

# Radio Digest

EVERY WEEK

## Illustrated

TEN CENTS

REG. U. S. PAT. OFF.

Vol. V

Copyright, 1923  
R. D. P. Co. Inc.

SATURDAY, APRIL 21, 1923

No. 2

## RADIO AIDS BOOTLEGGER

### MAKES RUM TRAILS SAFE FOR RUNNER

Prohibition Enforcers Have New Handicap in Northern New York

Big Plant Pilots Booze

Illicit Liquor System Very Complete — "May Revolutionize 'Profession'" Declares One

By A. H. Munday  
MONTREAL, QUE.—Radio has joined forces with rum-runners! Already handicapped by a lengthy boundary line and roads made impassable by the weather, prohibition officers are now face to face with a problem developed by the criminal application of Radio.

Somewhere in the woods, over the Canadian line, according to men known to be engaged in the business of rum-running, is a large powerful transmitting station. In every town and city on the booze route there are, according to the same source, large and powerful receiving stations.

Details of the new safeguard for the (Continued on page 2)



The petite brunette in the center?—That is Miss Inez Chambers, violinist virtuoso, of KGW. Now that you know who it is, you will agree that Inez plays as she looks—'Eh Bebe!' How heavenly she plays. At the right is Perin McGregor, well known and popular baritone, in Gypsy costume of one of his favorite roles. Mr. McGregor is considered a headliner on the programs of Station CJCD, Toronto, Canada. He has been heard many times from this plant and is always in demand by the fans. Above, left, is the 16-year-old pianist who entertained you recently from Edmonton, Alta.—'Eula, meet the fans.—Fans, meet Miss Eula Owens of CJCA.' If Mr. Keith is on the lookout for all star talent, we recommend the above three as a sure-fire trio

### Airphone Gives Sermon for Pastorless Church

Belmont Congregation Joins in Songs with Broadcast

BELMONT, MASS.—A little matter of being without a pastor at any time will not bother the Belmont Methodist Episcopal Church here, for a Radio receiving set with powerful amplifiers has been installed in the church, alongside the pulpit. The regular pastor was away one Sunday, and the laymen of the church took charge, with James P. Kelley in the pulpit.

### New Broadcast Plant to Be Erected in Dublin, Ireland

A Radio station, somewhat similar to the Eiffel tower in Paris, but not quite so large, will shortly be erected in Dublin, according to the British press. It will be entirely a government enterprise, and is expected to be situated in the Phoenix park, where there is every facility for such a plant.

The Free State authorities, once the station is established, intend broadcasting to towns in the provinces the latest market reports, news, and weather bulletins.

### CALGARY POLICE OUT AFTER TAX DODGERS

Canadian Owners of Home-Made Sets Evade License

CALGARY, ALTA.—Phenomenal development in Radio in this city has forced a new duty on members of the Calgary Police Department.

Both uniformed and plain-clothes men are now engaged in detecting Radiophans who have constructed Radio receiving instruments of the ten cent store variety, and are endeavoring to evade payment of the license levied by the post office.

### CALLIOPE IS PUT ON AIR FOR FIRST TIME

TYLER, TEX.—A novel Radio concert was broadcast recently by members of the J. Doug Morgan's Vaudeville Company from Station WOAF, when a calliope was tuned up and the music from the old favorite of circus days sent out into the ether. The program also included orchestra music, vocal solos and Hawaiian numbers.

DEFOREST COMPANY BOUGHT BY JEWETT

DR. DEFOREST TO REMAIN AS ADVISOR

Possible That Newly Purchased Corporation Will Combine with Jewett Company

(Special to RADIO DIGEST) DETROIT, MICH.—Outright purchase of the entire business, good will and patents of the DeForest Radio Telephone and Telegraph Company was announced today by President E. H. Jewett of the Jewett Radio and Phonograph Co. of Detroit.

Associated with Mr. Edward Jewett in the purchase are Theodore Luce, former Detroit now associated with the New York and Chicago bond house of A. C. Allyn; Frank W. Blair, President of the Union Trust Co. of Detroit; H. M. Jewett, President of the Paige-Detroit Motor Car Company; and several other capitalists and Radio experts.

Possess 181 Patents As a result of the purchase, the Detroiters come into possession of 181 Radio patents, among them the basic rights to the three-electrode audion bulb, which is an essential part of every long distance Radio receiving or sending set. All other tube manufacture is conducted by virtue of license under DeForest patents. Among the other patents are several others covering Radio equipment in general use, as well as a large number representing more recent development and research by Dr. Lee DeForest, and embodying startling new developments in the Radio field.

The purchase also includes the fine new plant of the DeForest Company at Jersey City, the largest individual plant in the world devoted solely to Radio manufacture, at which DeForest inventions are manufactured commercially. No announcement was made of the amount of money involved in the transaction.

DeForest to Remain Dr. DeForest remains with the company under a long-time contract as consulting engineer and is now, according to Mr. Edward Jewett, giving a large share of his attention to the perfection of equipment by which the human voice is synchronized and reproduced in connection with moving pictures, thus adding a startlingly widened range of interest to the hitherto silent drama.

"Dr. DeForest is really the father of modern Radio," commented Mr. Jewett in discussing the transaction. "Without his contributions to the science, commercial Radio would not be possible. Like most inventive geniuses, the commercial side of his work has been distasteful and he is glad to turn over this factor to our group. It is our intention to make the name DeForest as significant to the general public of the best and the most advanced in Radio, as it stands today among the experts. In accordance with this policy we will put behind the DeForest products every bit of Detroit enthusiasm and merchandising ability within our power.

May Consolidate "The affairs of the DeForest Company will be administered from Detroit, though we have no plans for any immediate change in the personnel or operating methods of the Jersey City factory.

"Will the DeForest Company be eventually combined with the Jewett Radio and Phonograph Company?" Mr. Jewett was asked.

"Such a combination is more than possible," replied Mr. Jewett. "It is also possible that the DeForest purchase may eventually result in a large addition to the manufacturing facilities of the Jewett plants at Allegan."

RUM RUNNERS RADIO

(Continued from page 1) rum-runners, as told in Montreal, prove it to be complete in every respect. The place where the sending station is located is the headquarters of the large booze ring. The rum-runner reports to this station, whereas formerly he was obliged to communicate with every town along the line by telephone.

