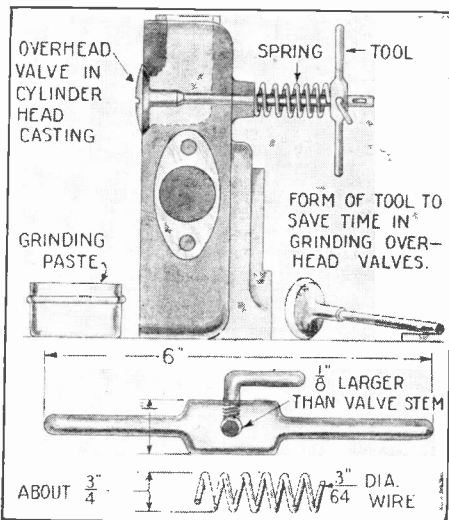
The overhead valve is one of the troublesome types to grind and is the one type most likely to be neglected for reason of the trouble.

A fast, serviceable and satisfactory means of grinding the overhead valves, of a removable cylinder head especially, is through use of a simple tool shown in the attached sketch.

This tool is made similar to a tap wrench and instead of attaching to the head of the valve, it is attached to the stem. A small spring is used under the tool and against the face of the casting to bring the valve firmly against the seat.

The tool is partly rotated to give the usual oscillating movement for grinding in the seat. Replenishment of the grinding compound between the valve and seat is accomplished by compressing the spring and the position of the valve is also changed by pushing down against the spring.

This tool will save time and effort in grinding valves on any cylinder head of the type on which it can be used.

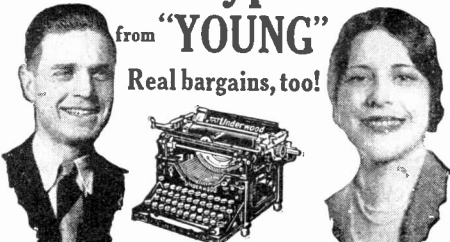


The illustration above shows a simple tool which can be attached to the stem of overhead valves for the purpose of grinding the valve and seat.

Wood Whittling

Read the interesting article, giving hints on this art in the next issue.

We're glad we bought our Typewriters



Don't let anyone fool you. There is only one "Young Process of Re-Manufacturing" originated and used exclusively by the Young Typewriter Co. Others may try to imitate, but "Young" is the only one that knows how it's done!

Prices Reduced

Express Prepaid on all standard makes for the next 30 days.

Free Trial Big bargains, easy payments on late model Underwoods, Royals, L. C. Smiths, Remingtons, etc. — perfect machines expertly remanufactured by the "Young Process" guaranteed like new for five years. Shipped direct from our factory to you at big saving. Our big illustrated catalog sent free and without obligation to buy. Write today.

Young Typewriter Company 654 W. Randolph Street Dept. 1152 CHICAGO (Originators of famous "Young Process")

RESHAPE YOUR NOSE

to beautiful proportions — while you sleep!

ANITA NOSE ADJUSTER is SAFE, painless, comfortable. Speedy, permanent results guaranteed. Doctors praise it. No metal to harm you. Small cost. Write for FREE BOOKLET BEFORE-AFTER

Gold Medal Won 1923

ANITA CO., Dept. C-73 ANITA Bldg., NEWARK, N. J.

Your Coat and Vest Can Be Matched With New Trousers

Save the price of a new suit. We match hundreds of coats and vests satisfactorily every day. Each pair tailored to your measure. 80,000 patterns. We submit sample of cloth for your approval. Just mail your vest or a sample of the suit. We employ no agents.

Enclose return postage if vest is sent.

ACME PATENTS MATCHERS Dept. BC-16
 20 W. Jackson, Chicago

MODEL MAKING

When you have made your Model Boiler, you will naturally wish to mount it with the best Steam Fittings obtainable. We can supply accurately made miniature Steam and Water Gauges, Steam Valves, Pumps, etc., also finished Engines and Rollers suitable for Model boats and stationary purposes. Special work to order. Large illustrated catalog 20c (refunded on first order).

BATHE MFG. CO.
 Dept. 2, 5214 Woodland Ave., Phila., Pa.

LAW

Personal Instruction By Mail Be a lawyer or law trained business man. Quality to earn \$2,500.00 to \$25,000.00 a year. EASY TERMS. Textbooks furnished. Practical and authoritative non-resident course. Endorsed by bench and bar. Prepares for bar or business. Over 60,000 students. PERSONAL INSTRUCTION. Guarantee to coach free any graduate failing to pass bar exams. SPECIAL REDUCED TUITION OFFER now in force. Write today for particulars and book on law FREE.

AMERICAN CORRESPONDENCE SCHOOL OF LAW
 Dept. 1423 3601 Michigan Avenue, CHICAGO

FREE RADIO GUIDE

Gives special hook-ups with illustrations. Shows the latest sets, the newest developments in radio at startlingly low prices. Get the set you want here and save up to 50%. Everything in parts. Kits, complete factory built sets and supplies. Orders filled same day received. Write for free 164-page copy NOW, also please send name of one or more radio fans.

BARAWIK CO., 540-557 Monroe St., Chicago, U. S. A.

Insure your copy reaching you each month. Subscribe to SCIENCE AND INVENTION—\$2.50 a year. Experimenter Publishing Co., 53 Park Place, New York, N. Y.

Make \$7.50 Every Day Right In Your Own Home! Start Anywhere--Any Time

It costs you nothing to learn how to start in to make good MONEY right in your own HOME TOWN. We will give you THREE DIFFERENT PLANS, one of which Plans is the famous "Mail Order Plan" whereby you can earn MONEY, either by part or full time, in the Privacy of Your Own Room, or by mail, or by personal solicitation. Beside that, we will give you a list of TWO HUNDRED "HOME" and other OPPORTUNITIES. Nearly every kind of work, all this we give you WITHOUT EXTRA CHARGE. Simply fill in the space below, and mail this adv., and ONE DOLLAR, for a Full Year of "THE HOME WORKERS' Magazine," a Magazine that specializes in giving articles on Applied Psychology and Ideas. Suggestions, and Plans for MAKING MONEY AT HOME. It is also an EXCHANGE for Buying, Selling and Renting Correspondence Courses and Books. (A copy of the magazine alone sent for 25c, none free). Remember you get these THREE MONEY-MAKING PLANS, and 200 OPPORTUNITIES FREE! Simply by subscribing to our Modern Progressive Constructive Magazine.

THE HOME MAGAZINE

Box 912, Dept. S. Nashville, Tennessee

Here is my DOLLAR, send me the THREE PLANS, 200 Opportunities, and a full year of The HOME Magazine.

Name
Address

Why a Cat Always Lands On Its Feet

(Continued from page 995)

swing further than the long one does. We say the moment of inertia of the long pendulum is greater than that of the small one, and now we will apply the moment of inertia to the cat. When the cat falls, it can make its hips and rear of the body pivot, as referred to the chest and front of the body, around an axis represented by its vertebral column. By the reaction the hind legs and hips turn in one direction, while the thorax turns through the same angle in the opposite direction.

The secret of the cat's action is that it modifies the moment of inertia of the parts of its body which do turn, so that one turns a little further than the other and in the proper direction. When the cat is in the air it can extend or draw back its paws. It can make the rear part of its body represent a short pendulum by drawing in the hind feet, so as to reduce the moment of inertia of that part of the body. By the reverse action, it can increase it. In this way it can make the moment of inertia of the rear of the body less than that of the front by the action of the paws. And now, as we have seen in the case of the two pendulums, the arc described by the rear of the body will be of greater angular magnitude than the arc described in the opposite direction by the front of the body and the thorax. As a result, the rear of the body gains in the angle of rotation in the opposite direction to the motion of the front of the body. Now, drawing in the legs which it had extended, and extending those which it had drawn in, it will make a gain once more in the same direction and so on.

First: The hind legs are kept extended, the front legs are drawn closely to the body, the thorax turns, we will say clockwise; the rear part of the body will be almost immobile. Second: The front legs are quickly extended; the hind legs drawn in, the thorax with its increased moment of inertia hardly changes, while the rear of the body turns again clockwise; the half turn is completed.

ELECTRICAL EXPERT'S OUTFIT



Complete when you enroll

\$50 VALUE. Real tools—no toys.

HERE ARE THE TOOLS that make money. Free, too, if you accept this special offer for S. of E. electrical training. Just a few happy hours each week at home means big success. Work that's full of thrills and fun. Send coupon for FREE book.

OUR MONEY BACK GUARANTEE BOND means that your training must absolutely satisfy you or every penny is refunded. S. of E. training makes good—with you. Our 23 years' experience has shown us the one right way for success. Mr. Harnischfeger, president of the Harnischfeger Corp'n, one of the largest electrical concerns in America says, "The best recommendation I have for your school is the number of your graduates who have made good in our organization. Their training is right."

LET THE OTHER FELLOW slave away at \$25 a week. You get the real job with S. of E. training. Our men go to the Western Electric, Harnischfeger Corp., Nordberg Mfg. Co., Allis Chalmers, and other big electrical concerns. Or you go into business for yourself and be your own boss.

In Business for Yourself



Hundreds of S. of E. Students locate for themselves with our help and make big money.

\$65 A WEEK AND UP is just ordinary pay in electrical work. Even common electricians make that much. But with S. of E. training you can be an electrical expert and get the big job.

OPPORTUNITIES BY THOUSANDS every day. No slack seasons. The electrical boom is just starting. S. of E. men are demanded first because our 23 years' experience means better and more practical training for our students.

64 PAGE BOOK NOW FREE—send for your copy free and postpaid. Money Back guarantee that our course satisfies or money back. Mail coupon today without fail.

A Personal Challenge

"Whatever your present occupation you can train you for success in electricity. Put yourself in my hands."



Oscar Werwath, Pres.

CLIP NOW!

School of Engineering
Dept. SI-H327
Box 331, Milwaukee, Wis.

Charles P. Steinhilber, A.M.P.D., "Electric Wizard" of General Electric was for the last 6 years of his life an advisory board of S. of E.

\$65 A WEEK AND UP!

A chance of a real career in electricity for yourself. In business or rapid advancement with electrical concerns.

Please send me free and postpaid your 64 page book giving details of S. of E. training. Also details of your Money-Back guarantee.

Name
Address
City State

PIMPLES

Cleared Up—often in 24 hours. To prove you can be rid of Pimples, Blackheads, Acne Eruptions on the face or body, Barbers' Itch, Eczema, Enlarged Pores, Oily or Shiny Skin, simply send me your name and address today—no cost—no obligation. CLEAR-TONE tried and tested in over 100,000 cases—used like toilet water—is simply magical in prompt results. You can repay the favor by telling your friends; if not, the loss is mine. WRITE TODAY. E. S. GIVENS, 468 Chemical Bldg., Kansas City, Mo.

RADIO BOOK FREE

Tells how you can make big money in world's newest and greatest field. Presents lifetime opportunity in Radio. Right now we want live agents and dealers in every locality. \$60 to \$100 a week easy.

40% to 60% Profit
Simply send name for this big illustrated book explaining liberal profit proposition and how to get latest radio goods at wholesale. Also prices on parts, sets and accessories and amazing special offers—all FREE. Write today

5 Tube Set
only \$39.50 RETAIL

Standard Radio Co. 1412 Walnut St., Kansas City, Mo.

Print Your Own

Cards, Stationery, Circulars, Paper, etc. Save money. Print for others, big profit. Complete outfit \$8.85, Job press \$11.29, Rotary \$14.99. All easy rules sent. Write for catalog presses type etc. **THE KELSEY CO., P-47, Meriden, Conn.**

DON'T MISS

*The Big Book Review
Section in This Issue*

WATCH FOR IT EVERY MONTH
REVIEWS OF LEADING BOOKS

Rules for Model Contest

(Continued from page 1018)

1. A handsome trophy cup engraved with your name, will be awarded as the prize for the best model submitted during the month. The decision of the judges will be final and will be based upon, A—novelty of construction; B—workmanship; C—operating efficiency of the model as related to the efficiency of the device which the model simulates; and D—the care exercised in design and in submitting to us sketches and other details covering the model.
2. Models of all kinds may be entered. They may be working models or not, according to the subject that is being handled.
3. Models may be made of any available material, preferably something that is cheap and easily obtainable. Models made of matches should not be submitted to this department but should go to our Matchcraft Contest Editor.
4. Models must be submitted in all cases. Good photographs are also highly desirable and where the maker does not desire the model to be taken apart, legible drawings with all dimensions covering parts that are not accessible must be submitted.
5. Models should be securely crated and protected against damage in shipment and sent to us by parcel post, express or freight, prepaid. Models will be returned when requested.
6. Models for entry in any particular contest must reach this office on or before the 25th of the third month preceding date of publication. For instance, models for the March contest must reach us on or before the 25th of December.
7. Address all entries to Editor Model Department, c/o Science and Invention Magazine, 53 Park Place, New York City.



SHOW CARD LETTERING

Learn at Home

HERE is the very course you need if you want to get a good paying position as a Show Card Letterer or Sign Letterer, or have a business of your own. This course is complete and practical and especially arranged to meet the needs of the student who studies at home. It was written by E. L. Koller, Principal of the School of Art of the International Correspondence Schools, member of the American Federation of Arts, and The National Society of Craftsmen.

Mr. Koller has had twenty years' teaching experience, and his success in helping other men and women is an indication of what he can do for you.

H. L. Wood, a clerk, made more than \$700 "on the side" before he had completed his course and also won \$125 in prizes. Harry William Lord writes that he has more than doubled his salary as a result of studying this I. C. S. course in spare time. William Whitman, a former wagon builder, now has a sign painting business of his own and is earning nearly three times as much as he did before enrolling with the International Correspondence Schools.

There is no doubt that Show Card Lettering and Sign Lettering offer a real opportunity to ambitious men and women. Just mark and mail the coupon and we'll gladly send you a booklet telling all about the I. C. S. course in Show Card Lettering, or any other subject in which you are interested.

INTERNATIONAL CORRESPONDENCE SCHOOLS
Box 6185-E, Scranton, Penna.

Without cost or obligation on my part, please send me one of your booklets and tell me how I can qualify for the position or in the subject before which I have marked an X:

SHOW CARD LETTERING

- | | |
|---|---|
| <input type="checkbox"/> ILLUSTRATING | <input type="checkbox"/> CARTOONING |
| <input type="checkbox"/> Business Management | <input type="checkbox"/> Advertising |
| <input type="checkbox"/> Business Law | <input type="checkbox"/> Better Letters |
| <input type="checkbox"/> Banking and Banking Law | <input type="checkbox"/> Stenography and Typing |
| <input type="checkbox"/> Accountancy (including C.P.A.) | <input type="checkbox"/> Business English |
| <input type="checkbox"/> Nicholson Cost Accounting | <input type="checkbox"/> Civil Service |
| <input type="checkbox"/> Bookkeeping | <input type="checkbox"/> Railway Mail Clerk |
| <input type="checkbox"/> Private Secretary | <input type="checkbox"/> Common School Subjects |
| <input type="checkbox"/> Salesmanship | <input type="checkbox"/> High School Subjects |

TECHNICAL AND INDUSTRIAL COURSES

- | | |
|---|--|
| <input type="checkbox"/> Electrical Engineering | <input type="checkbox"/> Surveying and Mapping |
| <input type="checkbox"/> Electric Lighting | <input type="checkbox"/> Architect |
| <input type="checkbox"/> Mechanical Engineer | <input type="checkbox"/> Architects' Blueprints |
| <input type="checkbox"/> Mechanical Draftsman | <input type="checkbox"/> Contractor and Builder |
| <input type="checkbox"/> Machine Shop Practice | <input type="checkbox"/> Architectural Draftsman |
| <input type="checkbox"/> Railroad Positions | <input type="checkbox"/> Structural Engineer |
| <input type="checkbox"/> Gas Engine Operating | <input type="checkbox"/> Chemistry <input type="checkbox"/> Pharmacy |
| <input type="checkbox"/> Civil Engineer | <input type="checkbox"/> Automobiles |
| <input type="checkbox"/> Steam Engineering <input type="checkbox"/> Radio | <input type="checkbox"/> Mathematics |

Name.....

Street Address.....

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

Canadians may send this coupon to International Correspondence Schools Canadian, Limited, Montreal, Canada

BECOME AN EXPERT ACCOUNTANT

Executive Accountants and C. P. A.'s earn \$3,000 to \$10,000 a year. Thousands of firms need them. Only 9,000 Certified Public Accountants in the United States. We train you thoroughly at home in spare time for C. P. A. examinations or executive accounting positions. Previous experience unnecessary. Training under the personal supervision of William B. Castenholz, A. M., C. P. A., and a large staff of C. P. A.'s, including members of the American Institute of Accountants. Write for free book: "Accountancy, the Profession that Pays." LaSalle Extension University, Dep 3384-H Chicago The World's Largest Business Training Institution

CHEMISTS

OUR NEW CATALOG OF

Laboratory Apparatus and Chemicals (1000 illustrations) containing a complete line, is now ready for distribution. Sent on receipt of 25c. RADIO CATALOG (100 pages) liberal discounts, 10c.

Laboratory Materials Company
635 East 71st St., Chicago, U.S.A.

Wirecraft--\$3,000.00 in Prizes

(Continued from page 1013)

It will be more popular than the Matchcraft Contest which expired last month. A decided advantage of this contest over the Matchcraft Contest is that models submitted will not break as easily. No names are listed on the Wirecraft page because no awards have as yet been announced. The list of names and the prizes which they win will be given in the April issue.

Rules of Wirecraft Contest

THIS is a wirecraft contest. Hence wire is to be used in the construction of all of the models entered in this contest.

The size of the wire to be employed is limited. The heaviest wire must not be larger than No. 8 American or B and S gauge, and the smallest no smaller than No. 30 B and S gauge—or (for foreign countries not having these exact sizes), the nearest available equivalent.

No. 8 B and S gauge is .12849 inches in diameter or 3.264 millimeters. Its nearest equivalent in the Birmingham or Stubs iron wire gauge is No. 18. In the Stubs steel wire gauge it is No. 30; in the British Imperial Standard it is No. 10. The nearest wire to No. 30 B and S gauge which is .01002 inches or .2546 millimeters in diameter is No. 31 in the Birmingham or Stubs iron wire gauge. In the Stubs steel wire gauge it is No. 80; in the British Standard it is No. 33.

The builder may avail himself of the opportunity of using any intermediate sizes of wires between No. 8 and No. 30, B and S gauge.

The wire may be copper, brass, iron, steel, or these materials coppered, tinned, nickel-plated, or galvanized, or the wire may consist of an alloy. Any kind of wire available on the market may be employed.

It is preferable to use non-rusting wires. The publishers will not be responsible for the rusting of any model. To protect wire which rusts easily or for color effects, the models may be painted, lacquered, varnished or otherwise covered.

Any additional decorations or accessories may be employed to enhance the effect. (Example: Silk on a lamp shade; glass in decorative fixtures; electric motors for operating mechanisms, etc.)

Only those portions actually constructed of wire will be judged.

(Example: A reed basket is suspended from a wire chain. The basket not being made of wire is NOT considered. On the merits of the chain only will the prize be awarded.)

Wires may be twisted, spliced, soldered, welded or bound together. Wire may be used to bind other wires together. If soldered a non-corrosive soldering flux should be employed.

There is no limit to the size of the models which may be entered nor to the number of entries which any maker may submit during any calendar month.

In every case the model must be forwarded express prepaid to SCIENCE AND INVENTION Magazine. It should be tagged with name and address of the maker, who will prepay charges if model is to be returned.

The first prize will always be awarded to a model possessing the greatest utilitarian merits. This must be an object NOT found on the market today.

The second prize will always be awarded to an object possessing the best decorative artistic or constructive effect. It may be a replica of an existing object or a model of an imaginative object or effect.

The remaining prizes will be judged from either one or the other viewpoints at the discretion of the judges.

All models may remain at the office of this publication until the close of the contest at the discretion of the editors.

This contest starts January 1st, 1927, and will terminate January 1st, 1928.

This is a monthly contest lasting for twelve months, each monthly contest closing on the first of the month following dates of issue. Thus the contest for the month of March, 1927, will close April 1st, 1927. Winners for March will be announced in the June Issue.

Address all entries to Editor Wirecraft
SCIENCE & INVENTION MAGAZINE,
53 Park Place, New York City

EARN UP TO \$125.00 A WEEK

MECHANICAL DENTISTRY

Making crowns, bridges, plates, etc., for dentists. You can learn

FREE BOOK on Mechanical Dentistry

Free Railroad Fare to nearest school. We help you secure spare time job while learning. Day or night school. Free Book on Mechanical Dentistry. Send for copy to

McCARRIE SCHOOLS of Mechanical Dentistry
1338 S. Michigan Ave., Dept. 68 Chicago, Ill.

BUY DIRECT. SAVE HALF.