The minute the report as to location and time is received at the Radio station, it is broadcast to every station. The time, meaning the exact hour at which he has paid for his protection in every town, a proceeding observed before the trip is attempted, is then arranged according to the time made on the trip.

May Revolutionize "Profession" "So far," declared one rum-runner, "it has worked fine. I have made two trips on the Radio schedule and got through without a hitch. All the men at the stations are experts in Radio and have no trouble in picking up all the signals. In fact, it is the most complete working system that I ever been connected with, and it looks as if it is going to revolutionize the 'profession' of rum-running."

Radiograms can be exchanged between vessels and Syria by means of the Alexandria Radio station. The rate is the same as the rate for Egypt increased by an additional rate of 30 centimes per word.

AN EVENING AT HOME WITH THE LISTENER IN (SEE NOTE BELOW FOR INSTRUCTIONS)

Table with columns: Station and City, Met., Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday. Lists various stations and their broadcast times.

(Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific time, subtract two hours. Thus the use is very simple.)

CONTENTS

Radio Digest, Illustrated, Volume 5, Number 2, published Chicago, Illinois, April 21, 1923. Published weekly by Radio Digest Publishing Company, 123 West Madison Street, Chicago, Illinois. Subscription rates, yearly, Five Dollars; Foreign, Six Dollars; single copies, Ten Cents. Entered as second-class matter at the postoffice at Chicago, Illinois, under the Act of March 3, 1879.

Table listing contents: "All the Live News of Radio" (1 to 9), An Evening at Home with the Listener In (2), Pretty Miss Uses "Bridge Arm" Aerial (3), This Week's Advance Broadcast Programs (4), Small Church Saves Choir Expense (5), Pola Negri, Paramount Star, Turns Fan (7), Directory of Broadcasting Stations, Part I (8), Fredrick B. Ostman Wins Hoover Cup (9), Editorials; Condensed by Dielectric; Indigest (10), A-B-C Lessons for Radio Beginners, Chapter XVI—The Reflex Circuit, by Arthur G. Mohaupt (11), Dial Mounting for Spider Web Coils and Other Kinks (12), How to Construct a Variable Grid Leak (13), "How" of the Flewelling Super, Part XI—Inductance vs. Capacity, by E. T. Flewelling (14), Construction of a Good Loud Speaker at Home, by Thomas W. Benson (15), Practical, Easily Made Single Tube Reflex Set, Part I—Circuit and Panel Layout, by H. J. Marx (17), The Reader's View; Book Reviews (18), Questions and Answers (19), Radio Illustrated, a Page of Pictures (20).

Looking Ahead

E. T. Flewelling, Do You Know Him?—In a new series of articles starting next issue Mr. Flewelling will describe the construction of the marvelous One Condenser Simplified Super Set. Be sure to get the whole series by starting with the issue of April 28.

The Single Tube Reflex Set—that will bring the local plants in on a loop, will be continued by H. J. Marx in the next issue. Only a small investment is needed to make this efficient wonder set. Read the first article describing it on page 17, this issue.

A New Beginner's Series—by a nationally-known Radio writer—will start with the conclusion of the series by Arthur G. Mohaupt. Tell your novice friends to be on the lookout for this feature which will lead them through the intricacies of Radio nomenclature without a scratch.

You Can Tell When You Listen in for What and Where—with the new advance program department recently started in the Digest. Most all the big stations are there. Take your pick of their features and stay home that night.

Part Two of the Only Complete Radiophone Station Directory—will appear next issue, following Part One this week. Over 600 plants in the United States, Alaska, Cuba, Porto Rico, Hawaii, and the Dominion of Canada, are given. You can't get along without this weekly revised service.

Newsstands Don't Always Have One Left WHEN YOU WANT

Radio Digest

YOU WANT IT! BE SURE OF YOUR WEEKLY COPY BY SUBSCRIBING NOW

SEND IN THE BLANK TODAY

Form for subscription: Publisher Radio Digest, 123 West Madison St., Chicago, Illinois. Please find enclosed check M. O. for Five Dollars (Six, Foreign) for One Year's Subscription to Radio Digest, Illustrated. Name, Address, City, State.

FRISCO EXPOSITION NETS 5,000 DAILY

One Hundred and Forty-Four Exhibitors Show Latest Ether Apparatus and New Inventions

SAN FRANCISCO, CALIF.—The National Radio and Electrical Exposition that recently closed at the Civic Auditorium here attracted crowds estimated at five thousand persons a day. The attractions of the show included many novel inventions and adaptations new to the ether science. There were 144 exhibitors.

The opening address of welcome by Mayor Rolph and a short talk by Louis E. Leurey, president of the San Francisco Electrical Development League, were heard not only by those assembled in the Civic Auditorium, but also by countless Radiophans throughout the country. This broadcasting feat was made possible by means of remote control leading to Hale Brothers' Class B Station KPO.

Elaborate receiving apparatus was installed in the auditorium to supply musical programs from Station KPO between 8:00 and 10:00 each evening.

WDAL Gives Buttons

JACKSONVILLE, FLA.—The Florida Times, Station WDAL, is now awarding to their listeners in a button with the insignia and call letters of the station. In order to receive a button it is only necessary to write the Times and give data to prove reception of their programs.

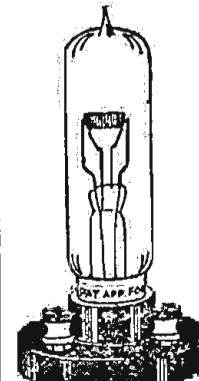
The War Mothers of Idaho have presented a \$500 set to the former service men at the Boise Barracks.

Lowest Prices Western Army Stores

- BALDWIN HEADSETS, type C, \$6.85
BALDWIN UNIT, \$3.85
45 Volt B Battery, \$2.95
22 1/2 Volt B Battery, large size, \$1.69
HOMCHARGER, De Luxe type, \$13.65
43-Plate Vernier Condenser, \$2.98
23-Plate Vernier Condenser, \$2.88
10-Plate Vernier Condenser, \$2.78
Moulded Variometer, \$2.98
Premier 180° Coupler, \$2.65
MURDOCH LOUD SPEAKER, \$3.95
100 Ft. Stranded Aerial Wire, 50c
Composition Insulator, 10c
ALL AMERICAN TRANSFORMER, \$3.98
3000 Ohm Headset, \$3.79
Composition Socket, Switch Lever, 25c
Asterloid Two Coil Mountings, \$2.98
LOOP AERIAL, green silk wire, fully guaranteed, value \$7.50, Spec \$4.95
Blue Prints for Ultra Audion, Reinartz, Flewelling, Wonder Circuit, Regenerative Feed-back. These prints are complete in every detail; are simple and easy to read. Also instructions how to build sets, 35c

DIODE Tubes DISCARD YOUR CRYSTALS

Attaches directly to crystal set in place of crystal detector
Electrad Diode Vacuum Tube
No storage battery required. No B battery required. Greater volume and distance from your crystal set. A perfect detector tube operates on two dry cells. Low current consumption insures long battery life. Complete instructions with each tube. Tube and sockets; special.



\$2.50

WESTERN ARMY STORES 2 BIG STORES 227-29 410-12 W. Madison St. S. Wabash Ave. CHICAGO, ILLINOIS Mail Orders Promptly Filled

# KYW AIDS DISTRESS IN RAGING STORM

## ISOLATED NEWSPAPERS RECEIVE LATEST NEWS

Listeners In Co-operate with Westinghouse Plant in Reporting Wrecked and Disabled Trains

CHICAGO.—Recently when a blizzard and sleet storm raged through the Middle West and disabled telegraph wires, Station KYW, Westinghouse Company, aided news agencies, railroads, and brokerage concerns in relieving the ensuing distress.

Radio then returned to its original role as one of the protectors of public safety and, by broadcasting over a wide area warnings, orders, and news dispatches, enabled trains to be located and newspapers to come out on time and give out-of-town traders up-to-the-minute stock information which enabled them to put through valuable deals.

### Arrange Code Communication System

As soon as the storm was known to have spread over a wide area and reports began to come in that telegraph wires were down all through the Middle West, the officials in charge of Station KYW began to receive numerous requests from the managers of railroads and the press associations for assistance in dispatching trains and spreading news. Although not organized for this relief work, a temporary system of communication was established by Walter C. Evans, chief operating engineer of KYW, in which the broadcasting station's powerful code transmitting set was put to use.

In a short time the code set was broadcasting over a wide area an appeal to broadcasting stations and amateurs located in the western portion of the Middle West to be on the watch for wrecked trains and those which were behind schedule. The persons hearing the call were instructed to communicate immediately with KYW, giving the station all available information. News began coming in at once by one way or the other. Included in the first signals received was the information that a train running on a single track line had been wrecked and passengers and crew were in distress. Telegraph signals were also received from train operators telling of damage and where help was needed.

### Straighten E. E. Tangles

With this information officials of the Illinois Central railroad and the Chicago, Milwaukee and St. Paul railroad at once got into communication with the places at which train service was halted and by Radio transmitted orders that soon straightened out a tangled situation.

Then word was received that because of wrecked telegraph lines the Belvidere, Ill., Republican and the Sterling, Ill., Gazette were severed from the news agencies. Late news bulletins were, therefore, read from the studio and the newspapers were enabled to fill their columns. According to letters received from the various editors all the broadcast news bulletins came in clearly, enabling them to make all their issues on time.

# SECOND OHIO SHOW HAS NOVEL EXHIBITS

## R. C. Higgy Displays Collection of Twenty-one Different Types of Tubes

COLUMBUS, O.—Columbus dealers in Radio sets and parts provided one of the most unusual displays possible at the second annual Ohio Radio Amateur convention, held recently at the Columbus hotel. Displays were on exhibit by the Superior Radio & Telephone Equipment Co., The Erner & Hopkins Co., Avery & Loeb Electric Co., Higgy-Avery Co., and the Hughes-Peters Electric Co.

One of the most interesting displays to the Radio enthusiast was the collection of vacuum tubes brought to the show by R. C. Higgy, of the Higgy-Avery Co., consisting of tubes which he has picked up over a period of years, from both this country and abroad. Twenty-one types of receiving tubes, the largest of which was a monster audiotron three inches in diameter and six inches long, made up the collection.

The Erner & Hopkins company installed a miniature broadcasting station with an outfit of ten watts capacity for visitors to view. Hundreds of Radiophans from all parts of Ohio watched this outfit with wonder and amazement during the three days' convention.

### WRAV Strongest in Ohio

YELLOW SPRINGS, O.—Station WRAV, the strongest in this section, has been erected at Antioch College here and is now in active use. The equipment is that of the broadcasting station formerly maintained at the Rike-Kumler store in Dayton, dismantled some time ago. Since then it has been strengthened until now it is much more powerful.

# ETHER WAVES HELP TO TRAIL PRISONERS

COLUMBUS, O.—The possibility of Radio as an aid to picking up the trail of escaped convicts was demonstrated here when G. L. Pirrung received a Radio broadcast from Davenport, Iowa, stating that two men, serving sentences for murder, had escaped from that city. Full descriptions of both men were given over the Radio and received perfectly by the Columbus amateur.

# RECEIVING SETS ARE INSTALLED IN TAXIS

PARIS, FRANCE.—A popular feature of up to date taxis in this city are the Radio cabs, which are equipped with Radio receiving sets by which passengers can entertain themselves while riding to their destinations. Concerts are picked up from the Eiffel tower, as well as English broadcasts and those from Holland. An increased charge of two francs is asked.

# USES "BRIDGE LAMP" AERIAL



In localities where an outside aerial is impracticable or forbidden, the Radiophan is oft hard put for a means of "getting" favorite stations. Our photo shows Miss Minnie Greenhouse, an ardent fan, who has solved the problem. She uses an ordinary iron "bridge lamp," which makes a beautiful bit of decoration and serves as an efficient aerial. © K. & H.

# INVITE VETERANS TO REUNION OVER ETHER

## Confederates Sing Old Civil War Songs for Microphone

NEW ORLEANS, LA.—The invitations to attend the reunion of Confederate veterans in New Orleans were conveyed by Radio, Captain James Dinkins, in charge of arrangements, announced. The captain is himself a veteran and declares nothing but the most advanced methods of announcements would have served the aged soldiers, whose ideas, he asserts, are as progressive as those of the youngest recruit. The announcements were broadcast April 2 and April 7, from the De Soto hotel's station. In addition to the announcements a quartette of veterans sang Civil war songs, including "The Girl I Left Behind Me" and "Lorena," and the services of a fife and drum corps were arranged for. This is said to be the first occasion of the broadcasting of fife and drum music in New Orleans. Miss Ida Jontz, secretary of the New Orleans Y. W. C. A., was in charge of the announcement-by-Radio programs. The convention was slated for April 10 to 13. Advance notices of the programs were broadcast.