GRADE A QUALITY GOODS at WHOLESALE

SEND for FREE BOOK

Any handy man can install his own plumbing and heating by our new, easy method. FREE installing plans show you how. You save waste and high labor cost with our cut-to-fit system. Fifty years of economy service to home owners, farmers, builders and mechanics. Million dollar plants behind our guarantee. Free Book shows everything in plumbing and heating fixtures and supplies. Write today. **HARDIN-LAVIN COMPANY.** ESTABLISHED 1876
104-14 West Pershing Road, Chicago, Ill.

Electrical Course for men of ambition and limited time. Over 4000 men trained. Condensed course in Theoretical and Practical Electrical

Engineering Including the close subjects of Mathematics and Mechanical Drawing taught by experts. Students construct motors, install wiring, test electrical machinery. Complete course

In One Year

Prepare for your profession in the most interesting city in the world. School established 1893. Send for catalog. **BLISS ELECTRICAL SCHOOL**
403 Takoma Ave., Washington, D. C.

MYSTERIOUS!

Winner for Agents

New Pocket Lighter! What Makes it Light? Why can't a Blizzard Blow it out? No flint—No Friction—No Troublesome Parts. Why fool with matches NOW? Instant—Infallible—Guaranteed. Send 5c for Sample and Selling Plans. **NEW METHOD MFG. CO.** Box S-1-2 Bradford, Pa.

You can be quickly cured, if you

STAMMER

Send 10 cents for 288-page book on Stammering and Stuttering, "Its Cause and Cure." It tells how I cured myself after stammering 20 yrs. B. N. Bogue, 8138 Bogue Bldg. 1147 N. III. St. Indianapolis

Learn Advertising at HOME

Many of the highest paid men in the world are advertising men. You can learn easily and quickly at home during your spare time. We guarantee satisfaction. Bigger opportunities now in advertising than ever before. Constant demand for our graduates at splendid pay. Send for FREE Book. Giving interesting information and vital facts—just what you want to know about advertising. Write today. **PAGE-DAVIS SCHOOL OF ADVERTISING** Dept. 1423 3601 S. Michigan Ave., Chicago, U.S.A.

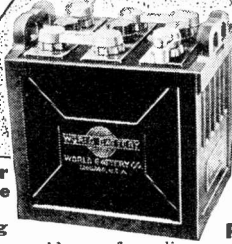
NEW—

Gigantic Spring Edition of

RADIO LISTENER'S GUIDE and CALL BOOK

196 Pages of Radio
50c EVERYWHERE

DESIGNED to OUTLAST World Storage A Battery



Two-Year
Guarantee
Bond
in Writing

NEW
LOW
PRICES

Famous the world over for reliable, enduring performance. Solid Rubber Case lasting protection against acid or leakage.

Approved and Listed as
Standard by Leading
Authorities

including Radio News Laboratories, Popular Sci. Inst. Standards, Pop. Radio Laboratories, Radio Broadcast Laboratories, Radio in the Home and Lefax, Inc.

Send No Money

Just state number wanted and we will ship same day order is received, by express C.O.D. Pay expressman after examining batteries. 5% discount for cash with order. Remember, you save 50% on World Batteries—so send your order today.

WORLD BATTERY COMPANY
Dept. 19
1219 S. Wabash Ave., Chicago, Ill.

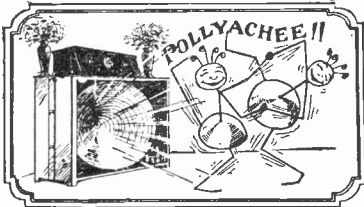
Solid Rubber Case
Radio Batteries
6-Volt, 100-Amperes \$10.00
6-Volt, 120-Amperes \$12.00
6-Volt, 140-Amperes \$15.00

Solid Rubber Case
Auto Batteries
6-Volt, 11-Plate \$10.00
6-Volt, 13-Plate \$12.00
12-Volt, 7-Plate \$14.50

Set your radio dial at 288.3 meters for the World Storage Battery Station WSBC. Variety—new talent—always interesting. Jerry Sullivan, Dir. and Announcer. "Chi-GA-W-go"

KDKA WSBC WEF KYW

WORLD'S FINEST
(3 FT. CONE) LOUD SPEAKER
"ENSCO" KITS—\$10.00



The choice of leading engineers. Write for booklet on how to make this in less than an hour.

ENGINEERS SERVICE COMPANY
25 Church Street New York

IT'S NEW

PIANO Playing with absolute no practice—FOR 50c

New system shows exactly how to play complete melody solos, songs or accompaniments with or without notes at once. Shows exactly what keys to strike. Marvelous, more simplified than any system ever conceived. Try my first book—gives 27 complete songs—If it isn't the most wonderful startling and easiest way of playing you ever saw, we will return your money. Send 50c—for Book with instructions and 27 songs played without notes. Book showing how to play instrumental melodies with or without notes, \$1.00.

PROFESSOR
M. LA FONTAINE
226 West 50th Street
New York City, N. Y.

BABY CALCULATOR
CHICAGO U.S.A. PATENT APPLIED FOR

NEW POCKET SIZE—Does work of \$300 machine. Guaranteed 5 yrs. Made of Steel—not a Toy.

FREE TRIAL SEND NO MONEY

\$2.50 Total Cost

Just name and address. We will ship immediately. Pay postman \$2.50 plus postage on delivery. If not satisfied after 10 day trial money refunded.

Agents Wanted
Baby Calculator Sales Co., Dept. 14
P.O. Box No. 1118 Chicago, Ill.

Insure your copy reaching you each month. Subscribe to Science & Invention — \$2.50 a year. Experimenter Publishing Co., 53 Park Pl., N.Y.C.

\$3,000.00 In Prizes Arranged in Monthly Awards

First Prize	\$100.00
For Utility Only	
Second Prize	50.00
For Artistic, Decorative or Constructive Effect—may be a replica or model of some imaginative or existing object.	
Third Prize	25.00
Fourth Prize	20.00
Fifth Prize	15.00
Sixth Prize	10.00
Seventh Prize	7.50
Eighth Prize	5.00
Ninth Prize	3.50
10th to 16th Prizes of \$2.00 each	14.00
Total	\$250.00

Tools Required

THE tools required for the construction of Wirecraft articles may be found in the Dec. issue of this publication, a reprint of which will be sent free upon request. The following tools may be used advantageously:

1 pair flat-nosed pliers. 1 pair round-nosed pliers. 1 wire cutter. 1 hacksaw. 1 small vise. 1 soldering iron.

The materials which are necessary are:

Solder, soldering paste or flux, nails, one piece of wood, and most important of all, wire of the sizes specified in the contest rules and regulations.

If the builder decided to weld his wires together, a small welding transformer or a storage battery may be used for this purpose. For the formation of long cylinders, a coil winding machine or a lathe may be advantageously employed. Toy motors for the operation of any devices constructed of wire could of course be procured and added to the model and the addition of miniature sockets and bulbs to illuminate the interior of any buildings constructed of wire might also find a place in some of the constructions.

Hints on Home Heating

By H. WINFIELD SECOR
(Continued from page 994)

for suspending by wire hooks on the back of radiators, or else on the top of radiators, as the pictures below show. Sometime ago we described an electric humidifier in the columns of this journal, this device comprising an electric fan and wick arrangement for evaporating moisture, and circulating it about the room. Most warm air furnaces nowadays are fitted with water pans which have to be filled daily, or as is the case in several instances, the water or humidity pan is automatically filled by a float arrangement, similar to the tanks in bathrooms. One of the reasons why we catch cold so easily in the wintertime has been ascertained as due to the fact that we keep our homes and offices too hot and moreover too dry. Thus the reason for watching the humidity, and the wise home owner will buy himself a simple inexpensive hygrometer.

The third picture on page 994 shows a very useful idea in the form of an external coal bin made out of concrete. This saves cellar space, and the coal always feeds down to the shovel hole, as becomes apparent on inspection of the drawing. The concrete is mixed in the usual manner and moulded by means of wooden forms built of boards.

Gain Vigor and Manliness THROUGH STRONGFORTISM



Be defiant, courageous and MANLY!

You won't be regarded as a real man by men or women if you are a slouching, nervous, fidgeting grouch—slinking along afraid of your shadow, timid in company; with catarrhal breath, rheumatic, constipated, dispeptic—round shouldered; with unsteady step,—a cold clammy grip;—lacking pep, punch or personality—you simply won't get anywhere. FELLOWS OF THIS TYPE ARE NOT WANTED.

If you are a weakling—sickly, nervous and always pessimistic—you will feel your inferiority wherever you go. Men will shun you. Women will not be attracted to you. Even dogs will bark at you!

IT IS THE PENALTY YOU PAY FOR WEAKNESS!—but you won't have to pay this price if you will face the facts and make up your mind you are going to go to the mat with ill-health and fight to a finish. It's up to you—TO YOU ALONE. You can overcome weakness.

STRONGFORT
Builder of Men

You can be raised from the depths of despair and despondency to the heights of glorious manhood. You can be powerful, vigorous, manly, happy and successful if you but give Nature a chance to work through my proven system.

STRONGFORTISM WILL MAKE A HE-MAN OF YOU

Through STRONGFORTISM men all over the world have been rejuvenated and restored to health and strength after they have suffered untold mental and physical horrors as the inevitable result of excesses, fast living, and abuse of their physical powers. STRONGFORTISM has a record unparalleled—there is no other system, or method, or course that compares with it in restoring impaired human beings to virile, manly strength by utilizing Nature's forces scientifically. It builds up the internal muscular system first and thus gets rid of CONSTIPATION, DYSPEPSIA, INDIGESTION, HEART AILMENTS, BAD BLOOD, CATARRHAL TROUBLES, RHEUMATISM and other afflictions, increasing your energy and stamina. External muscular development follows quickly and you become a new man inside and out—a fellow to be reckoned with and envied wherever you go.

I Want To Send You
MY FREE BOOK

This book of many pages and dozens of pictures tells of my wonderful experience—how I became the outstanding athlete of the world, performing feats others dared not attempt; how I turned the knowledge gained through developing my own body to the benefit of others, and then how STRONGFORTISM was evolved. It tells what I have done for others, what I can do for you. It doesn't mince words. It tells plain truths. "Promotion and Conservation of Health, Strength and Mental Energy," points the way from disease and weakness to health and strength. It is priceless. I'll send it to you on request—FREE. Write for your copy today.

STRONGFORT INSTITUTE
LIONEL STRONGFORT, DIRECTOR.
PHYSICAL AND HEALTH SPECIALIST
DEPT. 313 NEWARK, NEW JERSEY, U.S.A.

CLIP AND SEND THIS
FREE CONSULTATION COUPON
ABSOLUTELY CONFIDENTIAL

Mr. Lionel Strongfort, Strongfort Institute, Dept. 313, Newark, N. J.—Please send me absolutely free my copy of your book, "PROMOTION AND CONSERVATION OF HEALTH, STRENGTH AND MENTAL ENERGY." I have marked (X) before the subjects in which I am most interested.

- | | | |
|-------------|----------------|------------------------|
| ..Catarrh | ..Overweight | ..Great Strength |
| ..Colds | ..Constipation | ..Vital Losses |
| ..Asthma | ..Weak Back | ..Lung Troubles |
| ..Headache | ..Weak Eyes | ..Round Shoulders |
| ..Rupture | ..Rheumatism | ..Youthful Errors |
| ..Thinness | ..Nervousness | ..Manhood Restored |
| ..Pimples | ..Night Losses | ..Stomach Disorders |
| ..Insomnia | ..Short Breath | ..Increased Height |
| ..Impotency | ..Weak Heart | ..Muscular Development |

Other Ailments

Name

Age

Occupation

Street

City

State

New Low Price

The most modern, authoritative, encyclopaedia. All the world's knowledge ready for instant use in speeches, articles, reports, lectures, lessons—for study or for fascinating reading. By combining numerous economies in printing a large edition—binding in 13 volumes instead of 25—contents completely identical with the larger work—savings in manufacturing cost make it easy now for you to obtain, at a new low price

THE NEW INTERNATIONAL ENCYCLOPAEDIA



America's Own Greatest Reference Work

Britain, France, and Germany each has a national Encyclopaedia written from the viewpoint of its own people. The New International is prepared under the direction of the highest American scholarship, the only Encyclopaedia that can adequately meet the needs of the American people.

Free 80-page Booklet

Mail the coupon below for specimen pages from articles on Napoleon, Emerson, Washington, Archaeology, Aeronautics, Architecture, Combustion Engines, Earthquakes, and many other subjects, with abstract from "Courses of Reading and Study," together with information about the easy terms of payment.

DODD, MEAD & COMPANY, Inc.
449 Fourth Avenue, New York

Please send me without cost or obligation a copy of your booklet of specimen pages, full information about The New International Encyclopaedia, and the easy terms of payment.
Sci. & Inv. 3-27

Name
Address

OWN AN UNDERWOOD TYPEWRITER!



Prices CUT!



\$3.00
and
it's
yours!

A GENUINE UNDERWOOD!
Clip and mail this. If you want a real rebuilt UNDERWOOD—made of all typewriters. Remanufactured and guaranteed FIVE years. Price and terms you'll NEVER see equaled.
FREE BOOK with this BARGAIN and other models in FULL COLORS! Typist's Manual, touch typewriting course offer, etc. Write at ONCE to Shipman-Ward Mfg. Co., 2163 Shipman Bldg., Chicago.

Name
Address

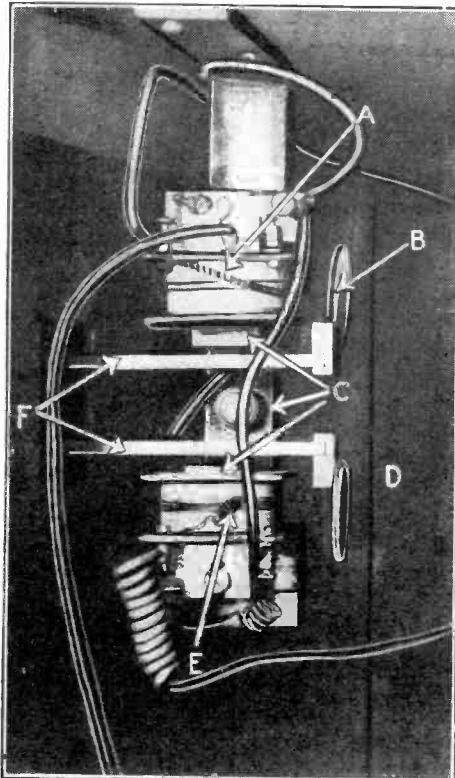
Television by New French System

By LUCIEN FOURNIER
(Continued from page 988)

brilliance as to cause great discomfort to their possessors. Mr. Baird at the new demonstration showed that he could transmit faces of human beings sitting in a room of inky blackness to a screen fixed in another room in which the watchers were in total darkness.

The inventor accomplishes this seeming miracle by using invisible infra-red rays. Such rays, he states, will pierce fog. By means of them it will be possible for a general in future wars to see every movement, even in the darkness, enemy troops, and an airplane can be watched without the aviator realizing that his presence is detected. In a fog at sea a beam of invisible light sweeping the water in front of a vessel will pick up any object ahead of it, such as another vessel or land.

It is the inventor's belief that in another year television will be a commercial proposition and the apparatus will be sold for \$150. It will enable its users to see and hear at the same time in connection with either the telephone or radio.



A—Coil producing alternating current of ten cycles; B—mirror; C—permanent magnetic circuit; D—frame; E—receiving coil of the tuning fork connected to the triode tubes; F—legs of the tuning fork (oscillating armature of the alternator).

REPORT LOUD PHONOGRAPH

A phonograph which, it is asserted, produces the tone volume of twenty orchestral instruments has been invented jointly by a Berlin, Germany locksmith, Paul Garn, and a carpenter, Wilhelm Pachali.

A mixture of atomized air and oil is generated with the aid of a hand-pump and then projected through a tube to the resonator. It is by the influx of this mixture into the soundbox, that the tone volume is augmented to such a degree as to create the effect of a full regimental band.



A Motor Boat—for half the cost!

The Super Elto clamps on any open boat—gives all motor boating pleasures at amazingly small cost. Powerful, speedy, reliable. Light and portable. Write today for intensely interesting catalog!

The Super Elto
Elto Outboard Motor Co.
Ole Evruds, Pres.
Dept. 48, Mfrs. Home Bldg.
Milwaukee, Wis.

"Starts With a Quarter Turn"

CAMERA FREE

Your Choice—\$100 Professional MOTION PICTURE Camera or Professional View Camera.

Be a motion Picture Cameraman. Portrait, News or Commercial Photographer. Big money in all branches. Hundreds of positions now open pay \$75 to \$250 a week. Easy, fascinating work.

BIG MONEY IN PHOTOGRAPHY
In your spare time at home you can quickly qualify for a big paying position and you get your choice of these standard professional cameras absolutely FREE. Instruction also given in our great New York Studios.

Write for FREE BOOK
Send name and address for big, new, illustrated book on professional photography. Explains amazing opportunities. Write for your copy tonight!
New York Institute of Photography
Dept. 82 10 West 33rd St., N. Y. City

Learn How to BOX

in 20 weeks, the System of Jimmy DeForest, World's Greatest Trainer and Maker of Champions, teaches you all there is to learn about boxing and physical training. Every 6 months 30 are selected from all classes and recommended to leading promoters for engagements. Send for famous book "The Golden Age of Boxing," full of valuable information, photos of great boxers and pupils who became successes overnight. Enclose 10c to cover cost of mailing, etc.
JIMMY DEFOREST BOXING COURSE, Box 3015
347 Madison Avenue New York City

\$100 a week Selling Shirts

Fred Frankel, Ill. writes: "I earned \$110 first week selling Carlton Shirts direct to consumer." You can too. No capital or experience required. We pay 25 per cent. cash commissions daily and big extra bonuses.
WRITE FOR FREE SAMPLES
CARLTON MILLS, Inc., Shirt Mfrs.
114 Fifth Ave., Dept. 166-C, N. Y.

DETECTIVES!

We train you to be a real detective. The CONNORS system of Lectures on THE SCIENCE OF CRIME DETECTION trains you to be a secret service operative and enables you to expertly handle criminal and civil investigations in five to ten weeks. Write for full information to Training Dept. 22A, CONNORS DETECTIVE AGENCY, New Haven, Conn.
Firms in need of detectives, write us.

NEW!

Spring Edition Radio Listener's Guide

Special Gigantic Broadcast Contest—10 Silver Cups and Souvenirs Given Away.
Broadcast Station List—New Circuits—

Data—Information—192 Pages.
ORDER YOUR COPY NOW

50c ON ALL NEWSSTANDS



FOKKER North Pole Monoplane Construction Outfit—\$8.50

Build and Fly Models of Famous Airplanes

It's the most interesting thing you ever tackled; develops your mechanical ability; teaches the principles of aviation; shows you the parts of big machines, how they are constructed and operated, what makes them fly, and many other things real aviators must know. Any bright boy can do it. Ideal Scale Drawings and Building-Flying Instructions show how, and Ideal Model Airplane Construction Outfits contain everything needed. For 25 cents we will send you the complete plans (3 ft. size) for any one of the following airplanes: **Fokker North Pole Plane; Curtiss JN4D-2 Training Plane; De Havilland "Round-the-World" Flyer; NC-4 Naval Seaplane; Bleriot, Nieuport or Taube Monoplane; or Cess. Peoli Racer.** Send 25 cents now and get plans for the one you want to build. (All 8 plans for \$1.50).

Every Boy's Airplane
The finest idea in Model Airplanes. Looks like a real one; clips together easily and quickly; ready to fly in 2 hours. **ONLY \$6.00**

Ideal Aeroplane & Supply Co., 165-169 Spring St., New York.

Catalog of Model Airplanes, Parts and Supplies, 5c postpaid




Do Wonderful Chemical Tricks and Experiments with CHEMCRAFT Junior!



Make ink, dye cloth, test water and soil. Puzzle your friends with magic chemical tricks; write secret letters with invisible ink; pour brown, blue and black liquid from a pitcher of water; make magic writing paper. You can do these and many other stunts with this wonderful outfit. Get yours now. Order at once and we will include the new 1927 "Boy's Hand Book of Chemistry," a 25-cent book; 60 pgs. of experiments, chemical facts and money-making ideas. **35c** Both for only

Porter Chemical Co.
105 Summit Ave.
Hagerstown, Md.





LEARN DRAFTING AT HOME IN SPARE TIME

BECOME AN EXPERT DRAFTSMAN. Earn \$200 to \$350 per month. Learn Machine, Architectural, Structural Drafting and Shop Mathematics in your spare time. Personal instruction. Drafting outfit given. Write for FREE 56 page book. **THE PRACTICAL MECHANIC Dept. 105, SOUTH HAVEN, MICH.**



LEARN TO DRAW!