### Boston Has School Club

BOSTON, MASS.—A Radio club has just been organized in the South Boston High School. Tentative plans are under way for a broadcasting station. The officers are: Fred Flynn, president; Robert Hairn, vice president; Henry Jones, secretary; John Lynch, treasurer.

# Calgary Board of Trade Uses CHCB for Publicity

## Plan Two-Minute Talks for Several Days

CALGARY, ALTA.—Definite advantage of the advertising facilities afforded by the Radiophone has been taken by business men of Calgary for the first time. Officials of the Calgary Board of Trade, analogous to the Chamber of Commerce in United States cities, will give brief speeches from CHCB, The Morning Albertan broadcasting station, extolling the good points and the beauties of Calgary and the surrounding district. The speeches will be of two minutes duration to be given at intervals of several days, and business men consider that Calgary in this manner will receive the most valuable and widespread advertising possible, and that only over the Radiophone could such results be obtained.

Publicity dealing with the famous Banff-Windermere trail to be opened this summer will be given for the special benefit of Radiophans of the United States, whom it is expected will form the greater part of the tourist traffic through Calgary and the mountain resort in the Rockies this year.

CHCB has been heard in every state in the United States and every province of Canada, and thus it is anticipated an audience of multitudes of peoples from many nations will be reached in this big publicity campaign.

Hospitals in Hartford, Connecticut, are equipped with Radiophones.

# OFFER MEDICAL AID TO SEAMEN BY AIR

## STANDARDIZED MEDICINE CHEST HELPS DOCTORS

Range of Ills Treated Over Ether Waves Varies from Ear Ache to Hernia

WASHINGTON, D. C.—Just a year ago the U. S. Public Health Service announced that it had completed arrangements to expand the medical aid service to American seamen, with which it had first been charged by Congress a century and a quarter ago, by prescribing by Radio for any sailor who might be taken ill at sea, and who might apply. Messages for aid were to be forwarded to the Service by the ship's Radio via the Radio Corporation of America or the Independent Wireless Telegraph Company.

### Diseases Vary

The range of diseases and mishaps for which aid has been invoked during the first year has been amazing. The list includes appendicitis, asthma, cramps, diarrhea, ear ache, eye injuries, heart diseases, hernia, hiccoughs, influenza, infected teeth, malaria, opium poisoning, ptomaine poisoning, and swallowing broken glass. Many of the diagnoses were made on board ship because sailors are resourceful in meeting emergencies. Sometimes interchange of several messages was necessary to obtain clear information as to the cause of the trouble. Cramps among the crew and later more cramps and worse cramps elicited the information that all the sick ate at a single mess. This known, treatment of the sick and means of preventing further cases were definitely outlined.

### Request from Czecho-Slovakia

When the patient grows better and the captain's apprehension is relieved, the case usually drops from observation. Weeks afterwards, perhaps, the interested hospital receives direct information as to what occurred later.

The latest call for help involving the Radio service of the Public Health Service came, not from a ship or sailor, but from a young man of 24, who lives in far-away Czecho-Slovakia. He had read in a local newspaper a Service broadcast about cancer, and at once wrote to say that he had had cancer of the nose and throat since he had been 18, and to beg the Service to tell him "how to get cured."

### Standardize Medicine Chests

The Service could not tell him how to get cured; nobody could do that without seeing him—if then. But it could and did tell him that he very probably did not have cancer at all. Cancer of the throat, it added, was a very fatal and rapid disease which seldom or never spared a victim for anything like six years; and, furthermore, it was a disease of later life and was very rare in persons as young as he. It advised him to be examined by a competent physician without delay.

The "Ship's Medicine Chest," a manual issued by the Public Health Service and carried by most ships, prescribes the carrying of standard stocks of easily applied remedies. This enables the Public Health Service physician at the hospital ashore to prescribe by Radio with the knowledge that the drugs he specifies are probably in stock on the vessel.

# BROADCAST HELPS TO AID GIRL'S RECOVERY

## Victim of Skiing Accident Forgets Pain by Listening In

MONTREAL, QUE.—The science of Radio is helping the surgeons cure a Montreal society girl of a broken back injury which was thought at the time to be fatal.

Miss Florence Gardner, victim of a skiing accident a few weeks ago, who has been in the Montreal General Hospital ever since and whose ultimate recovery is now certain, does not find time swing heavy on her hands despite her injury. And it is interest in Radio, the doctors claim, that is giving her new life to fight her battle with death.

Dr. D. Smelzer, assistant superintendent of the hospital, who is himself an expert in the science of Radio, says that listening in to the many excellent concerts, broadcast from the United States and Canadian stations, has made life very happy for Miss Gardner.

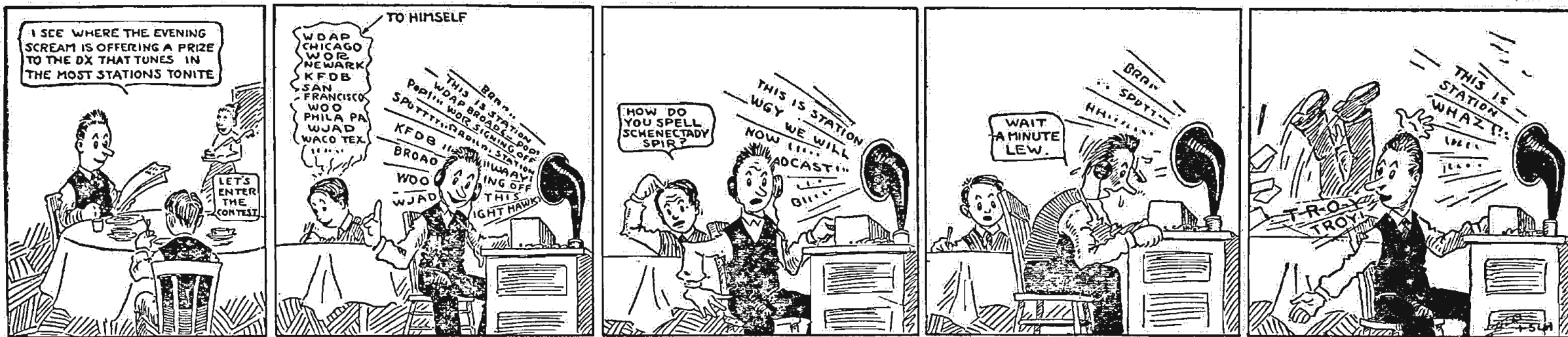
# Underground Communication Possible by Ether Waves

SPRINGFIELD, ILL.—Radio communication with those underground is believed to be possible through the experiments of the Radio and Research Club of the Springfield High School. In tests conducted at the Woodside mine, 250 feet underground, the club received messages from Radio stations in all parts of the country, and succeeded also in communicating with the outside world. The only means of communicating with entombed miners at present is by means of tapping on the walls.

THE ANTENNA BROTHERS

Spir L. and Lew P.

But Webster Didn't Have a Radio



The Week's Advance Broadcast Programs

Tuesday, April 17

KDKA (Eastern, 360), 6:00 P. M., Organ recital, H. R. Webb, Cameo Motion Picture Theater; 8:30 P. M., Concert, Allegro Mandolin Sextet and Company, direction of Percy Lichtenfels.
KGW (Pacific, 400), 3:30-4:00 P. M., Woman's program on child training.
KEJ (Pacific, 400), 8:00-10:00 P. M., German program, Los Angeles Trio, Piano, May McDonald Hope; Violin, Calmon Lubevski; Cello, Ilya Bronson.
KSD (Central, 400), 8:00 P. M., Concert, Mart Radmer's orchestra; 8:30 P. M., Violin, Ardell Huth; Piano, Aleda J. Bassell and Irene Huth; Baritone, Meyer Levy; Soprano, Alma Fuchs; Accompanist, Mrs. A. R. Alexander.
KYW (Central, 400), 8:00 P. M., One act play, "Bargain Day," Soprano, Bernice Anderson; Violin, Dorothy Boger; Accompanist, Lila Hanmer; Dramatic Coach, Jessie Royce Landis; Jimmy Hartwell's Orchestra. Dance music, Isham Jones orchestra.
WBAP (Central, 400), 7:15-8:00 P. M., Concert Tenor, James Wood; Violin, Clyde Whitlock; Baritone, C. E. Whitlock; 9:30-10:30 P. M., Opera, "La Traviata," Euterpean Club.
WDAP (Central, 390), 10:00 P. M.-1:00 A. M., Soprano, Rosemary Hughes; Concertina duets, Rudy Patek and Ben Ray; other artists by courtesy of Mrs. Saida Ballentine; 10:00 P. M.-1:00 A. M., Dance music program, Jack Chapman's orchestra.
WGI (Eastern, 360), 3:00 P. M., Amrad Women's Club; Talk, May Bliss Dickinson, Chairman of Mothercraft and Child Welfare Committee; 6:15 P. M., Weekly review, "Iron Trade Review," 8:30 P. M., Weekly business report, Roger W. Babson; Lecture, "Benares, the Holy City of the Hindus," Satyananda Roy, Calcutta, India; Concert, Boston Collegians, direction of George F. Rupert, Jr.
WGY (Eastern, 370), 7:40 P. M., Talk, "Keeping Fires Out of Our Forests," Wm. G. Howard; 7:45 P. M., Comedy drama, "Merely Mary Ann," in four acts, music by WGY instrumental orchestra.
WHAS (Central, 360), 4:00-5:00 P. M., Concert, Alamo Theater orchestra, Three-minute biography of Old Testament characters, "Nebuchadnezzar," Tenor and piano, Robert Veazy; Alamo Theater organ, H. C. Conrad; 7:30-9:00 P. M., Concert, Ray Pfaff orchestra; Reading, "An Interesting Historical Episode," Setting-up exercises.
WJZ (Eastern, 360), 1:15 P. M., Recital, Soprano, Ethel Burton; Contralto, Etta Linipert; Piano, Mrs. L. Carroll Beckel; 5:30 P. M., "The Music Lover," digest of music by Dr. Sigmund Spaeth; 7:00 P. M., an adventure with Mitch and Sheeters, from "Mitch Miller," by Edgar Lee Masters; 7:40 P. M., Concert, Patricia Boyle, blind pianist; 8:10 P. M., "Overheard in a Pullman Smoker" by Major G. K. Weston, East Orange, N. J.; 9:15 P. M., Concert, Williams College Musical Club from the Hotel Plaza.
WLW (Central, 360), 10:00 P. M., Musical program, Piano, Virginia Gilbert; Violin, Smith Farrar; Tenor, Fenton Pugh; Talk, Dr. Kaswell A. Mayo; Dance music, The Royal Ambassadors' orchestra.
WMAQ (Central, 400), 4:35 P. M., Concert, Bush Conservatory; 7:00-7:30 P. M., Gilbert & Sullivan Operetta, "Trial by Jury," Singers Club; 7:30-8:00 P. M., Talk, J. M. Fitzgerald; 9:15 P. M., Talk, "Value and Need of Community Centers," Eugene T. Lies.
WOC (Central, 400), 3:30 P. M., Educational talk, F. C. Walker; 5:45 P. M., Concert, Chimes.
WSB (Central, 400), 7:15 P. M., Radio Operatic Prologue for Atlanta's Annual Metropolitan Opera Week, direction of Erin Farley; 10:45 P. M., Colored Choir Big Bethel Methodist Episcopal Church.
WWJ (Eastern, 400), 9:30 A. M., "Tonight's Dinner"; Talk by Woman's Editor; 3:30 P. M., Speaker, Col. John T. Axton.
WWJ (Eastern, 400), 7:00 P. M., The Town Crier; Detroit News orchestra; Saxophone, Jack Leffel; Syncopated songs, Douglas Bailey; Dance music, Kasoors orchestra, Port Huron, Mich.