Remarkable book—"COMMERCIAL ART AND CARTOONING." Explains how to make illustrations for books, advertisements, etc. Also how to become a Cartoonist. **NO CORRESPONDENCE COURSE.** Book tells all—14 chapters—125 illustrations. Explains Elementary Drawing; Still Life; Pen, Ink, Charcoal and Crayon Work; Cartooning, etc. Bound Flexible, Im. Leather. Postpaid for \$2.00 (C. O. D. 17c extra). **OGILVIE PUB. CO., 57 Rose Street, New York. Dept. 139. DAILY \$2.00**

\$75 WEEKLY BUILDING RADIO SETS

Join the Association! We train you to build and repair radio sets—start you in business—enable you to earn \$3 an hour upwards. Free 5-Tube Radio Set to members. Write for special limited-time plan whereby your membership need not cost you a cent. Write today!

RADIO ASSOCIATION OF AMERICA
Dept. S.N 3 4513 Ravenswood Ave Chicago, Ill

MEN WANTED TO LEARN Motion Picture Projection

\$2,000 to \$4,000 a Year

Quickly learned. Short hours, big pay. Best equipped school in Michigan. Projectionists for Movie Houses and Road Shows.

MOVIE OPERATORS SCHOOL
61 Sproat Street, Dept. 4, DETROIT, MICHIGAN

The Power-Six Receiver

(Continued from page 1033)

balancing condenser. The proper setting is halfway between the settings where volume starts to increase. Replace filament connection to tube No. 2—and retune the station or signal carefully.

Remove either +A or -A filament connection to tube No. 1, and proceed to adjust balancing condenser No. 18 exactly as before, first finding approximate setting, then retuning carefully as before to find final setting. Rotate balancing condenser screw slowly, as the band of reduced volume is very small on this stage and may be missed. As soon as the position of reduced volume is found, retune carefully for loudest signal and rotate balancing condenser carefully to setting where signal becomes weakest or disappears. Replace filament connection to tube No. 1.

If the receiver has been carefully wired it may be possible to secure slight oscillation at wavelengths near 350 when volume control is full on. This is desirable for greatest sensitivity. If the receiver does not operate with sufficient sensitivity it indicates resistance at some part of the circuit, which may be due to some fault in construction or wiring. To increase sensitivity of receiver turn volume control to full on. Rotate balancing condenser No. 20 by half turn stages tuning in signal near 350 meters after each half turn adjustment until receiver beats or whistles are heard when rotating dials carefully across signal. Then turn balancing condenser back carefully enough to just stop such beats or whistles.

For distant reception best results are often possible when the receiver is adjusted so as to cause slight oscillation beats or whistles with volume control full on, especially near 350 meters. However if receiver is adjusted to such sensitive condition always keep volume control below the point of distortion or beats.

SHIELDING

We do not recommend shielding this receiver. Shielding, unless designed in the laboratory by competent engineers is very likely to reduce the efficiency of the receiver.

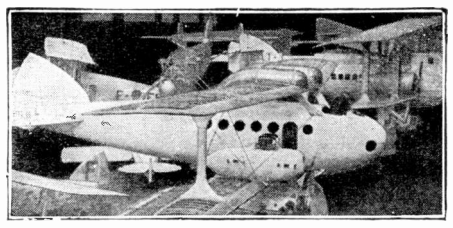
TUNING

With the tuning controls used here the approximate position for each wavelength is indicated directly. In tuning rotate the two dials together, keeping them both at approximately the same reading as the setting may not be exactly the same for each dial.

The capacity between circuits will vary in different sets due to variations in individual wiring, as well as any slight differences between individual coils and condensers, no matter how closely matched. Therefore with each condenser unit there is a small variable "trimmer" condenser. When once adjusted, the rear trimmers are not changed and the front trimmers only for very fine work in tuning. The trimmers are used to bring the circuits into resonance. The setting of front trimmer, and to a certain extent the dial reading, is affected by the position of the rear trimmer.

To begin adjustment set the rear trimmer on the left hand condenser full out. Set the rear trimmer on the right hand condenser full in. Then rotate panel trimmer back and forth rapidly as the main dial is moved slowly a few degrees to each side of the approximate setting for the station desired. Set dial at point where greatest volume results, then adjust trimmer for greatest volume. Next do this same thing with the other dial and trimmer.

Try to get the point of greatest volume with the front trimmer near its central position, and for fine tuning you may then turn



Aviation Brings Quick Success

TO young men of daring no other field of work offers such a fascination, such high pay, nor such opportunities for quick success as the field of Aviation. As yet, aviation is practically in its infancy. But now is the time to get in.

Amazing Opportunities in Airplane Industries

In the automobile industry and in the moving picture business hundreds of men got rich by getting in at the start. They made their success before others woke up. Today, these lines offer no greater opportunities than a hundred and one others. **BUT AVIATION IS NEW.** Get in while the opportunities are big. All over the country there will be a clamor for trained men. It will not be a question of pay but of getting capable men.

Become an Aviation Expert \$50 to \$100 per Week

The study of aviation is almost as fascinating as the actual work. Every lesson is full of interest. That is why it is easy to learn aviation. You do not have to make yourself study—it is like reading an interesting book that tells you things you have always wanted to know. Only one hour each evening will give you the basic training in a surprisingly short time.

One student, S. F. McNaughton, Chicago, says: "Your lessons are like a romance, and what is more, after one reading, the student gets a thorough understanding. One never tires of reading them." James Powers, Pa., another student, says, "I am indeed surprised that such a valuable course can be had from such practical men for so little cost."

Fascinating—Daring—Big Paying

Prepare Now for One of These Positions

- Aeronautical Instructor \$60 to \$150 per week
- Aeronautical Engineer \$100 to \$300 per week
- Aeronautical Contractor Enormous profits
- Aeroplane Repairman \$60 to \$75 per week
- Aeroplane Mechanician \$40 to \$60 per week
- Aeroplane Inspector \$50 to \$75 per week
- Aeroplane Salesman \$5000 per year and up
- Aeroplane Assembler \$40 to \$65 per week
- Aeroplane Builder \$75 to \$200 per week

Personal Instruction by Experienced Men

Men who have had actual experience give you personal attention. They select the lessons, lectures, blueprints and bulletins. They tell you things that are essential in everyday practice. Each lesson is easy to read and understand.

Get Big FREE Book—Now

Send coupon below for New Book, just out, "Opportunities in the Airplane Industry." It is interesting and instructive. It will show you many things you never knew before about aviation. We have but a limited supply of these books—send the coupon before they are all gone.

American School of Aviation
3601 Michigan Ave., Dept. 1423 Chicago, Ill.

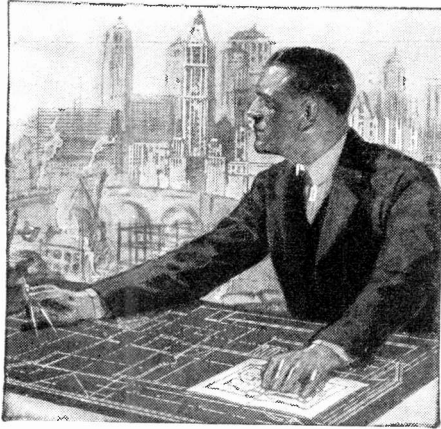
American School of Aviation
3601 Michigan Ave., Dept. 1423 Chicago, Ill.

Without any obligation, send me your Free Book, "Opportunities in the Airplane Industry", also information about your course in Practical Aeronautics.

Name.....

Street.....

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



Former Plasterer Now Earning \$12,000 a Year

"When I enrolled with the International Correspondence Schools, I was a plasterer and I didn't know a thing about blueprints. Today I have my own contracting business and I am able to figure the most difficult jobs and execute them to the satisfaction of everyone concerned. My income is between \$12,000 and \$15,000 a year. It certainly was a lucky day for me when I sent in that I. C. S. coupon."

That's a true story of what just one student of the International Correspondence Schools has done. Every mail brings letters from other ambitious men and women telling of promotions and increases in salary due directly to spare-time study.

One hour a day spent with the I. C. S., in the quiet of your own home, will prepare you for success in the work you like best.

Mail Coupon for Free Booklet

TEAR OUT HERE

INTERNATIONAL CORRESPONDENCE SCHOOLS
Box 6186-E, Scranton, Penna.

Without cost or obligation, please send me a copy of your booklet, "Who Wins and Why," and full particulars about the course before which I have marked X:

- | | |
|--|---|
| <input type="checkbox"/> Architect | <input type="checkbox"/> Plumber and Steam Fitter |
| <input type="checkbox"/> Architectural Draftsman | <input type="checkbox"/> Electrical Engineer |
| <input type="checkbox"/> Architects' Blueprints | <input type="checkbox"/> Electric Lighting and Rwys. |
| <input type="checkbox"/> Contractor and Builder | <input type="checkbox"/> Mechanical Engineer |
| <input type="checkbox"/> Building Foreman | <input type="checkbox"/> Show Card and Sign Painting |
| <input type="checkbox"/> Concrete Builder | <input type="checkbox"/> Business Management |
| <input type="checkbox"/> Structural Engineer | <input type="checkbox"/> Private Secretary |
| <input type="checkbox"/> Structural Draftsman | <input type="checkbox"/> Business Correspondent |
| <input type="checkbox"/> Heating and Ventilation | <input type="checkbox"/> Bookkeeper |
| <input type="checkbox"/> Plumbing Inspector | <input type="checkbox"/> Stenographer and Typist |
| <input type="checkbox"/> Foreman Plumber | <input type="checkbox"/> Higher Accounting |
| <input type="checkbox"/> Sheet Metal Worker | <input type="checkbox"/> Commercial Law |
| <input type="checkbox"/> Civil Engineer | <input type="checkbox"/> Common School Subjects |
| <input type="checkbox"/> Surveying and Mapping | <input type="checkbox"/> Mathematics <input type="checkbox"/> English |
| <input type="checkbox"/> Electric Wiring | <input type="checkbox"/> Illustrating |
| <input type="checkbox"/> Telegraph Engineer | <input type="checkbox"/> Railway Mail Clerk |
| <input type="checkbox"/> Telephone Work | <input type="checkbox"/> Civil Service |
| <input type="checkbox"/> Mechanical Draftsman | <input type="checkbox"/> Mining Engineer |
| <input type="checkbox"/> Toolmaker | <input type="checkbox"/> Gas Engine Operating |
| <input type="checkbox"/> Machine Shop Practice | <input type="checkbox"/> Stationary Engineer |
| <input type="checkbox"/> Chemist <input type="checkbox"/> Pharmacy | <input type="checkbox"/> Textile Overseer or Supt. |
| <input type="checkbox"/> Navigation | <input type="checkbox"/> Traffic Manager |
| <input type="checkbox"/> Salesmanship | <input type="checkbox"/> Automobiles <input type="checkbox"/> Spanish |
| <input type="checkbox"/> Advertising | <input type="checkbox"/> Agriculture <input type="checkbox"/> French |
| <input type="checkbox"/> Window Trimmer | <input type="checkbox"/> Poultry Raising <input type="checkbox"/> Radio |

Name.....

Street Address.....

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

Occupation.....

If you reside in Canada, send this coupon to International Correspondence Schools Canadian, Limited, Montreal.

Build Your Own Grandfather's Clock



We furnish blue prints, finishing material and instructions. Buy the works, dial, weights and pendulum from us at surprisingly low prices. You make a fine profit building artistic clocks for your friends.

Plain Works As Low As \$5.00. Others With Chimes At All Prices. Ask For Attractive Free Offer.

CLOCK COMPANY
1679 Ruffner St.
Philadelphia, Pa.

Insure your copy reaching you each month. Subscribe to SCIENCE AND INVENTION—\$2.50 a year. Experimenter Publishing Co., 53 Park Place, New York City.

either way without going beyond the range of the front trimmer. If this point of maximum volume does not come with the front trimmer near the central position, change the rear trimmer slightly and try again. You will find this easier than it sounds.

KEEPING CIRCUITS IN TUNE

When searching for weak, distant stations, it is necessary that all tuned circuits be kept in resonance—otherwise the station may not be heard; that is, it may be passed by. To keep the circuits resonant, in other words, tuned to the same wavelength when the tuning controls are rotated, is difficult unless you are systematic.

A simple rule is simply to follow the outside sounds or noise. There is always a certain amount of static present. If your tuning controls are kept together these sounds can be heard as you turn the dials, although there may be no station signal. Keep your circuit resonant so that these static noises can be heard, as you go up or down the scale and you will locate practically all stations within range. By recording dial readings these stations may be located thereafter without difficulty.

USE OF TUNING CONTROLS

Selectors one and two are used to tune the receiver to the same frequency as the signal to be received. For strong signals close tuning is not necessary and it may even be desirable to rotate selector to slightly out of resonance to prevent over-loading. However, weak signals require very close adjustment of selectors for maximum volume and volume may be considerably increased by means of the "trimmer" knobs. Always operate at lowest volume consistent with size of room.

Volume or sensitivity may be increased by rotating the volume control. Increasing the sensitivity beyond a certain degree may cause the circuit to go into oscillation. This is indicated by a "click," oscillation beats, whistles or distorted signals. Always reduce sensitivity below this point.

When tuning weak signals use both hands, tuning each control and its trimmer carefully. Then adjust sensitivity control carefully for loudest clear signal. See "Tuning."

TUBES

This circuit is designed for the use of 201-A or 301-A tubes or their equivalent in the three radio frequency stages and first audio. We recommend the 200-A or similar tube as a detector, and the UX-112 or its equivalent in the last stage of audio frequency amplification.

DRY CELL TUBES

Type 199 may be used, but the volume will be less than with standard 201-A tubes.

ANTENNA

Use either an indoor or outdoor antenna, composed of a single straight wire 20 to 60 feet in length. Loop antenna is not recommended. Use water pipe as ground if possible.

RHEOSTAT

Operate tubes at lowest brilliancy consistent with satisfactory results. If dry cell tubes, type 199 are used, a 10-ohm rheostat must be used instead of a 3-ohm unit specified for standard tubes.

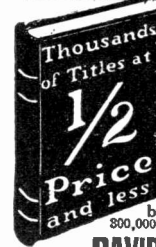
CONCLUSION

This circuit and parts therefor have been worked out with utmost care to fulfill the particular functions for which they were designed. You cannot change any one part of a circuit without affecting some other part. Therefore, follow instructions, unless you are more interested in experimenting than in results.

TOOLS REQUIRED IN BUILDING THE POWER SIX RECEIVER

Pliers, several kinds; screw drivers, several sizes; hammer; hacksaw and blades; hand drill; twist drills, several sizes; scriber; center-punch; soldering iron, electric or other type; wire solder, self-fluxing or plain solder and non-corrosive flux; rule, steel or wood; small tool and awl handle very useful; volt and ammeters for testing set, batteries, etc.

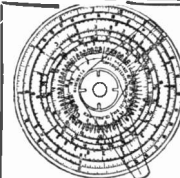
ANY BOOK IN PRINT



Delivered at your door. We pay the postage. Standard authors, fine editions, new books, all at biggest savings. Be sure to send postcard for Clarkson's catalog.

FREE Write for our great book catalog. This catalog is a short course in literature and is so used by some of America's leading universities; 800,000 book lovers buy from it. Free if you write now.

DAVID B. CLARKSON THE BOOK BROKER
351 CLARKSON BUILDING, CHICAGO, ILL.



THE MIDGET SLIDE RULE
Instantly adds, subtracts, multiplies, divides, solves proportions, gives all roots and powers. Logarithms, Sines, Cosines, Tangents, Cotangents, Etc. Also gives decimal equivalents, lettered and numbered drill and tap sizes.

More than 110,000 sold, more than 2000 unsolicited testimonials. The Engine-divided scales are on white finished aluminum and are grease and waterproof. Diameter 1 1/2". Price with Instruction Book, \$1.50. Pocket Carrying Case, 50c extra. Cash or C. O. D. Catalogue free. Your money back if you are not satisfied. **GILSON SLIDE RULE COMPANY, - NILES, MICH.**

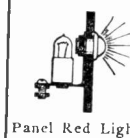
LAW STUDY AT HOME

Become a lawyer. Legally trained men win high positions and big success in business and public life. Be independent. Greater opportunities now than ever before. Big corporations are headed by men with legal training. Earn \$5,000 to \$10,000 Annually.

We guide you step by step. You can train at home during spare time. Degree of LL.B. conferred. LaSalle students found among practicing attorneys of every state. We furnish all text material, including fourteen-volume Law Library. Low cost, easy terms. Get our valuable 108-page "Law Guide" and "Evidence" books free. Send for them NOW.

LaSalle Extension University, Dept. 3384-L, Chicago

The World's Largest Business Training Institution



SOMETHING NEW IN RADIO

Red light indicates whether your set is in operation or not. Saves Batteries.

Balancing and Neutralizing Condensers - Small Type. Price \$2.50

THOSE RADIO TWINS

Eaton Bros. 23 Wolcott St. Springfield, Mass.

Panel Red Light
Price \$1.35

REFLECTING TELESCOPES SUPPLIES

ERNEST W. BLANDIN
1207 Columbia Terrace, Peoria, Ill.



BIG BOOK 10c!

Be a Man of Mystery! Amaze and Mystify your friends. Easy to learn. This New 80-page Copyrighted Book tells how. Large Catalog of Magic Tricks, Jokes, Puzzles and Imported Novelties included. Send 10c today!

LYLE DOUGLAS
Station A-3, Dallas, Texas

WANT WORK AT HOME?

Earn \$18 to \$60 a week Retouching photos. Men or women. No selling or canvassing. We teach you, guarantee employment and furnish Working Outfit Free. Limited offer. Write today, Arterraft Studios, Dept. 43, 3900 Sheridan Road, Chicago.



SQUAB BOOK FREE

Breed squabs and make money. Sold by millions. Write at once for free 40-page book beautifully printed in colors telling how to do it. You will be surprised. **PLYMOUTH ROCK SQUAB CO.**
506 H St., Melrose Highlands, Mass.

Just Out!

196 Page Spring Edition

RADIO LISTENERS' GUIDE
and CALL BOOK

BROADCAST STATION LIST—NEW
CIRCUITS, CONSTRUCTIONAL
DATA.

50C ON ALL NEWSSTANDS.

Stop Using a Truss



STUART'S PLAPAO-PADS are different from the truss, being mechanico-chemico applicators made self-adhesive purposely to hold the distended muscles securely in place. No straps, buckles or springs attached—cannot slip, so cannot chafe or press against the pubic bone. Thousands have successfully treated themselves at home without hindrance from work—most obstinate cases conquered.



Reduced Fac-Simile Gold Medal. Soft as velvet—easy to apply. Gold Medal and Grand Prix. Write name on Coupon and send TODAY. **FREE** Plapao Co., 924 Stuart Bldg., St. Louis Mo.

Name
Address
Return mail will bring Free Trial Plapao

AMAZING DISCOVERY
Abolishes Metal Polish

AGENTS!



Science has finally produced it. An instantaneous metal cleaner—neither sloppy liquid nor messy paste. Dry Magic Floss. Touch it to silver, nickel, copper or brass. The metal shines bright and clean instantly! No hard rubbing! Approved by Good House-keeping institute. Agents making up to \$30 a day! Sensational Demonstrations make sales self-closing.

Everybody Buys **SAMPLE FREE!**

Housewives buy the Lightning Polishing Cloths. Autoists buy Lightning Polishing Floss. Sell both to stores and offices in big quantities. Nothing else like them. Sure big, quick MONEY GETTERS. Exclusive territory. Real cooperation. Triple profit. Answer this ad at once. Make big money. Easy! Quick! Don't delay. Write NOW! FREE test sample and proposition by return mail. D E LIGHTNING CORP., 1773 Greenleaf Ave., Chicago

NEW PHOTOGRAPHIC ART

KYOGRAPH MINIATURES

The last word in Photography. Any photo or snapshot easily reproduced on watch dial case or locket. Also on all articles of Leather, Wood, Ivory or China. **SIMPLE PROCESS.** A child can do it. Your neighbors and friends will be pleased with the beautiful Sepia Kyrograph which when transferred becomes a treasured heirloom.

Professionals or Amateurs

Make big money in spare or full time by this wonderful process. Write at once for particulars.

KYOGRAPH PHOTO SYSTEM

21 West 17th St., Dept S, New York, N. Y.

YOU CAN ENTERTAIN WITH MODERN PRODUCTS

Hundreds of Mystifying Magic Tricks are contained in our new 48-page catalog. Send 15c to pay for postage and we will mail it with our famous MODERN MONEY VANISHER FREE.

THE MAGIC SHOP

Dept. S3, Hudson Terminal Concourse
New York City

LEARN TO Mount Birds

Learn at home by mail to mount Birds, Animals, Heads, Fox Furs and Make Runs. Be a taxidermy artist. Easily quickly learned by men, women and boys. Interesting and fascinating. Decorate home and den. Make Big Profits from Spare Time. **Free Book** all about how to learn taxidermy. Send Today for this wonderful new book. Don't delay! N. W. School of Taxidermy, 1253 Elwood Bldg., Omaha, Neb.