Wednesday, April 18

KDKA (Eastern, 360), 6:15 P. M., Concert, KDKA Little Symphony orchestra, direction of Victor Saudek; Tenor, Elmer F. Ablett; Accompanist, Bertha Geib.
KGW (Pacific, 400), 3:30-4:00 P. M., Children's program; Music, pupils of Mary Bullock; Stories by Aunt Nell; 8:00-

BUILDING, as it were, on the first appearance of this feature in the Digest, the advance programs are this week more in number and easier to use as a result of improved form. It is planned to soon furnish advance programs for every big station (500 watts or more) in the Digest Radiophone Directory (page 8). The form too, will be changed to meet with the demands for space as the stations become organized so as to be able to furnish advance programs with expediency. There are only fifty eligible plants. Already sixteen of these will be found in the "Advance Programs." Only features are listed below. Such parts of station programs as are regular week in and week out, are, as they have been from the start, found in the Digest Radiophone Directory. The following data on the stations for which advance programs are given, may be of help to the listener in:

Table with 3 columns: Call Letters, Owner and Location, Wave Length. Includes stations like KDKA, KGW, KEJ, KSD, KYW, WBAP, WDAP, WGI, WGY, WHAS, WJZ, WLW, WMAQ, WOC, WSB, WWJ.

9:00 P. M., First Act of opera "Ernani," Portland Opera Ass'n.
KHJ (Pacific, 400), 8:00-10:00 P. M., Chinese program.

KSD (Central, 400), 8:00 P. M., Concert, Knights of Columbus Choral Club at the Odeon.
KYW (Central, 400), 8:00-9:00 P. M., Musical program of the Marshall Field Choral Society assisted by Chicago Madrigal Club, phoned from Orchestra Hall.
WBAP (Central, 400), 7:15-8:00 P. M., Concert, Fort Worth Chamber of Commerce; 9:30-10:30 P. M., Concert, Texas Hotel orchestra.
WGI (Eastern, 360), 6:45 P. M., Talk on farm, garden and lawn, by Breck's; Girls' Story Hour, Eunice L. Randall; Trio, Rita Bowers, director; Talk, "Water," Henry Copley Greene, American Red Cross; Trio.
WHAS (Central, 360), 4:00-5:00 P. M., Alamo Theatre organ, H. C. Conrad; Three-minute biography of Old Testament characters, "Jeremiah"; Recital under auspices Mary Frances Stewart, Louisville Conservatory of Music; "Just Among Home Folks," from Louisville Courier-Journal; Daily short story, from Louisville Times; 7:30-9:00 P. M., Musical program, Stella Carrico, piano solo; Mary Bell Garrett, soprano; Rebecca Saunders, contralto; Mary Adams, piano solo; Mary Gorman, soprano; Grace Deppe, soprano; Mary Scudder, piano solo; Helen Eichenberger, accompanist; Violin recital, studio of King Waller; Reading, "An Interesting Historical Episode," Setting-up exercises.
WJZ (Eastern, 360), 5:35 P. M., "Iron and Steel Review," by the Iron Age; 7:00 P. M., "Animal Bedtime Stories," by Florence Smith Vincent; 9:00 P. M., Program by Doubleday Page & Co.; 9:15 P. M., Program by the National Tuberculosis Ass'n; 9:30 P. M., Ampico Series of Distinguished Artists' concerts, by Wm. Knabe & Co.; Talk, "Must Music Tell a Story," John Tasker Howard, composer-speaker.
WLW (Central, 360), 8:00 P. M., Children's program; Violin, Richard White; "Ann's Half Birthday," a play for children, with introductory remarks by author, T. C. O'Donnell, given by Junior Students of Reulman School of Expression.
WMAQ (Central, 400), 4:35 P. M., Piano recital, pupils of Mme. Sirockey, Lillian Korecky, Mildred Korinek, children; 7:00 P. M., Stories of Paul Revere, Georgine Faulkner, the Story Lady; 9:15 P. M., Musical program, Tenor, John Griffin, Pianist, Robert Lindt.
WOC (Central, 400), 3:30 P. M., Talk, D. K. Kirk; 7:00 P. M., Concert, Pipe Organ, E. John Richards; 8:00 P. M., Lecture, "Americanism," J. Williams, Colfax, Iowa; 10:00 P. M., Concert, Carlisle Evans orchestra.
WSB (Central, 400), 10:45 P. M., Musical program by Atlanta Woman's Club.
WWJ (Eastern, 400), 9:30 A. M., "Tonight's Dinner"; Talk by woman's editor; 7:00 P. M., The Town Crier; Detroit News orchestra; Speaker, G. S. Goldwater, Detroit fire marshal; Musical program, Grinnell Bros. music store.

Thursday, April 19

KDKA (Eastern, 360), 6:00 P. M., Organ recital, H. R. Webb, Cameo Motion Picture Theater; 8:30 P. M., Concert, Univ. of Pittsburgh Band, transmitted direct from Carnegie Music Hall.
KHJ (Pacific, 400), 8:00-10:00 P. M., Concert, Philharmonic Symphony orchestra; Flutist, J. J. Gilbert.
KSD (Central, 400), 8:15 P. M., Massenchor Concert, 600 voices at St. Louis Coliseum, instrumental music by St. Louis Symphony orchestra.

KWY (Central, 400), 8:00-9:00 P. M., Concert, Lyon & Healy; Dance music, Isham Jones orchestra; 9:05 P. M., "Twenty Minutes of Good Reading," Rev. Claude J. Pernin.
WBAP (Central, 400), 7:15-8:00 P. M., Popular selections; Violin, Rowe Davison; Piano, Jack Norwood; 9:30-10:30 P. M., Concert Texas Women's College.
WDAP (Central, 390), 10:00 P. M.-1:00 A. M., Musical program, Soprano, Helen I. Blakeley; Baritone, J. F. McNichols; Soprano, Lorraine Ford. Senn High School students, boy soprano, Francis Goetz; Baritone, Gordon Ibbotson; Cello, Wm. Williams; 10:00 P. M.-1:00 A. M., Dance music program, Jack Chayman's orchestra.
WGI (Eastern, 360), 6:15 P. M., "General Conditions in the Shoe and Leather Industry," by New England Shoe and Leather Ass'n; 8:30 P. M., "Americanism," Judge Thomas P. Riley of Malden; Talk to American Legion Posts by Hon. James T. William; "Fashionable Intelligence" by Percy Fendall, A Comedietta in One Act, presented by The Amrad Players, W. Eugene Hammett, Director. Sketch, "Drifted Apart" by Sir Charles L. Young, Amrad Players.
WGY (Eastern, 370), 2:00 P. M., Talk, "What Animal Experimentation Has Taught Us," Jessie G. Cole, nutritionist, N. Y. State Dept. Health; 7:45 P. M., Concert, Columbia County Philharmonic Orchestra.
(Continued on page 6)

REINARTZ ALL PARTS NECESSARY DEALERS: ATTRACTIVE DISCOUNTS HUDSON-ROSS 123 W. Madison St. Chicago

How to Make a Reinartz Receiver COMPLETE BLUE PRINT for the construction of a Reinartz Receiving Unit and two step amplifier. INSTRUCTIONS FOR ASSEMBLY Description of apparatus and accessories and details of tuning. WINDING A REINARTZ COIL Cabinet Dimensions Panel Layouts List of Parts Send only money orders—no checks or stamps. Coins at your own risk. Book Department RADIO DIGEST 123 W. Madison Street CHICAGO, ILL. Only 50¢

# SMALL CHURCH SAVES CHOIR EXPENSE



A novel method whereby organ music from another church is used to good advantage in a smaller church by the aid of Radio, is being used by Rev. Lyman R. Hartley of the Fort George Presbyterian Church in New York  
© K. & H.