THIS CLASS PIN 25c.

12 or more, Silver plate, Single pins 35c ea. choice 2 colors enamel, 3 letters, date. Sterling Silver, 12 or more 45c ea. Single pins 65c ea. Free Cat. shows Pins, Rings, Emblems 20c to 35c ea. 685 Metal Arts Co., Inc., 7723 South Ave., Rochester, N.Y.

"BECOME A LIGHTNING TRICK CARTOONIST"

Send \$1.00 for Beginners Instructions with Laugh Producing Program of 23 Comic Trick drawings. Catalog of Chalk Talk Supplies Free BALDA ART SERVICE, Dept. 4, Oshkosh, Wisconsin.

Wrestling Book FREE

Learn wrestling at home from former world's champion Farmer Burns and Frank Gotch. Free book tells how. Secret holds, blocks, tricks revealed. Be strong, healthy. Handle big men easily. Write for free book. State age. Farmer Burns School, 1253 Railway Bldg., Omaha, Neb.

Interesting Experiments with High Frequency Currents

By S. E. NEWHOUSE, JR.

(Continued from page 1025)

maximum output on less than one kilowatt. It is not essential that the condensers be immersed in oil, this being done only as an added precaution.

The question is often asked "Why are high frequency currents harmless to the human body?" With frequencies of this high value, the reversals of the current are so rapid that the current does not have time to penetrate into the tissues of the body. Hence the major portion of the current passes over the surface of the body and little, if any, inconvenience is experienced. The frequency obtained from the different resonators varied over quite a range, depending on the inductance and capacity of the coils; the variation being from about 120,000 cycles for the largest coils to as high as a million cycles for the small resonators.

The building and operation of these artificial lightning generators will bring many thrills and real satisfaction to those who are interested in producing things of a spectacular nature.

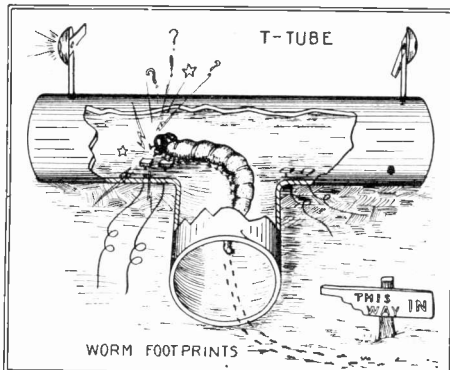
The Astrology Humbug

By JOSEPH H. KRAUS

(Continued from page 1009)

should never publish your horoscope and you gave the reason as being due to planets. In order to disprove to you that the planets have any influence on our decision in this matter at all, we did publish a portion of your manuscript and the only reason that the remainder of it was not published was because of its extreme length. We can assure you that had your manuscript been shorter, it would have been published verbatim, which brings us back to the statement you made that you will have to look further into the matter of the horoscope to see just why we did publish your manuscript and that you did probably investigate the prenatal horoscope conditions. Inasmuch as we did not publish your manuscript in its entirety and also that we did not omit it, but only used a portion thereof, we are wondering what you are going to look into in order to determine our reasons for even this action. Your statement to the effect that we are working toward the accomplishment of making Astrology an exact science is not in accordance with the facts. The death ray has not been discovered, and the many reports concerning this ray were purely publicity features. A heat ray producing dangerous results when operated at close range was probably the forerunner of the newspaper and scientific magazine series of articles on the death ray. With reference to the Proton-Neutron, we would advise that that is purely theoretical. While we have an idea that matter is constituted of these electrical charges, there is just as great a possibility that someone will come forward with entirely new theories or may even again resolve the Proton or the Neutron into component parts, although at the present time we do not believe that this could be accomplished.—Editor).

EDUCATED WORMS



According to a report by a naturalist named Heck the lowly worm was taught to turn to the right after being shocked repeatedly 200 times when attempting to make a left turn in the T-shaped tube.



Follow this Man!

Secret Service Operator
38 Is on the Job!

FOLLOW him through all the excitement of his chase of the counterfeit gang. See how a crafty operator works. Telltale finger prints on the lamp stand in the murdered girl's room! The detective's cigarette case is handled by the unsuspecting gangster, and a great mystery is solved. Better than fiction. It's true, every word of it. No obligation. Just send the coupon.

FREE!

The Confidential Reports
No. 38 Made to His Chief

And the best part of it all is this. It may open your eyes to the great future for YOU as a highly paid Finger Print Expert. More men are needed right now. This school has taken men just like you and trained them for high official positions. This is the kind of work you would like. Days full of excitement. Big salaries. Rewards.

Can You Meet This Test?

Can you read and write? Are you ambitious? Would you give 30 minutes a day of your spare time preparing yourself for this profession?



Would you like a life of excitement, thrilling adventures and high pay? Answer yes and I'll show you how to attain all this. Send the coupon and I'll send the Free Reports—also a wonderful illustrated book telling of the future awaiting you as a Finger Print Expert.

T. G. COOKE, Pres.

University of Applied Science
1920 Sunnyside Ave., Dept. 14-23, Chicago, Ill.

University of Applied Science

1920 Sunnyside Ave., Dept. 14-23, Chicago, Ill. Gentlemen:—Without any obligation whatever, send me your new, fully illustrated Free Book on Finger Prints and your offer of a FREE course in Secret Service Intelligence and the Free Professional Finger Print Outfit.

Name

Address

Age

CONQUER YOUR NERVES

—or Your Nerves Will Conquer You

Nerves! Nerves! Nerves! We hear and see it everywhere today! Only a few people can escape this enemy of health, youth and happiness!

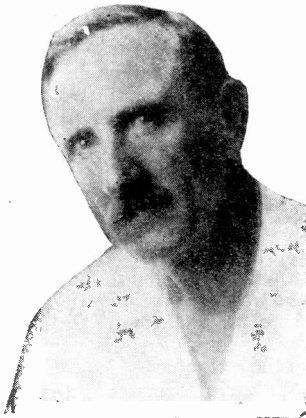
It is not surprising that the toll of nervousness is so great, for the mile-a-minute life of today is enough to break down the strongest constitution.

If only a few of the symptoms of nerve exhaustion attack you—nervous indigestion, restlessness; "that tired feeling" and the mental symptoms: fear, self-consciousness, irritability—your life becomes dull and uninspiring—for to be nervous is to be but half alive.

Tonics and physical exercises alone can be of little avail in correcting nerve trouble. The cure lies only in a sound and thorough understanding of the functioning of the nerves, and more especially knowledge of your own nervous characteristics and weaknesses.

If you are one of the unfortunate many who has sought relief in vain, you will find it in the pages of "NERVE FORCE," a book dealing with every phase of nerve troubles and their correction, and written by an authority who has devoted his whole life to the study and advancement of this science—Paul von Boeckmann.

Send for the book today. It will be a revelation to you and will teach you for the first time how to master your nerves and avoid future "slipping." Your money refunded if you are not fully satisfied.



PAUL VON BOECKMANN

Author of "Nerve Force" and various other books on Health, Psychology, Breathing, Hygiene and kindred subjects, many of which have been translated into foreign languages.

Price 25 cents (coin or stamps)

Write to PAUL VON BOECKMANN

Studio 525, 110 West 40th St., New York

A FOREIGN LAND— but two days from New York

BERMUDA—here are the charms of the Old World amidst the comforts of the new.

Only 48 hours from New York. Average winter temperature 60° to 70°.

Two sailings weekly on the modern transatlantic liners, under contract with the Bermuda Government—

S.S. Fort Victoria
S.S. Fort St. George

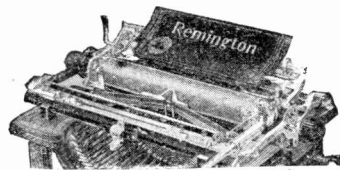
Hotels

The Bermudiana in Hamilton, the St. George Hotel in St. Georges—the last word in modern comfort.

For booklets and reservations write

FURNESS BERMUDA LINE

34 Whitehall Street, New York City, or any local tourist agent



10 DAYS FREE TRIAL—ONLY \$37.50

Own one of these genuine Standard No. 10 REMINGTON typewriters. Has all the latest improvements, clear type, back spacer, two-color ribbon, automatic ribbon reverse, shift-key lock, tabulators, etc. Has been expertly rebuilt, renickel, re-varnished and locks just like a new machine. With each typewriter we supply a rubber cover and a fresh ribbon without charge.

FREE INSTRUCTIONS IN TYPEWRITING

We send to every purchaser an illustrated book with full instructions to enable you to become a capable and speedy typist by touch system.

YOU TAKE NO RISKS: Send \$5.00 with order. Balance of \$32.50 plus small express charge will make you a full owner of one of these machines. After you have had our typewriter for ten days, if you are not entirely satisfied your money will be refunded.

We do not sell any of these typewriters on time payments. Otherwise we could never offer them at these very low prices. By having added expenses on account of bad debts, charge accounts and collections costs we may have to charge double price. But by eliminating these expenses you are sure of getting your typewriter at rock-bottom price and the greatest value for your money on the market.

A written guarantee for one year is given with each machine. From past records we find there is usually no trouble with our typewriters for at least five years. Send in Your Order Now.

ESGEE SALES COMPANY,
Box 120, Madison Sq. Sta., Dept. 52, New York, N. Y.

Make Your Own Monster
CONE SPEAKER
3 FOOT HIGH
Made in 30 Minutes
WE FURNISH EVERYTHING
So easy to build a child 12 years old can put it together in 30 minutes.

FREE—Instructions, Blue Prints.
You will greatly improve reception with this big FENCO Cone.

Only \$12

CIRCULAR CUT READY TO GLUE
Equal to any \$60 mfd speaker, 30 minutes easy work saves you \$18.

HERE'S WHAT YOU GET
2 Sheets (circular cut) Alhambra FOX-O-TEX Paper.
1 FENCO Adjustable Unit.
1 Baffle Ring.
1 Set of Apex Fittings.
1 Mounting Bracket—1 Iron Handle.
1 Can Cement—3½ Yds. Oriental Gold Lace.

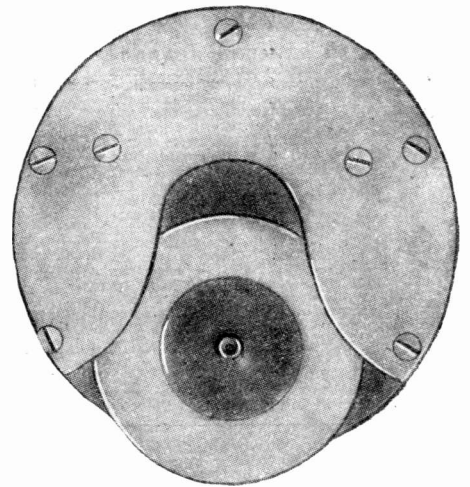
ALL FOR ONLY \$12. POSTPAID.
Send P. O. or Express Money Order or cash registered mail.

FACTORY GUARANTEED.
FENCO CONE CO., 57-59 Murray St., N. Y.

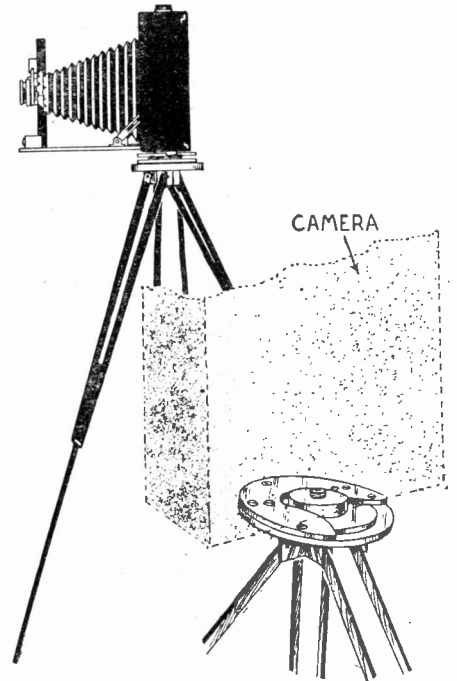
From Factory to You SAVES \$48

Insure your copy reaching you each month. Subscribe to **RADIO NEWS**—\$2.50 a year. Experimenter Publishing Co., 53 Park Pl., N. Y. C.

TRIPOD HEAD



Here is a new type of tripod head which enables the camera-man to set up his camera instantaneously. It will be observed that the disk is permanently attached to the camera and that the mounting on the top of the tripod is grooved so that the disk can slip into it very quickly and easily. One turn of the screw underneath the tripod enables the head to be tightened in place or permits the camera to be swung around in any direction. The camera also slips out of place instantly, instead of requiring to be unscrewed from the tripod. The photograph of the device is shown above and its method of attachment below.

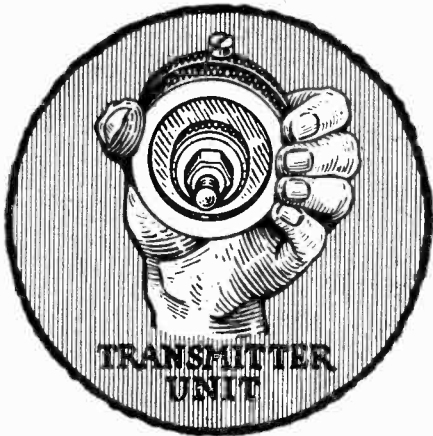


In the diagram at the left the method of attaching a camera to the new type of tripod head is illustrated, while below is a perspective view of the new device enabling instant attachment or detachment.

BEAUTY PRODUCING STRAWBERRIES

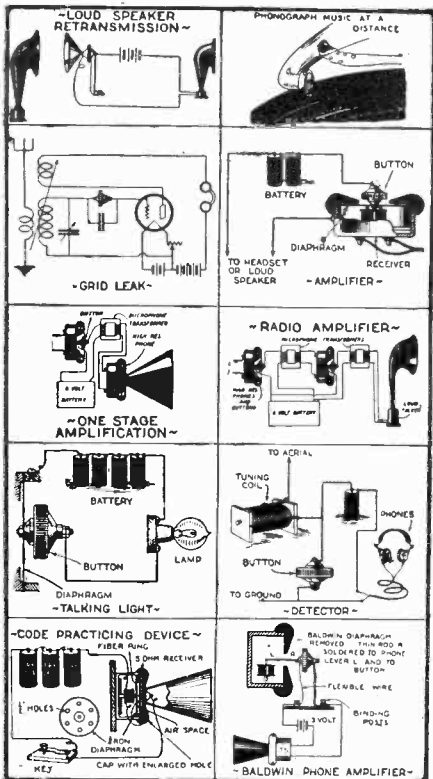
Recently Dr. Walter J. Swingle of the U. S. Department of Agriculture arrived at San Francisco with a selection of strange and exotic fruits valued at \$150,000. Among these fruits was a giant strawberry said to have marvelous beauty-giving powers. According to Dr. Swingle, this strawberry was claimed to have properties which will reduce the weight of the person eating them and also clear the complexion. The fruit grows on a tree, is hardened, defies frost and could probably be grown in many parts of the United States. Its habitat is on the China coast, south of the Yangtse River.

Thousands Use These Ingenious TRANSMITTER UNITS



Here's a marvel of Engineering design—a practical miniature transmitter, used by thousands of radio fans and experimenters for amplification purposes. It is a most novel unit, having hundreds of uses. Every amateur should have two or three of these amplifiers in his laboratory.

A FEW USES FOR THESE UNITS



With each unit is mailed an eight-page instruction pamphlet containing suggestions for innumerable uses. Our supply is limited; avoid disappointment by ordering today. The coupon below is for your special convenience.

SPECIALY PRICED
 While they last— **95c**
 (or Two for \$1.75) per unit

THE PRESS GUILD,
 66-5 West Broadway, New York, N. Y.
 Enclosed find 95c/\$1.75 for which send me postpaid one/two amplifier units as advertised.
 Name
 Address
 City, State

Rules for Matchcraft Contest

(Continued from page 1007)

\$100.00 Monthly Prize "Matchcraft" Contest

DURING the past year SCIENCE AND INVENTION Magazine awarded \$5000.00 for articles made entirely of matches. While this \$5000.00 contest has officially expired, the publishers have decided that because of the great popularity in Matchcraft constructions, the contest would continue in force on a new prize basis until further notice. The list of new prizes will be found in the center box and the same rules for the first contest are to be observed in this contest.

- (1) Models submitted must contain at least 90 per cent. safety matches in their construction.
- (2) Models made of toothpicks, paper matches, or non-safety matches, are not eligible in this contest.
- (3) Models can not be built around boxes or other supporting articles. Walls, roofs, etc., must all be self-supporting and made of matches.
- (4) All liquid adhesives, such as glue, shellac, cements, etc., are permissible.
- (5) Models may be painted, gilded or silvered.
- (6) Models may be of any size.
- (7) In order to win a prize, it is necessary that either models be submitted, or, if this is not practical, owing to their size, a 5"x7" photograph of the model may be sent in lieu of the model itself. The best models submitted each month will be awarded the prizes scheduled herewith.
- (8) All models submitted to SCIENCE AND INVENTION Magazine will be promptly returned to the builder, who will prepay all charges.

PRIZE AWARDS

First Prize	\$50.00
Second Prize	20.00
Third Prize	15.00
Fourth Prize	10.00
Fifth Prize	5.00
Total	\$100.00

(9) Where SCIENCE AND INVENTION has any doubts as to the model (where photos only are submitted) complying with all the regulations, the judges may, at their discretion, request that the actual model be sent in for inspection, paying transportation charges both ways.

(10) This is a monthly contest and will continue until further notice. Each monthly contest closes on the first of the month following date of issue. Thus the contest for the month of March will close April 1st and prize-winning announcements will be made in the June, 1927 issue.

(11) Models must be shipped in a strong wooden box, never in a cardboard box, as SCIENCE AND INVENTION can not be held responsible for breakage in transit due to models having been improperly packed.

(12) When models are sent, be sure to affix tag, giving your name and address, to the model itself. In addition, put name and address on outside wrapper of package.

(13) Address all letters, packages, etc., to Editor, "Matchcraft" Contest, care SCIENCE AND INVENTION Magazine, 53 Park Place, New York.

Caution—Soak or cut heads from matches before building your model so that the models may be expressed or mailed. The strike-everywhere square cut Liberty matches can be used if the heads are cut off.

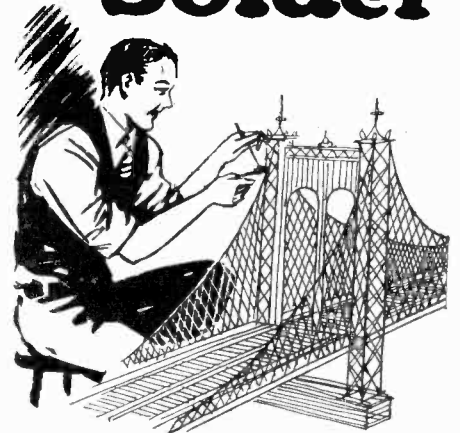
LIGHTS ON THREE AIRWAYS

Light on the transcontinental airways between Chicago and St. Louis, and Chicago and Dallas were turned on recently.

One-half of the lights on Route 2 of the airways, from Chicago to St. Louis, and Route 3, Chicago to Dallas were switched on at Christmas time.

The lights on Route 1, from Boston to New York were to be turned on Feb. 1.

Wire Krafters here's a tip on Solder



KESTER METAL MENDER a genuine Solder ready to use



Wirekrafters using Kester Metal Mender have the advantage over competition by being able to solder as well as an expert. Models soldered with Kester have that professional touch about them.

Whether for wirekrafting, or general metal mending, Kester will do prize-winning work. No skill is necessary because within the hollow wire of Kester are tiny pockets full of a scientific flux best suited for general soldering. Just before the solder melts the flux flows to the spot and the bright virgin solder follows—a neat substantial bond is the result.

Let Kester Metal Mender help you win a wirekraft prize, and serve you in your household and auto repairs. Send the coupon and receive a booklet containing valuable soldering information and

-- FREE SAMPLE --

Chicago Solder Company



CHICAGO SOLDER CO.,
 4201-270 Wrightwood Ave., Chicago.

Gentlemen: I would sincerely appreciate your soldering booklet and Free Sample of Kester Metal Mender.

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

Opportunity Ad-lets

YOU will find many remarkable opportunities and real bargains in these columns. It will pay you to read and investigate the offerings made every month by reliable firms, dealers and amateurs from all over the country. No matter what you may be seeking, whether supplies, automobile accessories, the opportunity to make money, or anything else, you will find listed here the best and most attractive specials of the month.

Advertisements in this section twelve cents a word for each insertion. Name and address must be included at the above rate. Cash should accompany all classified advertisements unless placed by an accredited advertising agency. No advertisement for less than 10 words accepted. Ten per cent discount for 6 issues, 20 per cent discount for 12 issues. Objectionable or misleading advertisements not accepted. Advertisements for the May issue must reach us not later than March 10th.

The Circulation of Science and Invention is over 200,000 and climbing every month

EXPERIMENTER PUBLISHING CO., INC., 53 Park Place, New York City, N. Y.

Adding Machines

Free Trial. Marvelous Calculator. Adds, Subtracts, Multiplies, Divides automatically. Work equals \$300.00 machines. Five year guarantee. Price only \$15.00. Write today for free trial offer. Special: \$3.00 Pocket Calculator, only \$2.00 cash. Lightning Calculator Co., Dept. K, Grand Rapids, Mich.

Advertisers and Distributors

Earn \$8. Distribute 400 free Samples Stopleak Rivets. Send 6c stamps for samples and secure territory. Rivet Co., Colton, N. Y.

Advertising Agencies

24 Words—355 Rural Weeklies, \$14.20. Ad—Meyer, 4112-S1, Hartford, St. Louis, Mo.

Agents Wanted

Agents—Best seller; Jem Rubber Repair for tires and tubes; supercedes vulcanization at a saving of over 800 per cent; put it on cold. It vulcanizes itself in two minutes and is guaranteed to last the life of the tire or tube; sells to every auto owner and accessory dealer. For particulars how to make big money and free sample, address Amazon Rubber Co., Philadelphia, Pa., Dept. 601.

\$60—\$200 a week. Genuine Gold Letters for store windows. Easily applied. Free samples. Liberal offer to general agents. Metallic Letter Co., 441 B., North Clark, Chicago.

\$10 daily silvering mirrors, plating and refinishing lamps, reflectors, auto, beds, chandeliers by new method. Outfits furnished. Write Gunmetal Co., Ave. D, Decatur, Ill.

Bankrupt and Rummage Sales. Make \$50.00 daily. We start you, furnishing everything. Distributors, Dept. 171, 609 Division, Chicago.

Make Money Silvering Mirrors, refinishing auto headlights, tableware, metal plating, bed stands, chandeliers. Outfits furnished. International Laboratories, Dept. 69, 309 Fifth Ave., New York.

Agents—New Plan, makes it easy to earn \$50.00 to \$100.00 weekly, selling shirts direct to wearer. No capital or experience needed. Represent a real manufacturer. Write now for FREE SAMPLES. Madison Company, 566 Broadway, New York.

Big money and fast sales. Every owner buys gold initials for his auto. You charge \$1.50; make \$1.35. Ten orders daily easy. Write for particulars and free samples. American Monogram Co., Dept. 71, East Orange, N. J.

66 Miles on 1 Gallon—Amazing New Auto Gas Saver. All makes. 1 Free. Critchlow, E-87, Wheaton, Ill.

\$50.00 Weekly easy, applying Gold Initials on Automobiles. No experience needed. \$1.45 profit every \$1.50 job. Free Samples. "Italco Monograms", R1043, Washington, Boston, Mass.

Free Extra Prints with wonderful \$29.75 Suits. Make \$85 weekly. Wonderful \$23.50 line. 10% Profits. Free Outfit. Jay Rose, Tailors, 413L South Wells, Chicago.

Polmet Polishing Cloth cleans all metals like magic! Gets enthusiastic attention. Sells fast at 25c. Sample Free. F. C. Gale Co., 93 Edinboro Street, Boston, Mass.

Mirrors Resilvered at Home. Costs less 5 cents per square foot; you charge 75 cents. Immense profits plating autoparts, reflectors, tableware, stoves, refinishing metalware, etc; outfits furnished. Details Free. Write Sprinkle, Plater, 855, Marion, Indiana.

Agents make \$10.60 Daily selling Non-Splash Water Filters on sight. Best canvasser's article on market. Investigate. Write for particulars. Desk 20, Seed Filter Company, 73 Franklin Street, New York.

Agents are cleaning up with National Fibre House Brooms and Auto Mitten Dusters. Send for Free Catalog and Sample Offer. National Fibre Broom Co., St. Louis, Mo.

Oh Hello! Why didn't I see this before. Christy's Iron Rust and Stain Remover sells like blazes. Write for free sample. Christy, Inc., 5080 Lakeway, Newark, New York.

Agents: Make \$500.00 Monthly. Pay daily. No investment. Rhinestone Initial buckles and novelties sell easy everywhere. Exclusive territories. Chaton Novelty Co., 606 Blue Island, Chicago.

Thaxly Formulas, Processes, Trade-Secrets, produce perfect products. Catalog, special circulars free. D. Thaxly Co., Washington, D. C.

\$14.50 Daily Easy—Pay in advance. Introducing Chieftain Guaranteed Shirts, 3 for \$1.95. No experience or capital needed. Just write orders. We deliver and collect. Full working outfit free. Cincinnati Shirt Co., Lane 2702, Cincinnati, Ohio.

District Salesmen Make \$30.00 a Day, taking orders for Goodwear tailored-to-measure clothes at sensational new low price. \$25.00 Sales Outfit Free. Exclusive Territory. Prefer married man, 30 years old or over, and permanent resident in district. Address Dept. 806, Goodwear Chicago, Inc., 844 West Adams, Chicago.

Sell Show-cards. New line. Big profits. Quick sales. Particulars free. K. Elko, 525 South Dearborn St., Chicago.

Our New Household Device washes and dries windows, sweeps, cleans walls, scrubs, mops. Complete outfit costs less than brooms. Over half profit. Harper Brush Works, 152-3rd St., Fairfield, Iowa.

Agents Wanted (Continued)

Agents: 90c an hour to advertise and distribute samples to consumers. Write quick for territory and particulars. American Products Co., 9043 Monmouth, Cincinnati, Ohio.

District Agents—Sell \$23.50 All Wool Union Made Suits and Topcoats for large, old established firm. Wonderful values; one price. Liberal commissions in advance; money back guarantee. Expensive 9x13 swatch outfit free. Protected territory. Write 1-F Harvey, Box 00, Chicago, Ill.

Agents—\$72 Week. Brand new tool chest, 8 tools in one. Fine leather case. Fits hip pocket. Demand enormous. Write quick. Novelty Cutlery Co., Chest 255, Canton, Ohio.

Don't sell for others. Employ agents yourself. Make your own products. Toilet articles, household specialties, etc. 500% profit. We furnish everything and show you how. Valuable booklet free. Write at once. National Scientific Laboratories, 1912W Broad, Richmond, Va.

Just Out—Patented Apron. No strings or straps; on or off instantly; \$20 a day easy; every demonstration a sale; over 100% profit; commissions daily; write today for free offer. Sta-Put Co., Dept. 503, St. Louis, Mo.

Airplanes, Aviation

Boys send dime for 12 inch mounted propeller and circulars telling how you can get a three-foot model airplane free. Nothing to sell. Aero Shop, 3050 Hubbard Ave., Detroit, Mich.

Biggest, Best Catalog Model Airplanes, Parts, Supplies; 5c postpaid. Ideal Co., 169 1/2 Spring St., New York.

Aquatic Devices

Self-Inflating Life Belt—pocket size. Wonder of the age. Miniature hollow-ribbed lifeboat extendable around body instantly. Sustains wearer in deep, rough water. Most practical safeguard for sea-travelers and non-swimmers. Room to aquatic sports. Get free illustrated booklet. Self-Acting Life Belt Co., 55 E. 8th St., New York.

Art

Imported French Art Pictures, five for 25c, small supply. Edelman, 2120-b Surf Ave., Brooklyn, N. Y.

Battle Photos and War Relics

For Dens; Relics from Europe's battlefields (also medals) illustrated catalogue with sample war photos 25c. International, 1839 Albany Ave., Brooklyn, N. Y.

Books

Free—My Illustrated Circulars on Newthought, Self-culture, Healing, Yoga Philosophy, Occult, Mystic and Scientific Books. Martens Publisher, Inc., Burlington, Iowa.

Hypnotism Wins! 25 easy lessons and 218 page illustrated reference guide, \$2.00. "Mindreading" (any distance). Wonderful, \$2.00. Science Institute, S430 Milwaukee Ave., Chicago.

Business Opportunities

Free Book. Start Little Mail Order Business. Pier Company, 72AF Cortland Street, N. Y.

You can have a business-profession of your own and earn big income in service fees. A new system of foot correction; readily learned by anyone at home in a few weeks. Easy terms for training, openings everywhere with all the trade you can attend to. No capital required or goods to buy, no agency or soliciting. Address Stephenson Laboratory, 18 Back Bay, Boston, Mass.

Stop Plodding! Be Successful. Operate a Tire Repair Shop. Make big profits in any locality. We teach you and furnish complete equipments \$160 up. Book of Opportunity free. Haywood's, 1312 South Oakley Avenue, Chicago.

Increase your income during spare time. Be independent, start a business of your own. "Selected Opportunities" listing 21 good plans, also two formula charts \$1.00. Robt. Smeriglio, S207 Stillwater, Stamford, Conn.

Establish big paying business in your home town or travel. Many opportunities offered. E. Santschl, Glenclon, Ill.

Start a business of your own. Nothing else to buy. Instructions 25c in coin. Clifton J. Day, 9129 Jones Mill Road, Chevy Chase, Maryland.

Start a business of your own. Large earnings possible. Small capital needed to start. List free. Koneyak, 18 W. Branch Court, West Hazleton, Pa.

Start Money Making Mail Order Business. Write today enclosing stamp. Mason, 3900 Broadway, Room 6, Chicago.

Conduct a Mailing and Distributing Bureau. Complete instructions, 25c. Benjamin Marks, Homestead, Penn.

An Independent Income for Life. Operate at home or travel. Valuable information free. E. Santschl, Glenclon, Ill.

Stocks—Bonds. Domestic-Foreign, bought-sold. Dealers in all marketable securities. Frank X. Everett & Co., 20 Broad St., New York.

Cameras and Photography Supplies

Establish yourself at home, as a photographic expert; make \$75 a week while learning; professional camera furnished free; write quick for full information. International Studios, Dept. 5332, 3601 S. Michigan Ave., Chicago, Ill.

Chemistry

Learn Chemistry at Home. Dr. T. O'Connor Sloane, noted educator and scientific authority, will teach you. Our home study correspondence course fits you to take a position as chemist. See our ad on page 983 of this issue. Chemical Institute of New York, 66 W. Broadway, New York City.

Your Chemical problems solved and working process furnished for Five Dollars. Write me. W. Stedman Richards, Consulting Chemist, Box 2402, Boston, Mass.

Attention Amateur Chemists! Send 25c in coin for Junior Chemlab. Contains chemicals, apparatus, instructions to perform 20 mystifying experiments. Clinton Chemical Co., Box 335, Swolesboro, N. J.

Experimenters, 20 chemicals for \$1.00. C. P. quality. Service Laboratories, 900 Belmont, Chicago.

Correspondence Courses

Home Study: High School, Normal, Business, and Collegiate courses. Bulletin free. Apply Carnegie College, Rogers, Ohio.

Used correspondence school courses sold on repurchase basis. Also rented and exchanged. Money-back guarantee. Catalog free. (Courses bought). Lee Mountain, Pisgah, Alabama.

Educational

Home Study Courses. All Schools. Lowest Prices. Terms. Catalog Free. Mention subject. Fred Goetz, 410-H Sansome, San Francisco.

For Inventors

Inventors—Get this pamphlet, "What to Invent." No theory or guess work, but things actually asked for by manufacturers. Sent prepaid for only \$1.00. Inventor's Syndicate, 22 Paladium Bldg., St. Louis, Mo.

Unpatented Ideas Can Be Sold. I tell you how and help you make the sale. Free particulars (Copyrighted). Write W. T. Greene, 808 Jenifer Bldg., Washington, D. C.

Inventors! Use our special service for presenting your invention or patent to manufacturers. Adam Fisher Mfg. Co., 205-A Enright, St. Louis, Mo.

Inventions Commercialized. Patented or Unpatented. Write Adam Fisher Mfg. Co., 205 Enright, St. Louis, Mo.

Inventions developed to practical basis—Non infringing devices designed—Basic claims suggested. A. Papini, Leonia, N. J.

Manuscript typing. Strict secrecy maintained. Inez Lee, Epping, N. D.

Formulas

500 Formulas 20c, Catalog FREE. Ideal Book Shop, Park Ridge, Illinois.

For Sale

For Sale—Telegraphone, for Radio Broadcasting, recording and reproducing. Wonderful results obtained. Box 95, Creighton, Pa.

Games and Toys

Boys! Boys! Boys! Big illustrated catalog of tricks, puzzles, novelties, jewelry. Send 10c for your copy today. Dept. S, American Bazaar, Inc., 640 Broadway, N. Y.

Help Wanted

Silvering Mirrors. French plate. Easily learned, immense profits. Plans free. Wear Mirror Works, 16 W. Excelsior Springs, Mo.

Be a Detective. Work home or travel. Experience unnecessary. Particulars Free. George Wagner, former Government Detective, 1968 Broadway, N. Y.

Detectives Earn Big Money. Travel. Excellent opportunity. Great demand everywhere. Experience unnecessary. Write, American Detective System, 1971 Broadway, N. Y.

Firmen, Brakemen, Baggage-men (white or colored) sleeping car, train porters (colored), \$150-\$250 monthly. Experience unnecessary. 897 Railway Bureau, East St. Louis, Ill.

Help Wanted (Continued)

Join Big Money Class. Learn fascinating trade or profession at home. Unlimited opportunities. D. Santschl, Glenellyn, Ill.

You Are Wanted. Men—women. 18 up. U. S. Government Life Jobs. \$95 to \$250 month. Steady work. Short hours. Paid vacation. Experience unnecessary. Common education sufficient. Sample coaching with full particulars—Free. Write today sure. Franklin Institute, Dept. G18, Rochester, N. Y.

U. S. Government Jobs. Become Railway Postal Clerks (\$178-\$225 month); City Carriers—Postoffice Clerks (\$142-\$192 month); Rural Carriers (\$175-\$225 month). Men 18 up. Steady work. Life positions. Paid vacation. Common education sufficient. Experience unnecessary. Sample coaching and full particulars free. Write today sure. Franklin Institute, Dept. G4, Rochester, N. Y.

How to Entertain

Plays, musical comedies and revues, minstrel music, blackface skits, vaudeville acts, monologs, dialog, recitations, entertainments, musical readings, stage handbooks, makeup goods. Big catalog free. T. S. Denison & Co., 623 So. Wabash, Dept. 99, Chicago.

Insects Wanted

Why not spend Spring, Summer. Fall gathering butterflies, insects? I buy hundreds of kinds for collectors. Some worth \$1. to \$7. Simple outdoor work with my instructions, illustrations, price list. Send 10c for Illustrated Prospectus. Sinclair, Dealer in Insects, Dept. 41, Box 1424, San Diego, Calif.

Instruction

Learn Chemistry at Home. Dr. T. O'Connor Sloane, noted educator and scientific authority, will teach you. Our home study correspondence course fits you to take a position as chemist. See our ad on page 983 of this issue. Chemical Institute of New York, 66 W. Broadway, New York City.

Correspondence Courses Sold Complete: One-third usual price, because slightly used, easy terms, money back guarantee. All schools and subjects. Write for special free catalog. Courses bought for cash. Economy Educator Service, II-202 West 49th St., New York.

Inventions Wanted

Will buy approved invention. Write W. L. Kendig, 416 N. Duke Street, Lancaster, Pa.

Inventions Commercialized. Patented or Unpatented. Write Adam Fisher Mfg. Co., 205 Enright, St. Louis, Mo.

Magic and Games

Free with \$25 order our large die box. Send 20c for our large catalogue of tricks, puzzles, wigs, sensational escapes. Oaks Magical Co., Dept. 549, Oshkosh, Wis.

Books—Magic, Mysteries, Magic Tricks, Novelties, Catalogue Free. Singer, 200, Hancock, Wis.

Magic easily learned with our modern tricks and instructions. Astonish others. Packet of secrets and new illustrated catalog of magic for stage and parlor, 10c. Piedmont Novelty Shop, Box 621, Danville, Va.

Magic Tricks. Card tricks. Coin tricks. Hypnotism. Ventriloquism. 64 page books. Complete guides, 10c each. G. Fenner, 2101 Jefferson, Louisville, Ky.

Books, Games, Magic, Tricks, Entertaining Novelties, Catalogue Free. Makary, M-339 Mountain St., Pittsburgh, Pa.

Manufacturing

To Order—Mechanical work, all branches. Models, Experimenting. Quantity production. Parma Engineering Works, Brooklyn Station, Cleveland, Ohio.

Inventors. I have competent equipment and build high grade models of inventions. Write me. Bennie Nortwed, Ethan, S. D.

Manuscripts

Short Stories Wanted

Earn \$25 weekly. Spare time, writing for newspapers, magazines. Experience unnecessary. Details Free. Press Syndicate, 687, St. Louis, Mo.

Make \$25 weekly at home, spare time, writing short stories for photoplays. Experience unnecessary. Outline free. Producers League, 603, St. Louis, Mo.

Miscellaneous

Beautiful registered bull pups \$15. Bulldogs, 501 Rockwood, Dallas, Texas.

I Catch From 45 to 60 foxes in from 1 to 5 weeks' time; can teach any reader of this magazine how to get them. Just drop me a card for particulars. W. A. Hadley, Stansstead, Quebec, Canada.

Mexican made pistol holsters, cartridge belts, lariats; horse hair articles, rattlesnake belts, and fobs. Ingersoll Leather Co., 321 Fannin, Houston, Tex.

Forms to cast Lead Soldiers, Indians, Marines, Trappers, Animals, 151 kinds. Send 10c for Illustrated Catalogue. H. C. Schiercke, 1034-72nd St., Brooklyn, N. Y.

Chemical Questions Answered, accurate information \$3.00. Snover, 80 Wall Street, New York.

Modernmeyer's XRay. For sale or trade for Arizona, Kansas or Georgia property. Box 24, Cochocton, Ohio.

Underground Treasures. Simple, scientific method for locating explained free. T. Santschl, Glenellyn, Ill.

Wirekraft. Send 25c for wire bending tool. Wirekit, P. O. Box, 1263, Washington, D. C.

Workbenches—Steel legs cheapest, for home, shop, garage, circular free. Perrin Co., Port Huron, Mich.

Three-line nickelplated pocket stamp—with pad, \$1.00. Harold Gomez, 3001 W. 24th St., Brooklyn, N. Y.

Motorcycles—Bicycles

Don't buy a Bicycle Motor Attachment until you get our catalogue and prices. Shaw Mfg. Co., Dept. 6, Galesburg, Kansas.

Fine used motorcycles; all makes; guaranteed, shipped on approval; terms; bargain prices. Write for free catalog. T. Clymer, Denver, Colo.

Motors

Motors—New GE, 110 or 220 volt, 60-cycle Single Phase. 1/4 HP., \$11.90; 1/2 HP., \$25.50; 1 HP., \$38.50. Mail \$3 check or money order. We will ship C. O. D. anywhere. Motor Specialties Co., Crafton, Pa.

Musical Instruments

Viols—Deep, Mellow, Soulful—on easy credit terms. High grade, wonderful instruments of my own make. Development of many years' experience. Write for book. Gustav A. Henning, 2421 Gaylord St., Denver, Colo.

Old Coins

California Gold, quarter size, 27c; half-dollar size, 53c. Columbian nickel and catalogue, 10c. Norman Shultz, Box 716, Salt Lake City, Utah.

Old Money Wanted

\$2 to \$500 Each paid for hundreds of Old or Odd Coins. Keep all old money, it may be very valuable. Send 10c for new illustrated Coin Value Book, 4x6. Guaranteed Prices. Get Posted, We pay Cash. Clarke Coin Company, 14 Street, LeRoy, N. Y.

Patent Attorneys

Millions spent annually for ideas! Hundreds now wanted! Patent yours and profit! Write today for free book—tells how to protect yourself, how to invent, ideas wanted, how we help you sell, etc. American Industries, Inc., 212 Victor Bldg., Washington, D. C.

Richard E. Babcock, Patent Lawyer, Washington Loan & Trust Bldg., Washington, D. C. Booklet.

Monroe E. Miller, Ouray Bldg., Washington, D. C. Patent Lawyer; Mechanical, Electrical Expert. Booklet and Priority Record blank gratis.

Patents—Send for form "Evidence of Conception" to be signed and witnessed. Form, fee schedule, information free. Lancaster and Allwine, Registered Patent Attorney in United States and Canada, 212 Ouray Bldg., Washington, D. C.

Patents Procured: Trade Marks Registered—A comprehensive, experienced, prompt service for the protection and development of your ideas. Preliminary advice gladly furnished without charge. Booklet of information and form for disclosing idea free on request. Richard B. Owen, 120 Owen Bldg., Washington, D. C., or 41-T Park Row, New York.

Patents. Send for free booklet. Highest references. Test results. Promptness assured. Send model or drawing for examination and opinion. Watson E. Coleman, Patent Attorney, 724-9th Street, N. W., Washington, D. C.