Photo shows Rev. L. R. Hartley in his pulpit and the loud speaker and receiving sets that furnish the organ recitals. The church with this novel method is always crowded. The church has no organ so Dr. Hartley uses organ preludes that come via Radio from St. Thomas's church. The chimes problem is solved by placing a loud speaker outside of the church and using Radio chimes  
© K. & H.

## AIRPHONE DIRECTS WEIRD OPERATION

### ADMINISTER TREATMENT FROM MOVING SHIP

After Ether Communication with Doctor Ship's Cook Is Operated Upon by Unskilled Officers

NEW ORLEANS, LA.—One of the strangest stories ever brought into port, a drama of the sea, complicated surgery and the newest marvel of communication, Radio, was told by witnesses when the United States Shipping Board vessel Elkhorn docked here.

The officers of this vessel witnessed the weird phenomenon of a first mate performing a surgical operation on the ship's cook at the direction, by Radio, of the surgeon of another steamship, while both vessels were traveling farther and farther apart as the operation progressed.

The cook of the Elkhorn, Samuel Thompson, was washed aft during a storm at sea, striking obstructions on the deck and sustaining a horrible wound where a chunk of flesh weighing several pounds was torn away from his thigh. There was no ship doctor aboard. Radio Operator Nugent was on the job, however, and he sent an appeal through the air asking any surgeon within hearing to communicate with the Elkhorn's Radio. Doctors Wood and Croft of the S. S. American, enroute to England, answered. The Elkhorn was on her way to France, but the American was so much speedier than the freighter that the distance between them was constantly widening. A description of the wound was Radioed to the surgeons, who replied:

"Has bleeding stopped? Wire pulse." First Officer Edgerly and Third Officer Ziess Radioed back:

"Yes. Temperature 102. Pulse 100. Unable to sleep. Pains around spine."

Instructions for washing the wound, for injections to deaden the pain, and for bandaging came back immediately from the America's surgeons. Later diet instructions came. The wound failed to improve and the two mates, dreading instructions to operate, reported faithfully. The wound turned black, and the ether conveyed instructions to cut the dead flesh away. With a sterilized razor blade the operation was performed by First Officer Edgerly, with laudanum administered as an anaesthetic.

Anxiously awaiting the result, the next morning the America's surgeons received the report that the operation had succeeded. The cook recovered rapidly and the freighter's officers and crew celebrated the first day he was able to go on deck. He went ashore at Le Havre and went to a hospital to convalesce. The ship

Three and four stages of amplification and two special type loud speakers are used. Some of the Sunday evening services are devoted entirely to Radio  
© K. & H.

## Accounting Examination Is Given Over Broadcast

Feasibility of Unique Plan Opens New Method for Quiz

NEW YORK.—Students in the Haaren High School of New York had the unique experience of receiving their lessons by Radio, on April 4, between 1:15 and 1:45 p. m., when Station WJZ at Newark broadcast a series of accounting problems, which was received by Radio in the classroom of the high school, where adding machines were used in the solution of the problems.

This is the first experiment to be made with a view of determining the feasibility of conducting a course of instruction by Radio in an educational institution of New York or elsewhere.

At a recent conference, which was attended by the officials of the Board of Education, it was decided that the experiment should first be carried out at the Haaren High School, under the direction of R. W. Burnham and Fred Siegel, of the faculty. Accordingly, a high power receiving set was installed in the building with a power amplifier attachment, so that the pupils in all parts of the classroom will be within easy hearing distance. In order that the officials of the Board of Education might know the character of the instruction broadcast and witness the demonstration, they were in full hearing of the instructor's voice at headquarters, where an installation was made. A skilled accountant at the board headquarters performed the problems given from the broadcast station and checked the final results of the students.

More than 1,000,000 acres of timberland are now patrolled daily in the vicinity of Spokane by an airplane fire patrol. The plane is equipped with Radio. One plane covers in two and one-half hours the same territory that required the constant attention of a large force of foresters.

finished its voyage to Antwerp and made its return voyage to America, which just ended with her entrance at this port.

While on her way here the officers received word that the cook contracted a complication of diseases while at Havre, and died there at a hospital. The unfortunate denouement, the ship's officers feel, does not detract from the immensity of the discovery that Radio operations can be successfully performed, since the healing of the wound for which the Radio-directed operation was put in effect, was both prompt and complete. The Elkhorn landed at Havre late in January.

## White Star Liner Has Powerful Set

Sending Machine Enables Operator to Work at Rate of 100 Words a Minute

NEW YORK.—The White Star liner Majestic, the largest ship afloat, is equipped with a Radio set which is not only more powerful than that usually to be found on a passenger vessel, but which in itself marks an innovation in ship Radio.

On such a huge vessel, carrying as it does a human population larger than that of many a small town, the problem of handling Radio messages calls for extraordinary ingenuity and resourcefulness, and so it happens that the Majestic's Radio office is the only one employed on an ocean liner that is equipped with a machine for sending messages.

### 100 Words a Minute

It is the use of this remarkable machine that makes it possible to send Radiograms at the rate of one hundred and more words a minute, a speed which no Radio operator could reach or ear recognize, a speed never before attained on a ship.

Once a message is filed for transmission on the Majestic, but little human effort is required to flash it to its destination.

The passenger's Radiogram blank is handed in by the purser and by him to one of the operators. On other ships the operator pounds a telegraph key, but on the Majestic he pounds a typewriter instead. Each stroke of a key perforates a paper tape, and thus the message is converted into a series of holes. This perforated paper tape is then passed through a transmitting machine which is a marvel of ingenuity—an electrically driven machine which does its work almost noiselessly and which never makes a mistake.