Cooperative Plan for safe-guarding and commercializing inventions before patenting. Write for free booklet, Ralph Burch, Patent Lawyer, 501 Jenifer Building, Washington, D. C.

Unpatented Ideas Can Be Sold. I tell you how and help you make the sale. Free particulars. (Copyrighted). Write W. T. Greene, 809 Jenifer Bldg., Washington, D. C.

Get your own patents. Application blanks, complete instructions \$1. Cutting Bros., Campbell, Calif.

Patents. Time counts in applying for patents. Don't risk delay in protecting your ideas. Send sketch or model for instructions or write for Free book, "How to Obtain a Patent" and "Record of Invention" form. No charge for information on how to proceed. Communications strictly confidential. Prompt, careful, efficient service. Clarence A. O'Brien, Registered Patent Attorney, Security Bank Building (directly across street from patent office), Washington, D. C. See page 1051.

Patents: Trade-Marks. Ten years experience in Patent Office. Consultation invited. Booklet. Geo. Beeler, 2001, 150 Nassau St., New York.

"Inventor's Advisor," the valuable Patentbook with 129 Mechanical movements and Illustrations, sent free upon request. M. I. Labiner, Patent Attorney, 3 Park Row, New York.

We Finance Your Application and assist selling the patent. Patent Bureau, Times Bldg., St. Louis, Mo.

"Inventors' Guide" free on request; gives valuable information and advice for all who have original ideas or improvements. Frank Ledermann, Registered Attorney and Engineer, 17th Floor, Woolworth Bldg., New York.

Inventors who derive largest profits know and heed certain simple but vital facts before applying for Patents. Our book Patent Sense gives those facts; sent free. Lacey & Lacey, 614 F St., Washington, D. C. Established 1869.

Patents

Inventions commercialized. Patented or unpatented. Write Adam Fisher Mfg. Co., 205 Enright, St. Louis, Mo.

Two Inventions—Two automatic inventions and a plaster paris process. Beware inventors' rights. William Haines, Habana, Cuba.

Patents Wanted

Mr. Inventor. If you have a patent or invention for sale write Hartley, 38 Court St., Bangor, Me.

Inventions Commercialized. Patented or Unpatented. Write Adam Fisher Mfg. Co., 205 Enright, St. Louis, Mo.

Personal

The Face is the Most Interesting Story. Learn to read it. Send 10c and 2c stamp for my booklet, How to Read Character From the Face. Josef J. Brabender, Port Washington, Wis.

Photography

Have you a Camera? Write for free sample of our big magazine, showing how to make better pictures and earn money. American Photography, 118 Camera House, Boston, 17, Mass.

Photoplays Wanted

\$1,250—For A Photoplay—\$1,250. Written by an unknown writer whose story was sold through our sales department. We copyright, revise, criticize and market photoplays. We are right on the ground in Hollywood in daily touch with the studios. We know the market. Send manuscript today for free criticism and advice. Universal Scenario Co., Room 217, 5507 Santa Monica Blvd., Hollywood, Cal.

Printing Outfits and Supplies

Print your own cards, stationery, circulars, paper, etc. Complete outfits \$8.85; Job Presses \$11, \$29; Rotary \$19. Print for others, big profit. All easy, rules sent. Write for catalog presses, type, paper, etc. Kelsey Company, F-6 Meriden, Conn.

Radio

Boys! Don't overlook this. The "Rasco" Baby Detector. Greatest detector ever brought out with molded base. Fully adjustable. See former advertisements in this publication, or our catalogue. Detector with Galena Crystal complete 50c. The same detector with Iaducite Crystal 75c prepaid. Send for yours today. Radio Specialty Company, 109 Park Place, New York City.

Crystal Set perfect selectivity in fancy chest, \$1.25. Radio Power Co., Box 1103, Milwaukee, Wis.

Storage battery soldering iron heat in ten seconds. Guaranteed, price \$3.00. Orlando Elec. Specialty Co., Box 599, Orlando, Fla. Agents Wanted.

Wireless from Mars! Startling! Thrilling! Hand it to your friends to read and then watch them drop it with surprise! Barrel of Laughs! Price, 15c. Mars Novelty, 1914 Crystal St., Chicago.

Rubber Stamps

Your name handsomely moulded in fancy letters upon a rubber stamp \$1.00 plus 10c for postage. Please print name, R. Skeffington, 18 Bulfinch St., Boston, Mass.

Salesmen Wanted

Minutes Pay Dollars demonstrating wonderful three pound calculator. Retail \$15.00. Work equals \$300 machines. Adds, subtracts, multiplies, divides automatically. Five year guarantee. Big demand; large profits, experience unnecessary. Write quick for liberal trial offer and protected territory. Lightning Calculator Co., Dept. W, Grand Rapids, Mich.

We Have a Clean Dignified Offering that is a sure-fire money maker. Men on our sales force are welcome wherever they go, and their earnings are substantial. You can qualify if you're honorable, straight-forward, reliable. We have a high-class offering and so want only high-class men. If you're such a man, write us. Address Salesmanager, 870 West Adams, Dept. 78, Chicago.

Salesmen Wanted. Nationally advertised, universally needed product. Sells to Stores, Garages, Factories, Schools, Homes, Farmers, Auto Owners. Used by everybody. Big demand, ready sale. Big commissions. Complete sales training given. Credit extended to customers. Sample can be easily carried. Concern rated very high—established many years. Opportunities for lifetime jobs at big pay. Address Territory Manager, Dept. 60, Post Office Box 985, Dayton, Ohio.

Great neckwear line now free! Features finest quality neckwear at factory prices. Collect big commissions daily. Write for Free tie offer and Free outfit. Navco Neckwear, Desk 2-N, Covington, Ky.

Wonderful Opportunity for reliable man as representative of \$1,000,000 firm showing nationally advertised line of staple merchandise to business men. Basic necessity—steady repeater. Under-selling competition 30%. Earnings start big, grow larger. Our men earn \$50 to \$100 and more weekly—full or spare time. No experience needed. A few exclusive territories are open. Write for full information—Free. J. B. Simpson, Dept. 1317, 813 Adams St., Chicago.

Tailoring Salesmen—Entire new, distinctive advertising sales plan gets the orders for you. Guaranteed fitting made to measure suits, \$18.50 to \$17.50. Big commissions, 200 samples, \$20 outfit free. Wholesale Direct Tailors, Dept. 24, Buffalo, N. Y.

Song Poems—Song Poem Writers

Free "Song Writers Guide," B21-1239 Elm, Green Bay, Wis.

Song-poem writers. Address Monarch, 1472 Broadway, Dept. 1535, New York.

Stamps and Coins

Stamps 100 All Different 3 cents. S. I. Quaker Stamp Company, Toledo, O.

Belgium, No. 216-266 Catalogue value, \$3.20; price, 50c. Monthly bargain list free. The Setwell Co., 2317 Cortelyou Road, Brooklyn, N. Y.

Typewriters

Typewriters, all standard makes, \$10 up. Fully guaranteed. Free trial. Write for complete illustrated lists. Northwestern Exchange, 121 N. Francisco Ave., Chicago.

Ventriloquism

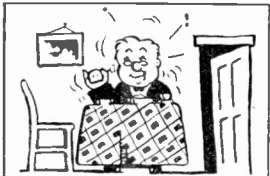
Ventriloquism taught almost anyone at home. Small cost. Send 2c stamp today for particulars and proof. Geo. W. Smith, Room 8-160, 125 N. Jefferson Ave., Peoria, Ill.

Wanted

Detectives Earn Big Money. Work home or travel. Experience unnecessary. Write, George Wagner, former Government Detective, 1968 Broadway, N. Y.

BOOK REVIEW

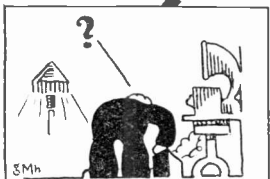
THEN



7 P.M. - Rushes supper to tune in big DX.



7:30 - Discovers set won't work.



9 P.M. - Still trying to locate trouble.



12 P.M. - Gives up in disgust!

Don't hire an expert! Repair your Radio set yourself—it's easy.

No matter how much or how little you know of your radio receiver, this new "Radio Trouble Finder" book is going to be a big help.

It explains the common and special faults of all the standard receivers of today; tells how to recognize instantly, by various methods, where the trouble lies and also gives special simple tests by which you can determine what is wrong with your receiver. Then for each particular fault there is explained the proper procedure for correcting it.

Book Contains 64 Pages
Size 6x9, Illustrated,
Handsome 2 Color Cover

THE CUSTOMS OF MANKIND by Lilian Eichler. Stiff cloth covers 5 3/4" x 8 3/4", illustrated, 754 pages. Published by Nelson Doubleday, Inc., Garden City, N. Y. Price \$3.00.

The lady who wrote this work states on her title page that it has notes on modern etiquette. The frontispiece, however, gives a view which it is to be hoped refers to ancient etiquette. It really seems curious that the customs of mankind should be formed and developed into such fixity as to give material for a seven hundred-page book like the present. The subject ranges from the sources of origin of etiquette all through the development of civilization, and there is an attempt to get at the origin of all the ways of even modern society, such as the hand-shake, the raising of the hat, kissing, courtship, marriage customs, the history of writing, the holidays, burials, are all treated; and an interesting, although rather short, section treats on the subject of children and the relation to their parents. Among aboriginal customs pressing noses and rubbing noses are included. Even the barber pole is spoken of with its origin attributed to the original use of it to be held by the patient whom a barber was bleeding, and to the same unfortunate barber was attributed the origin of tipping and it is referred etymologically to the initials of the three words, "To Insure Promptness." All sorts of curious things appear in the section on popular superstitions. Bicycling, golf and basketball are among the games spoken of. At the end is given a four-page list of authorities consulted, and a two-column index of twenty pages closes the work, which we warmly commend to our readers.

THE HUMANIZING OF KNOWLEDGE, by James Harvey Robinson. Stiff cloth covers, 4 1/2 inches by 7 inches, 94 pages. Published by George H. Doran Co., New York City. Price \$1.00.

Claim is made that the author's educational theories have caused wide discussion and have brought universal commendation. The book is pleasant reading even though one may doubt whether the commendation will be quite universal. He appreciates the work done by the wonderful Grecian philosophers and he brings out the idea that the doctrines of Aristotle, whom he terms the greatest of all scholars and scientists, actually operated to better human knowledge. Glancing through the book gives the impression that the author takes a very sensible view of the great educational question which has been foolishly forced upon the nation of whether evolution shall be taught in the schools.

PROSPERITY THROUGH POWER DEVELOPMENT. Stiff cloth covers 6" x 8 3/4", 60 pages. Published by National Electric Light Association, New York City.

This is a convenient summary or compilation of papers presented at the first World Power Conference of 1924 held at London. It treats of government regulation, of super-power stations, of public versus private ownership and related topics, and makes a very convenient little treatise.

FUNDAMENTAL PRINCIPLES OF GENERATORS AND MOTORS; EXAMPLES by Prof. F. E. Austin, E. E. Stiff cloth covers, 5" x 8", illustrated, 108 pages. Published by Prof. F. E. Austin, Hanover, N. H. Price \$2.50.

This author-published book is practically the tenth of a series which Prof. Austin states are to be found at all public libraries and can be procured from any book dealer. It is a mass of calculations and does not lend itself to easy review, yet, on glancing through it, the diagrams themselves suggest what may be termed a picturesque treatment of the subject, and the numerous calculations and formulas operate to bring us right down to earth. Wire-tables and an index close the work. It is unpleasant to criticize, but we would like the wire tables to have included the carrying capacity of wires either on the Underwriters' or other standard basis. The author is rather ultra-logical in giving the practical units, the volt, ampere, etc., and omitting for the moment the ohm, which, however, occurs three pages later, but so far the reviewer has not yet found the ohm defined by the author. But this, of course, is rather captious for the work is to be commended to the electric engineer.



The
NEUTRODYNE
For those who
want to
ENJOY Radio

If you've never had a "Neutrodyne," you don't know what quiet, clear, steady, Reception is.

Why have Neutrodynes been sold in the hundreds of thousands—Why are they being sold today in even greater quantities? — Because the Neutrodyne gives you quietness, freedom from internal squeals and howls, with which no circuit can compare.

Tuning a Neutrodyne is a pleasure—Distance, volume, clarity—are all achieved.

If you want the pleasure of a fine Radio Receiver, build the Neutrodyne with a Consrad Pattern.

Full size blueprints furnished on Panel and Wiring—16 Page instruction pamphlet. All in handsome folders.

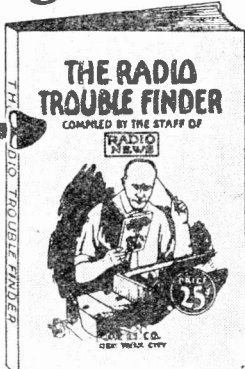
50c
ON ALL
NEWSSTANDS

If your newsdealer can not supply you write direct.

The Consrad Co., Inc.
53 Park Place,
New York, N. Y.

Consrad

ONLY
25c
On All
News-
stands



BUY YOUR COPY TODAY

If you cannot secure a copy from your dealer, order direct.

THE CONSRAD COMPANY
53 Park Place, New York, N. Y.

150
radio
hookups
unmatched

68 Pages of
Radio's most
popular circuits
only 25c

This 68 page book of the Conrad Company is the latest compilation of Hookups in Radio. The Hookups are those that have been tried, tested and perfected by time and by thousands of Radio Listeners.

This priceless book contains: 18 Crystal Detector circuits, 39 Regenerative, 21 Reflex, 23 Radio Frequency, 10 Super-Regenerative, 10 Amplifier and Oscillator, 5 Super-Heterodyne and other valuable Hookups.

All circuits are shown by simplified drawings and each is explained in detail.

The book is 6x9 inches in size, illustrated, and is contained in a special attractive 2-color cover.

SOLD ON ALL
NEWSSTANDS AND
AT RADIO STORES

If your dealer cannot supply
you write direct

The Conrad Co., Inc.,
53 Park Place, N. Y. City

Gentlemen—I enclose 25c for 1
Copy of "150 Radio Hookups."

Name

Address

City, State

DAS NEUE UNVERFUM. Stiff cloth covers, 6¼" x 9½", illustrated, 473 pages. Published by Union Deutsche Verlagsgesellschaft, Berlin, Germany.

This is a scientific annual and the copy before us marks its forty-sixth year. The Navy of the United States now possesses one of the largest, if not the largest, floating crane in the world which has been mounted on an old battleship. The frontispiece in this book shows a land crane in the Hamburg harbor lifting up a first-class passenger car—a close competitor with our floating crane. The name of this book suggests difficulty in reviewing it. It starts with a section devoted to fishing, hunting and adventure. Then come stories of countries and strange people, all of which, with numerous illustrations, is of decidedly general interest. One story, as we may call it, depicts the greatest thirst on the waterless desert with a very impressive colored picture of a rider alone in the wilderness. All sorts of other subjects follow, there being the greatest variety of topics, and it interests us very much to see that the pages of "The Experimenter" and other associate publications have been utilized to add to its interest. Thus we find a future city reproduced from its columns, all the captions being translated into German. We mention this because it is an indication of thoroughness on the part of the publishers, which thoroughness appears all through the book. There is comparatively little attempt to classify the subjects, and it may almost be said that this very feature, which might be interpreted as a defect, makes the book more interesting. Of course the idea is for it to be popular reading and such it certainly is. America contributes her share. We even find the progress of the great carving on the face of the great cliff on Stone Mountain, Ga., very thoroughly illustrated. Two pictures are given of the ship on which the Flettner Rotor was tried before and after the installation. They are given on opposite pages and the contrast is certainly curious. Airplanes, gliders and dirigibles give matter to fill a number of pages. Many animal pictures are given mostly in black and white, and a limited number of colored pictures add greatly to the artistic value of the book. A special section is devoted to radio, and to this we find that THE EXPERIMENTER and RADIO NEWS have contributed, and an article by the writer of this review on the subject of chemical manipulation has been utilized. We are gratified to find our work appreciated in the Fatherland. To those who can read German, we warmly recommend the book.

RADIOTECHNIK, by Prof. J. Herrmann. Stiff cloth covers, 4" x 6¼", illustrated, 128 pages. Published by Walter de Gruyter & Co., Berlin, Germany.

This is indicated as the first of a series of books on the titular subject of radio science, the present one appearing as a general introduction. In its rather short scope of about 130 pages, it gives a nice little presentation of the subjects, and its scope is certainly very extended in proportion to the size of the book.

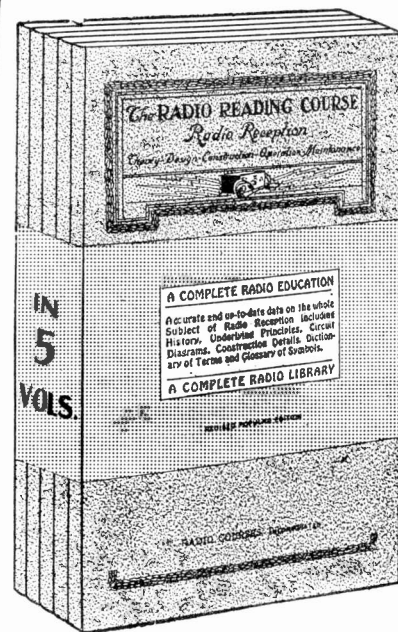
GENERAL SCIENCE by William H. Snyder, Sc.D. Stiff cloth covers 5" x 7½", profusely illustrated, 591 pages. Published by Allyn & Bacon, New York City. Price \$1.60.

The title of this book, "General Science," includes within its scope an appalling range of information. It has been selected by the author of the work, Dr. Snyder, to make a most interesting manual for general reading, touching on almost every branch of natural science with a quantity of illustrations, one or more to a page. It is a little distracting to run through its pages, for the text of chapter following chapter jumps about all over the field of knowledge, and sometimes the jumps are pretty long. The effect of this is that it will never lose interest to the reader, and it will be found unexpectedly up to date, because we generally expect such a work to be more or less behind time, and this certainly is not.

PHASES OF MODERN SCIENCE. Stiff cloth covers 5½" x 8¾", 232 pages. Published by A. & F. Denny, Ltd., 163A Strand, London, W.C. 2, England.

This very peculiar book, in the good sense of peculiarity, approaches a catalogue as it is published in connection with the science exhibit at the British Empire Exhibition. The best authors and highest scientists of England have contributed the articles, so that they are in the very fullest degree authoritative. "The Origin of Wireless," by Sir Richard Glazebrook, and "Thermionic Valves," by Prof. Fleming, are typical of the subjects treated. We are glad to see acknowledgement made of the work of Thomas A. Edison, as the Edison effect discovered by the great American inventor is at the base of all modern radio. These two chapters follow each other, but all sorts of chemical and physical biological topics are given in a series of monographs, which are only too short, and whose list of authors presents a wonderful array. Sir Ernest Rutherford, Sir Joseph Thompson, Sir Oliver Lodge, Dr. F. W. Aston may be cited as among the authors. Dr. Aston's article on atoms and isotopes was made up in part of abstracts from lectures delivered before the Franklin Institute of Philadelphia.

(Continued on page 1077)



Price \$1.97

A
RADIO
EDUCATION

IN 5 VOLUMES

Theory, Design, Construction,
Operation and Maintenance

LEARN AT HOME

These five component parts of a complete Radio Instruction Course are outlined in five volumes that contain not merely the essentials as so many books do, but more, they contain all that any modern up-to-the-minute textbook on any subject would cover. They are in themselves a COMPLETE radio education teaching every possible portion of Radio science.

Size of each book 6 by 9 inches, handsomely bound and illustrated with charts, diagrams, descriptions of equipment, etc.

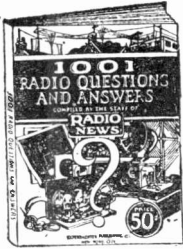
SEND NO MONEY for these books. Just forward your name and address. We send you the books at once. On receipt of same you pay the postman \$1.97 plus a few cents postage and then they are yours.

Distributed by
The Conrad Co.
64 Church St., New York, N. Y.

Second call to this wonderful Magazine offer

Free

You save \$1.00 and get 100 page books free



WE GIVE YOU THIS VALUABLE BOOK

A Book full of radio problems and how to solve them.

A brand new book filled to the brim with a priceless array of selected Questions and Answers that are necessary to everyone in the construction, care and maintenance of modern sets, including information on hundreds of simple and complex circuits in common use today.

Radio engineers spent 7 months to give you this valuable book. Contains 116 pages, 300 illustrations and is published in the large Magazine size 9 x 12 inches. This book will be given you absolutely FREE with your subscription to

RADIO NEWS

RADIO NEWS is the medium that keeps thousands upon thousands of radio fans in direct touch with what is going on everywhere in the industry. It is radio's greatest magazine written for everyone who owns or uses a radio set, whether he be a broadcast listener or professional radio engineer. Contains no less than 20 separate big features and departments every issue, 200 Pages, size 9 x 12, illustrated—PRICE \$2.50.

Some of the big features in the March issue of RADIO NEWS are:—



Hello London! Are You There New York?

Portable Super-Heterodyne Detection Finder by F. W. Dunmore—Bureau of Standards, Washington, D. C.

The Samson R. F. C. Receiver.

The Theory of Wave Traps by James Wood, Jr.

Fill out and mail this coupon today and have RADIO NEWS delivered to your home each month for twelve months, and one copy free of "1001 Questions and Answers."



IT COSTS NOTHING TO OWN THIS BOOK

POPULAR MAGIC is a book for you, for everybody, young and old. But especially for those who want popularity, those who want to realize how much the admiration of friends help toward making life worth more.

POPULAR MAGIC contains thousands of simple, entertaining parlor tricks, as many puzzling magical stunts and a whole book full of mystic spirit novelties. A new set of tricks for every day in the year.

You can get this book absolutely FREE by subscribing now to—

AMAZING STORIES

A new kind of magazine. Scientification by world-famed writers. Marvelous, Amazing Stories by great men, such as Jules Verne, H. G. Wells, etc., appear in this new magazine AMAZING STORIES every month.

Stories of flying into space at dazzling speed on a comet; Mesmerizing the dead; remarkable situations of all kinds. Tremendously interesting—yet instructive.

Keeps you in touch with the writings of the men of the greatest imaginations in the world. A magazine for young and old.

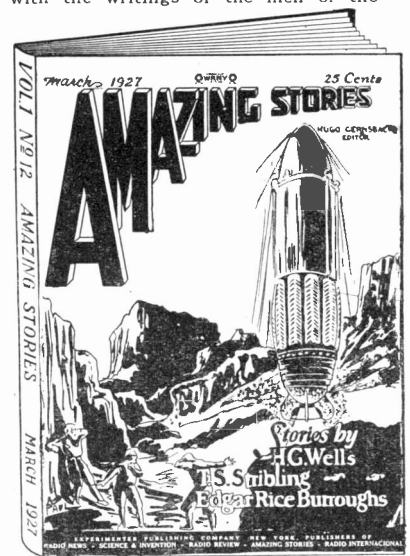
Some of the big feature stories of the March issue just out are:

The Green Splotches by T. S. Stribling.

Under the Knife by H. G. Wells.

The Land That Time Forgot by Edgar Rice Burroughs.

Price \$2.50 the Year. Think of it for only \$2.50 you get one copy free of POPULAR MAGIC and AMAZING STORIES for 12 consecutive months delivered to your door. Fill out and mail the coupon now.



Experimenter Publishing Company, Inc.
53 Park Place
New York, N. Y.

EXPERIMENTER PUBLISHING CO., Inc.,
53 Park Place, New York, N. Y.

Gentlemen: I enclose \$.....for one year's subscription to, you are also to send me free one copy of.....

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

Experimenter Publishing Company, Inc.
53 Park Place
New York, N. Y.

SCIENTIFIC RESEARCH AND HUMAN WELFARE. By Franklin S. Harris, Ph.D. Stiff cloth covers 5¼" x 8", 406 pages. Published by The Macmillan Co., New York City. Price \$2.50.

This book comes from the Capital of Morman-don, Dr. Harris, its author, being President of Brigham Young University. The introduction, which lets us know to some extent the views of the author, puts us at once on our feet in preparation for going through the book. The topics are very numerous, there being no less than fifty chapters in its 373 pages. It gives a very fine resumé of what is being done in the world, and what has been done to ameliorate the lot of mankind. As an example of the detail of the book, there is a chapter on saving steps for the housewife. Here we find the electric iron described as using up about forty million dollars' worth of electricity every year. It is not enough for him to cite the sewing machine, but he cites the electrically driven one, and so from one end of the book to the other every sort of detail is brought in to tell the story of modern times from the standpoint of food, medicine, dyes, etc. We believe it will be rather hard to think of any topic in modern improvement which will not be found directly or indirectly spoken of here.

THE SPECTROSCOPY OF X-RAYS by Manne Siegbahn, Professor in the University of Upsala. Translated by George A. Lindsay, Asst. Prof. of Physics in the University of Michigan. Stiff cloth covers 6¼" x 9½", illustrated, 288 pages. Published by Oxford University Press, New York City. Price \$6.00.

From the great Swedish University of Upsala, this most valuable treatise comes. It opens up with a summary on the knowledge of X-rays prior to the year 1912. At this time Laue had a happy idea, as our author calls it, of using the crystal edifice as a grating for X-rays, just as the spectroscopists use a Rowland grating, as we may term it, for light-spectroscopy. The book goes on to give very full details of X-ray apparatus with many diagrams and illustrations, and goes into all the details of how the investigations are carried out, treats at length on the arrangement and theory of the spectra, and then comes to the crux of the subject in the shape of the continuous X-ray spectrum, its total intensity and intensity of distribution. All this applies to the atom. In the measurement of the length of the extremely short X-ray waves, Millikan's work is most appreciatively used. The appendix is an excellent example of what such a section should be, giving a great number of most interesting tables and a bibliography; the latter filling twenty pages gives an idea of the immensity of this subject.

CRYSTALS AND THE FINE-STRUCTURE OF MATTER by Frederick Rinne, Professor of Mineralogy in the University of Leipsic. Translated by Walter S. Stiles. Stiff cloth covers 5½" x 8¾", illustrated, 196 pages. Published by E. P. Dutton & Co., New York City. Price \$4.20.

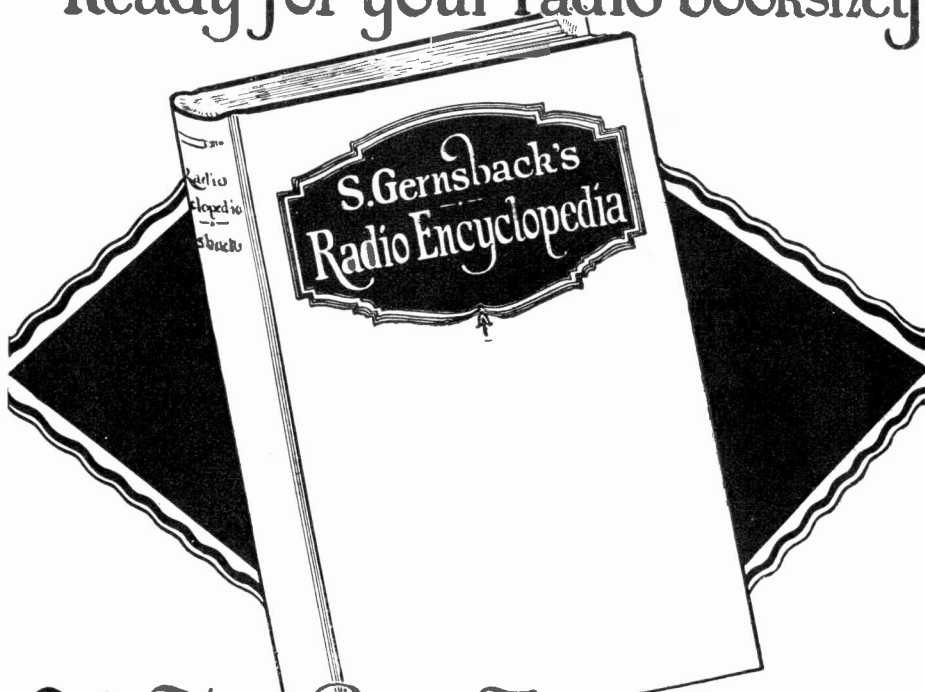
We have just reviewed a book on this subject coming from Upsala, Sweden. Here Leipsic University in Germany gives us another treatise on the structure of crystals and atoms. As a mere matter of book making, we have the same to say about it as we did about the other one, that it is worthy of all commendation. It has for its subject very liberal illustrations, and the isometric production used throughout in conjunction with half-tones give a most attractive aspect to its pages. The table of atoms gives the ninety-two numbers, which table as we now know is pretty nearly filled. So many attractive books are appearing on this and analogous subjects that one feels that all science is not open to any one person and that the limitations of time require the individual to restrict his devotion to sub-divisions only, for such limited division may require a lifetime for its study. The Laue effect to which we alluded to in our review of Prof. Siegbahn's book is here very nicely treated with illustrations. An interesting feature of the book are portraits of leading scientists. The portrait of the famous Abbé Haüy, who over a hundred years ago founded modern crystallography, is most impressive. A very fine portrait of Dr. Röntgen heads the book, and a reproduction of an Albert Durer engraving representing melancholy is given.

VON DER FASER ZUM GEWAND, by Dr. Hans Wolfgang Behm. Stiff cloth covers, 5¼" x 7¾", illustrated, 76 pages.

Published by Kosmos, Stuttgart, Germany. Ladies like silk and other textiles when they take the shape of dresses. In many homes today hand-weaving is being done which is certainly quite a fascinating occupation. The seventy pages of text in this little book is a very interesting presentation of spinning and weaving arts, which presentation is so good that we certainly recommend it to those of our readers who can read German.

(Continued on page 1079)

Now it's complete ~ ~ ~ Ready for your radio bookshelf



The First Radio Encyclopedia ~ Ever Published ~

Edited by **SIDNEY GERNSBACK**, Editor of "Radio Listener's Guide and Call Book (Radio Review)." Editor of "Money Making." Author of "Wireless Course in Twenty Lessons"—"One Thousand and One Formulas"—"Practical Electricity Course"—etc.

S. GERNSBACK'S RADIO ENCYCLOPEDIA is the only standard work ever published in America attempting to classify alphabetically the countless words used in the highly specialized science of RADIO.

The **ENCYCLOPEDIA** is written in plain English so that everybody can understand the definitions and descriptions.

This is not a Dictionary, but a real Encyclopedia of Radio.

The book contains as a supplement a classified cross-index designed to bring together radio references under one heading having relations in common.

All circuits new and old are described by word and picture and every part and apparatus used in Radio is explained and made understandable by means of photographs and drawings.

The work contains 1,930 definitions, 549 photographs, drawings and diagrams. Size of book is 9 x 12 inches, nearly an inch thick, 168 pages printed on strong heavy paper, specially made for books of this kind. It is bound in stiff Keratol covers, hand sewed and gold stamped.

PRICE \$2.00 Postage Paid

SEND ALL ORDERS DIRECT TO THE EDITOR

SIDNEY GERNSBACK

53 PARK PLACE

NEW YORK CITY

S. GERNSBACK,
53 Park Place, New York, N. Y.

S. I. 3

I enclose \$2.00 for one copy of your new "RADIO ENCYCLOPEDIA" as advertised above.

NAME

ADDRESS

CITY, STATE

START IN BUSINESS FOR YOURSELF TODAY

"SPARETIME MONEY"

A BOOK--NOT A MAGAZINE

Is a complete 100 page book that gives you 52 approved plans in detail for establishing your own Sparetime business

Fifty-two plans—completely outlined with a procedure for establishing yourself in those most successful and most lucrative Spare Time businesses in the United States.

Each plan consists: First—of a definite workable item that can be retailed by people of limited means and have only a few spare minutes a day to utilize. Second—the best method of production is outlined carefully with suggestions as to what to avoid. Third—Avenues of distribution or selling are given—such methods of selling by mail as are applicable and all similar details are discussed, and Fourth—information of importance in carrying on to reap large, generous profits are discussed.

Altogether you have before you 52 complete, accurate Spare Time businesses that have returned hundreds of dollars to others.

Sparetime Money, contains 100 pages, of the large magazine size, 9 x 12 inches—with handsome colored covers.

Price 50¢

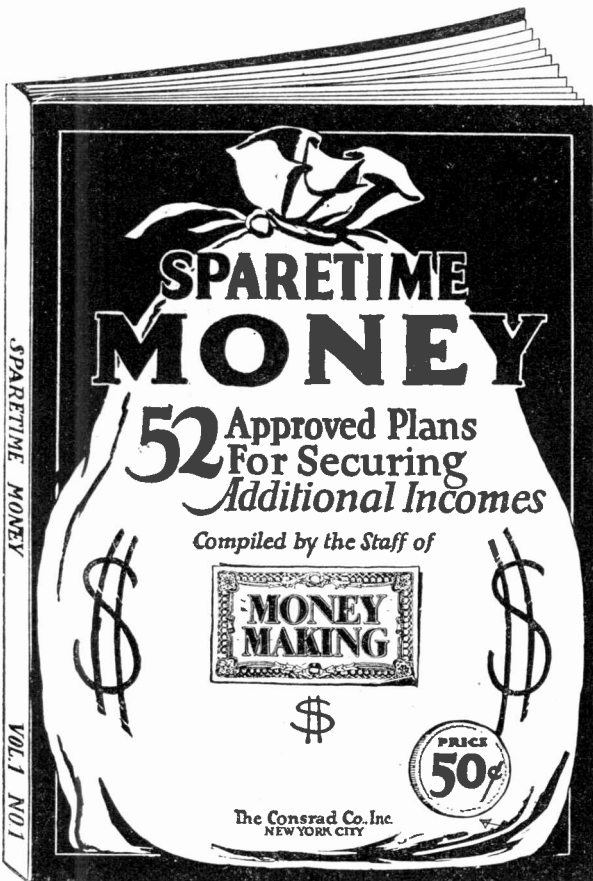
SOLD ON ALL NEWSSTANDS

If Your Dealer Cannot Supply You, Order Direct

The Consrad Co., Inc.

53 PARK PLACE

NEW YORK, N. Y.



Now! The Big Second Edition Is Ready!

The world's latest book on Modern Magic prepared under the direction of the Master Magician Dunninger is now printed in its Second Edition

THOUSANDS OF THE LATEST MAGIC TRICKS BIGGER AND BETTER THAN THE 1st EDITION

Be the popular man in your circle of friends. You can entertain them and hold their attention with a thousand surprises and novelties.

POPULAR MAGIC is a book for you, for everybody, young or old. But especially for those who want popularity, those who want to realize how much the admiration of friends helps toward making life worth more.

POPULAR MAGIC contains thousands of simple, entertaining parlor tricks, as many puzzling magical stunts and a whole book full of mystic spirit novelties. A new set of tricks for every day of the year. Compiled by the staff of the great magazine "SCIENCE AND INVENTION."

300 ILLUSTRATIONS

SIZE 9 x 12 INCHES

PRICE 50¢

SOLD ON ALL NEWSSTANDS

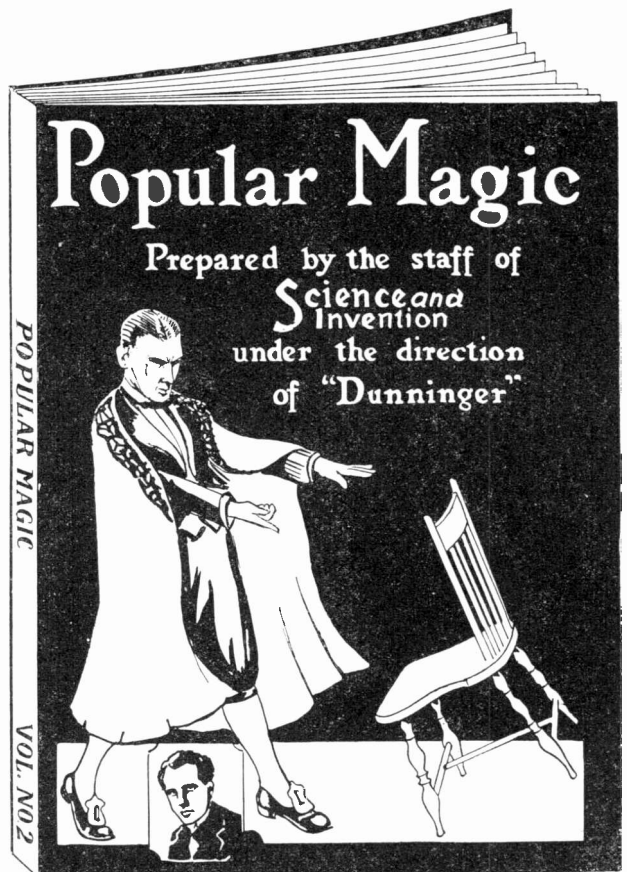
If Your Dealer Can Not Supply You Write Direct

Copies of the First Edition Can Be Procured By Writing Direct

Experimenter Publishing Company, Inc.

53 PARK PLACE

NEW YORK, N. Y.



Does Your Lodge or Club Need MONEY?

WE have arranged a program whereby we will give "Treasury Funds" to live organizations.

If your organization can use extra money — fill out the coupon below and mail to our Mr. Murray. He will tell you about a pleasant plan that requires no investment.

TEAR OFF HERE—AND MAIL

EXPERIMENTER PUB. CO., INC. S.&I.
 M. B. MURRAY, 53 Park Place,
 New York City, New York
 Tell me "How"—Please.

Name

Address

Organization

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

No. of Members

Needs \$..... For.....

\$MONEY\$

Real Money

May be earned during your spare time taking subscriptions to—

- RADIO NEWS
- SCIENCE & INVENTION
- AMAZING STORIES
- MONEY MAKING

Selling these magazines is easy—just a few minutes a day—after school — after work — or after household duties will net you BIG PROFITS and a STEADY INCOME.

Hundreds of others are receiving large sums of money weekly through our plan.

LIBERAL COMMISSIONS

Write today for Application Blank and full particulars

AGENCY DIVISION

Experimenter Publishing Company
 53 Park Place, New York, N. Y.

VOM VORIGEN ZUM NACHSTEN KRIEG, by General Major Freiherr Von Schoenaich. Stiff cloth covers, 5" x 7½". 181 pages. Published by Neuen Gesellschaft, Berlin, Germany.

This book contains so much of international politics and naturally from the German standpoint, that we cannot within the limits of our space give an adequate treatment to it. It starts with what evidently is an indignant presentation of the topic by bringing to the front the statement that the English, or rather that some of the English, contemplated the organized destruction of all German factories as a good way to get rid of German competition. They do not seem to relish the idea of the destruction of Germany, and the author cannot be blamed for this, but we find very little in it about the destruction of Belgium and the ruining of France, which fortunately was very incomplete after the miracle of the Marne. It notes that a student attacked Albert Einstein in Germany with gas bombs because he was a Jew and a Pacifist. Another celebrated law professor, Walter Schuecking, had to leave Marburg because the students didn't like his Pacifist attitude. Other incidents are given with laughable and also sad features of militarism among the people. It seems that one of the German generals is quoted as saying that he is the only man who can make a revolution ("Putsch") in Germany, and that he said he wouldn't, while others claim he said, "I will not do it yet." The book makes one feel as if Germany was on anything but a secure foundation.

SURVEYING FOR EVERYONE, by A. Francon Williams, F. R. S. G. S. Stiff cloth covers, 4¾ inches by 7½ inches. Profusely illustrated, 114 pages. Published by Macmillan Co., New York City. Price, \$1.40.

This is an unusually attractive little book and covers its titular subject quite satisfactorily, and as an example of its treatment we would refer to the method of finding the area of an irregular field as shown on page 31. Plane table work is given which always impresses one very favorably and the wonderfully attractive prismatic compass is described and surveying by it is also described.

PLANTS AS INVENTORS, by R. H. France. Paper bound stiff covers, 5 inches by 7¾ inches. Profusely illustrated, 64 pages. Published by Albert and Charles Boni, New York City. Price, 40c.

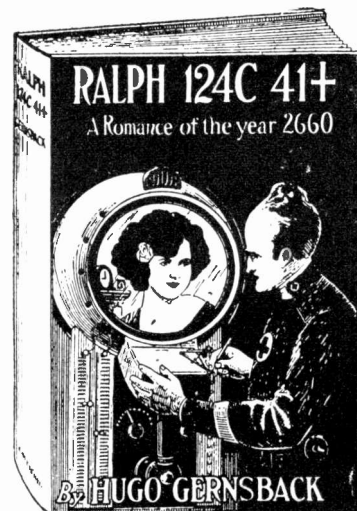
The title of this book is undoubtedly designed to catch the eye and to attract readers. The idea seems so odd, but we do get a little comfort from emphasized statements on pages 48 and 49, one of which starts out with the assertion that it is not the plant which invents. This assertion is really a comfort because how in the world a plant is going to invent anything when many of the inventions of humanity are so futile and useless, is certainly rather a puzzle. Turning to the text and illustrations we find the book really suggests that we find things in plant life which are similar to human inventions and even suggestive of them. There are numerous illustrations.

MACHINE SHOP HANDBOOK, by the International Correspondence Schools, 335 pages, 282 illustrations, size 3¾" x 5½", published by the International Text-book Company, Scranton, Pa. Price cloth bound \$1.00. Leatheroid bound. Price \$1.50.

This interesting little volume is crammed with knowledge which will help in solving many difficult problems. The publishers have endeavored in this book to compile such information as will be of value to persons engaged in shop work. For the greater convenience of the user it has been made a reference book of small size but containing a vast amount of information needed by the mechanic. A special system of indexing is employed. Every important item is indexed under all letters in which it is likely to be sought, thus making it easy to find information on any subject. The following subjects are treated: useful tables and rules; shop work; and first aid to the injured.

AUTOMOBILE HANDBOOK, by International Correspondence Schools, 345 pages, 156 illustrations, size 3¾" x 5½", published by the International Text-book Company, Scranton, Pa. Price cloth bound \$1.00. Leatheroid bound. Price \$1.50.

The rapid growth of the automobile industry and consequent demand for information has induced the publication of this book. This handy manual contains such data as are most useful to the chauffeur, repairman, owner and salesman. It also contains practical information on automobile troubles and remedies in such form as to be readily available. The illustrations have been taken from the latest models of cars so that the handbook is strictly up to date. The illustrations will be found especially useful to the driver or owner who wishes to obtain a comprehensive knowledge of the construction and operation of auto engines, transmission, carburetors, etc. Such tables as are desirable have been inserted, together with excerpts from the auto laws of all the states,



An amazing romance of the year 2660

By HUGO GERNSBACK

Editor of *Amazing Stories*, *Radio News*, *Science & Invention*

Against an amazing background of mechanical electrical and chemically altered life of mankind there is set a brilliant and colorful romance in the life of the greatest living scientist of that age.

Ralph's love for the beautiful stranger, his conquest of his rival and the worsening of the great saturnine Martian, culminating in a running fight in space with tragedy and terror conquered by almost unbelievable and incredible weapons, make one of the most interesting and gripping stories ever told.

PRICE—\$2.15 Prepaid

EXPERIMENTER PUB. CO., INC.
 53 Park Place - New York, N. Y.

"RADIO FOR ALL"

HUGO GERNSBACK'S
 GREAT BOOK FOR RADIO
 BEGINNERS AND
 AMATEURS ALIKE

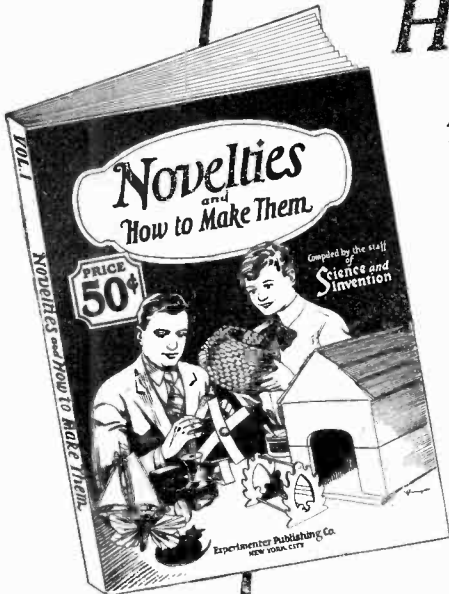
What the beginner in radio needs is a book in which he can get all the information necessary for him to understand radio to make or buy a receiving set suitable to his means, to know how to operate his set, and, after he has an understanding of the radio art, information that will enable him to advance and get the most out of his outfit. All this must ordinarily be dug out of textbooks and pamphlets, but the aim of this book is to have all the data and information that the beginner will need from the time that he takes up radio. It is a permanent, comprehensive reference book for the died-in-the-wool dabbler in Radio.

PRICE \$2.00 POSTPAID

EXPERIMENTER PUB. CO., Inc.,
 53 Park Place New York, N. Y.

“NOVELTIES”

How to Make Them



Almost every home has an old clock around— Do you know that a great many surprising, fun making, and useful novelties can be made just from the old springs, the gears, etc.

NOVELTIES, the new book, compiled by the staff of SCIENCE & INVENTION shows you how to make hundreds of wonderful Novelties, mostly out of old scrap things laying around the house. 116 Pages, in this book, show pictures, diagrams and explanations of remarkable, interesting things to make in your spare time.

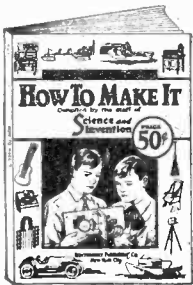
Every page has a big, wonderful surprise for you. There is no end to the simple, magical things you can make at home.

It is sold on all newsstands. Buy your copy now. If your dealer cannot supply you use the special coupon below.

PRICE
50
CENTS

NOVELTIES, contains 116 Pages, hundreds of illustrations and is published in the big magazine size 9x12 inches

PER COPY



MAKE HUNDREDS OF USEFUL THINGS AT HOME WITH “HOW TO MAKE IT”

Building your own home furniture, cameras, radio cabinets, sport devices, etc., is easy if you know what materials you need, and have an illustrated explanation on how to proceed. Then, too, you can save a good deal of money by making these valuable things yourself.

“How to make it” a big book compiled from the great magazine “Science and Invention,” is full to the brim with hundreds of up-to-date things to make at home. Things that can be made by any man with only a few simple tools.

Contains 116 Pages, 300 Illustrations. Large Size 9x12 Inches. PRICE 50c

SURPRISE YOUR FRIENDS MASTER MYSTERY

Read “POPULAR MAGIC”

POPULAR MAGIC contains thousands of simple, entertaining parlor tricks, as many puzzling magical stunts and a whole book full of mystic spirit novelties. A new set of tricks for every day of the year. Compiled from the great magazine “Science and Invention.”

GET THIS GREAT BOOK TODAY. Chock full of Tricks, Novelties, Mystic performances, Master sleights-of-hands, Gags, Disappearing acts. All kinds of fun. Buy a copy or order direct. PRICE 50c.



Contains 116 Pages of Tricks, Hundreds of Illustrations, Size 9x12 Inches

EXPERIMENTER PUB. CO., Inc., S.I. 3
53 PARK PLACE, NEW YORK

Gentlemen: I am enclosing \$..... for one copy of NOVELTIES; HOW TO MAKE IT; POPULAR MAGIC

NAME

ADDRESS

CITY, STATE

(Check Books Desired)

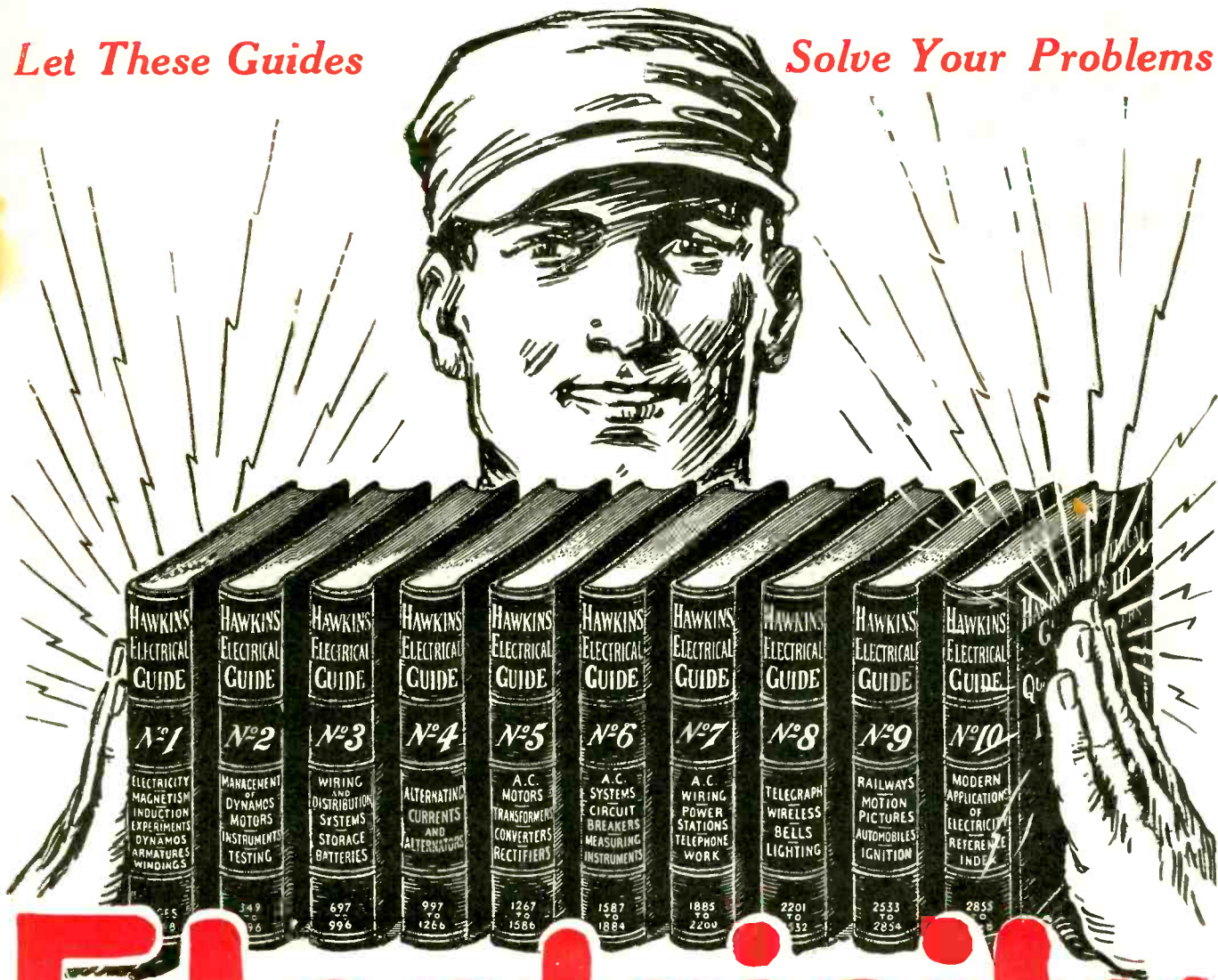
SOLD ON ALL NEWSSTANDS

IF YOUR DEALER CANNOT SUPPLY YOU USE COUPON

Experimenter Publishing Co., Inc.
53 Park Place New York, N. Y.

Let These Guides

Solve Your Problems



Electricity at your finger ends

HAWKINS ELECTRICAL GUIDES IN TEN VOLUMES

3500 PAGES
4700 PICTURES

\$1 A VOLUME
\$1 A MONTH

SEND NO MONEY—SEND ONLY THIS COUPON

Know the facts in Electricity. They mean more money and better position for you. Hawkins Guides tell you all you need to know about Electricity. Every important electrical subject covered so you can understand it. Easy to study and apply. A complete, practical working course, in 10 volumes. Books are pocket size; flexible covers. Order a set today to look over.

LEARN ALL ABOUT

Magnetism—Induction—Experiments—Dynamos—Electric Machinery—Motors—Armatures—Armature Windings—Installing of Dynamos—Electrical Instrument Testing—Practical Management of Dynamos and Motors—Distribution Systems—Wiring—Wiring Diagrams—Sign Flashers—Storage Batteries—Principles of Alternating Currents and Alternators—Alternating Current Motors—Transformers—Converters—Rectifiers—Alternating Current Systems—Circuit Breakers—Measuring Instruments—Switchboards—Wiring—Power Stations—Installing—Telephone—Telegraph—Wireless—Bells—Lighting—Railways. Also many Modern Practical Applications of Electricity and Ready Reference Index of the ten numbers.

SHIPPED FREE

Not a cent to pay until you see the books. No obligation to buy unless you are satisfied. Send Coupon now—today—and get this great help library and see if it is not worth \$100 to you—you pay \$1.00 a month for ten months or return it.

THEO. AUDEL & CO.

65 West 23rd Street, New York City.

Please submit me for free examination, HAWKINS ELECTRICAL GUIDE (Price \$1 a number). Ship at once prepaid, the 10 numbers. If satisfactory, I agree to send you \$1 within seven days and to further mail you \$1 each month until paid.

Name

Occupation

Employed by

Home Address

Reference

S. I. March

FREE 10 DAYS TRIAL

THE NEW IMPROVED INKOGRAPH \$1.50

The Perfect Writing Instrument GREATEST VALUE EVER OFFERED

\$1000 REWARD

to anybody who can prove that these testimonials were solicited by us.

Inkograph has proven so satisfactory and has elicited considerable favorable comment an enclosing money order, please send me three more. T. J. Trow, Traveling Claim Agent, Joplin, Mo.

The Inkograph fully justifies all claims you make. I own a Waterman but Inkograph is far preferable. Frank R. Sargent, Oakland, Calif.

You have one of the best writing instruments I ever used regardless of price. I use the lowest grade stationery and there is never a blot or scratch because of its round smooth point. It is a wonderful invention. L. H. Orley, Albano, Va.

Oh boy, I am tickled skinny to have the Inkograph. It's a darling. I can now make carbon copies in taking orders and send original in ink to factory instead of a penciled sheet. It surely flows over the paper as if it was grease instead of ink. No trouble at all and a thing I could not do before to trace straight lines very fine and clean. No smear, no muss of any kind. It's just great. E. A. Simms, Jersey City, N. J.

My Inkograph is the smoothest writing instrument with which I have ever written. That is saying a lot. I am a teacher by profession. I have a \$7.00 pen and another that cost more than the Inkograph, but Inkograph is better than either. It is the greatest improvement in writing instruments since the Babylonians recorded their thoughts on clay tablets with a triangular pointer. John R. Atwell, Chadwick, N. C.

My Inkograph is the first and only writing utensil I ever owned that I can use with pleasure. To be without it for any time would upset my business day. It has always worked perfectly. I have never had any difficulty with it. Arthur L. Fox, Centerville, Mich.

I am a bank teller, have used all kinds of fountain pens but can honestly say for my work I never found a pen so easy and tireless to write. You can pick it up any time in any position and write immediately and all numbers and words will be the same. Try and do it with any other pen. My buddies all agree that it is best for our work. O. R. Morley, Allentown, Pa.

Delighted: It writes bully—you have invented a pen that is perfection. It is so much more rapid than my \$9.00 fountain pen. I wish you abundant success. S. L. Carlton, Aurora, Ill.

I am very well pleased with my Inkograph. It is just what I have been looking for. I have had several ink pencils but nothing like the Inkograph. It writes like the point was greased and it makes no difference what kind of paper, it is fine for shipping tags. S. T. Jarrett, Harrisville, W. Va.

The Inkograph is all that you claim it to be. Enclosed find order for two. Robert Heller, Craigsville, Pa.

The Inkograph, I am thoroughly convinced, is the best writing instrument I have ever used. It is sure, sane and clean and always ready to use. I am very well pleased with it. J. E. Hampton, Pensacola, Fla.

NEVER before has any manufacturer of a standard writing instrument which is guaranteed to give perfect satisfaction, offered you so great a value. Remember, the Inkograph answers the purpose of both pen and pencil combined. Its point is shaped like a fine lead pencil point and writes with ink free and easy without a miss, skip or blur. The steady uniform flow of ink actually improves your handwriting. Won't blot, scratch, leak or soil hands.

You who already possess a standard fountain pen will find the Inkograph a most valuable addition to your writing equipment, for it will do everything any fountain pen can do and many very important things which it is impossible to accomplish with any fountain pen at any price.

Combines the Best Features

of both pen and pencil, minus the weak points of both, plus improvements not found in either. The lead pencil smudges, the point breaks and its writing soon is obliterated. Most fountain pens skip, scratch, flog, clog, leak, blot, soil hands and clothing. The old stylographic ink pencil dries up, balks, blots, writes heavy, flows unevenly and is never reliable. The Inkograph feeds as fast and uniform on the 20th page as it did on the first.

Cannot Leak

Not the tiniest drop of ink will spill, although one filling is sufficient to write thousands of words. Will write on any quality of paper.

Makes 3 to 4 Carbon Copies

at one time with original in ink. Bear down as hard as you like without fear of bending, spreading, injuring or distorting its 14 Kt. solid gold point. Are you a salesman?—use an Inkograph, make out your orders in ink and retain a duplicate for your records. Do you wish to keep a copy of your private correspondence?—use an Inkograph. Do you do office work which requires clear carbon copies?—use an Inkograph. Do you make out bills or sales slips?—use an Inkograph and make a permanent original in ink with carbon copies. You can permit any one to write with your Inkograph, for no style of writing can affect the Inkograph point as it will a fountain pen.

Draws Lines to a Ruler

Without smearing, smudging or blurring the paper. Writes with any color of ink.

Requires No Blotter

The ink dries as fast as you write, because the flow is fine, even and uniform.

Patent Automatic Feed

Prevents clogging. No complicated mechanism to clean or get out of order. A year's guarantee certificate with full directions accompanies each Inkograph and is your absolute protection.

An Instrument of Refinement

In appearance it is the equal of writing instruments which sell for a great deal more. Its beautifully highly polished finest quality of hard rubber, its 14 Kt. solid gold point and feed, safety screw cap, nickel self-filling lever and clip make it an instrument of distinctive elegance and refinement. Made of black Hard Rubber—each Inkograph is designed and finished to please the eye and fit the hand of all.

You Who Are Dissatisfied With Your Fountain Pen

Try the Inkograph—remember, all we ask you to do is try it, for if it does not prove thoroughly satisfactory and if it is not handier and does not write smoother and is not far superior to any fountain pen you ever owned, whether it cost \$5, \$6, \$7 or \$8, return the Inkograph to us and we'll refund your money—no questions asked.

DEALERS



Inkograph Co., Inc.
197-3 CENTRE ST.
NEW YORK, N. Y.
(Tear Here)

SEND NO MONEY

Your name and address are sufficient. Pay postman \$1.50, plus postage on delivery. When cash accompanies order, Inkograph will be sent postage prepaid. If within ten days the Inkograph does not prove satisfactory return it and we'll refund your money without further correspondence. It is because we are sure the Inkograph will meet your requirements to perfection that makes it possible for us to make you so attractive an offer.

This Coupon Properly Filled Out

Is all that's necessary. Send it to-day and procure one of the New Improved Inkographs on a 10-Day Free Trial, with no strings tied to it.

Mark X Here If You Want Ladies' Style

INKOGRAPH CO., INC.
197-3 Centre St., New York, N. Y.

Gentlemen: You may send me your Inkograph. I will pay postman \$1.50, plus postage on delivery.

Name

Address

City State

Received my Inkograph. Am surprised to know how well I can write with it. The Inkograph is a wonderful little writer, it's my friend now for good penmanship. I am writing this letter with it can you tell the difference between Inkograph and pen letters? I Can, is my answer.
C. R. Fuller, Patterson, Mo.

I received my Inkograph with which I am writing this letter. I have purchased at least one dozen ink pencils. Yours seems to be the only one that gives perfect satisfaction. I believe you have solved the problem of the perfect writing instrument.
Dr. Richard T. McLaud, Dunkirk, Ind.

The Inkograph is truly the best pen I ever had the pleasure to use barring no price or make of pen, after I take into consideration the high price I usually paid for a Parker, or a Waterman pen, I cannot see how such a low priced pen as the Inkograph can be put on the market and give such unusual service. Harvey L. Winston Brentwood, Calif.

In making out local requisitions, it is necessary to make an original and two carbon copies on very heavy paper, and the Inkograph does this twice as well as the hardest indelible pencil and is much neater and the original is much more legible.
Wm. L. Fortney, Placerville, Ia.

Your Inkograph is everything you state. It is just wonderful. So send me two more.
Arthur Olcott, Tucker, La.

Gave pen thorough tryout. Enclosed find sample of work I have to perform. Have been using pencil. Never got entire satisfaction. Hard pencil makes original too pale and soft pencil makes poor copy. I am highly pleased. S. M. Cooper, Inquiry Division, P. O. South Bend, Ind.

I found the Inkograph all very represent it to be and I was very well satisfied with it. I made a great mistake when I bought the Inkograph, as I did not take out the pen, for the pen is gone. I am writing this to ask that you send me another Inkograph by return mail, charges C.O.D. I can recommend the Inkograph very highly to anyone who needs a pen which will stand up under very hard usage. George B. Moore, Columbia, Fla.

It sure has improved my hand writing—I never took home any medals for penmanship but I can almost read my own writing since I got this pen. M. F. Johnson, Medina, Wis.

I want to thank you for the return of my Inkograph pen, which you repaired for me. I feel rather lost without this pen in my pocket. I prefer it to any pen I ever carried principally because of the ease with which one can write with it, not having to be careful whether you slide the pen to the North, East, South or West, it flows freely in all directions. Wm. B. Brown, New York, N. Y.

Received my Inkograph and same is filling a long-felt want. Kindly send two more of the same style by parcel post collect as soon as possible.
Theodore Priestley, Akron, Ohio.

I bought one of your pens a year ago. You sure build the best pen on the market to my notion. Frank R. Ellsworth, Fargo, N. D.

I wouldn't take \$5.00 for the pen I am writing this letter with. I have a good fountain pen but don't write any more with it. I am proud of the Inkograph and that I can say this to you and mean every word of it.
R. H. Wilson, Beckley, W. Va.

AGENTS—

Sell Inkographs, make bigger profits, more sales, without investment. Quicker commissions, popular prices, no competition. Send for an Inkograph or write for special sales plan booklet.