### 350 Messages a Day

In a single trans-Atlantic voyage her operators will handle 3,000 messages, aggregating about 40,000 words. Even the city branches of land telegraph companies handle no more. In a single day the Majestic has handled 350 messages in ten hours.

## Gets Brazilian Reports

NEW ORLEANS, LA.—The New Orleans Green Coffee Association members are now offered an opportunity to get prompt reports on the new Brazilian market at first hand by Radio through the enterprise of Clarence Fox, of the S. A. Levy Co., Importers, here, who has just installed one of the finest receiving sets in the city.

## \$8,000 HAUL MADE ON WESTINGHOUSE

### THIEVES TAKE VALUABLE APPARATUS

Dealers All Over United States and Canada on Lookout for Stolen Merchandise

SPRINGFIELD, MASS.—Automobile thieves and stolen automobile smugglers have done an enormous business for several years, their operations extending to all parts of the United States and Canada and to many foreign countries. Criminals apparently keep up to date as well as honest folk, for the latest type of criminal, following hard on the heels of the auto thieves, is the Radio robber. And they are going into the game wholesale, too, with prospects of large returns unless speedily caught.

Recently a gang stole from the Westinghouse Electric and Manufacturing Company's storehouse here 807 Radio head sets, 1,000 radiotron bulbs, type WD 11 and 133 loud speaker units. A haul worth, at a low estimate, around \$8,000. Not so much as the value of two or three high-powered cars, but perhaps more easily disposed of, to dishonest dealers or individual buyers.

A reward of \$200 has been offered by the Westinghouse company, and the Springfield police have sent out a broadcast and circularized every Radio dealer and second-hand store as a warning. The tubes were not packed in the ordinary carton used for retail stores, but smaller ones, 2½x2½x6¼ size. The loud speaker units should not be found on sale anywhere as a separate article, but are sold only in the Radiola Grand Radio Set. Dealers and others having such Radio units offered to them will thus know they are stolen.

## Japan Asks 30,000,000 Yen to Develop Ether Traffic

In order to develop commercial Radio on a large scale, the Japanese Department of Communications has requested an appropriation of 30,000,000 yen, which, it is said, will be granted by the government, according to a report received by the Department of Commerce from Commercial Attache Abbott, at Tokio. The Organization of a private company to manufacture Radio apparatus, build stations and do a general communication business, has been suspended, as it conflicts with existing Japanese law. If the appropriation is secured, the Department of Communications hopes to become a party to the agreement in regard to exchange of patents existing between the Marconi, Telefunken, Telegraphie sans Fils, and the Radio Corporation of America.

A Philadelphia high school boy has built a set in a corncob pipe that gives good results.

**ADVANCE PROGRAMS**

(Continued from page 4)

**WHAS (Central, 360), 4:00-5:00 P. M.**, Alamo Theater organ, H. C. Conrad; Three-minute biography of Old Testament characters, "Ezekiel"; Musical program, instrumental trio, double violin quartette, female chorus, girls' glee club; "Just Among Home Folks" from Louisville Courier-Journal; Daily short story, Louisville Times; 7:30-9:00 P. M., Dance music, Franklin orchestra; Three-minute digest of International Sunday School lesson for April 22, T. F. Gordon; Child welfare talk, "Truant," Frederick Hess; Reading, "An Interesting Historical Episode"; Setting-up exercises.

**WJZ (Eastern, 360), 2:00 P. M.**, "Book Reviews," Grace Isabel Colbron; 7:00 P. M., "Jack Rabbit Stories," David Cory, New York Evening Mail; 9:00 P. M., "Sports," W. J. Slocum, Sporting Editor of the New York Tribune.

**WLW (Central, 360), 10:00 P. M.**, Concert, Iota Chapter of Sigma Alpha Iota Sorority, Cincinnati Conservatory of Music.

**WMAQ (Central, 400), 4:35 P. M.**, Dramatic program; 7:00 P. M., Talk for Boy Scouts; 7:15 P. M., Talk, Mrs. W. G. Bennett, International Order of King's Sons and Daughters; 7:30 P. M., "The Irish Minstrel," Cathal O'Byrne; 9:15 P. M., Cosmopolitan String Quintette.

**WOC (Central, 400), 3:30 P. M.**, Talk, Karl G. Stephan; 7:00 P. M., Concert, Hawk-eye orchestra, Clinton, Iowa, Gladys Muerling, pianist; 8:00 P. M., Lecture, "Our National Parks," Carl Balcomb, Davenport, Iowa.

**WSB (Central, 400), 7:15 P. M.**, Concert by Edna Mae West, soprano; Chalmers Shumate, pianist; John Hannoules, saxophone; 10:45 P. M., Georgia Serranaders Singing Syncopators.

**WWJ (Eastern, 400), 9:30 A. M.**, "Tonight's Dinner"; Talk by woman's editor; 7:00 P. M., The Town Crier; Detroit News orchestra; two piano duet, Agnes Jackson and Deora Wolfer; Soprano, Edna J. Sylvester; Baritone, C. F. Gesley.

**Friday, April 20**

**KDKA (Eastern, 360), 6:15 P. M.**, Concert, KDKA Little Symphony Trio; 7:15 P. M., Special farm features by the National Stockman and Farmer; 7:30 P. M., "Why I Hold on to My Illusions," as answered in Rostand's "Chanticleer."

**KGW (Pacific, 400), 7:00-7:30 P. M.**, Univ. of Oregon extension course lecture; 8:00-8:15 P. M., Scotch songs, K. B. Meeker; 8:15-9:00 P. M., George Olsen's Portland Hotel Orchestra; 11:00-12:00 P. M., Meeting of Hoot Owls.

**KSD (Central, 400), 8:00 P. M.**, Soprano, Louise Heimmueller; Piano, Marguerite Heimmueller and I. Esther Wright; Reader, Thelma Duckworth; 11:30 P. M., Piano, Catherine Carmichael; Baritone, W. F. Davie; Tenor, Waldo Finke.

**KYW (Central, 400), 8:00-9:00 P. M.**, Baritone, R. G. Ball; Accompanist, Gertrude G. Perkins; Piano, Amy Degerman; Reader, Margaret H. Miller. Dance music, Isham Jones orchestra; 9:05 P. M., Book review, Llewellyn Jones.

**WBAP (Central, 400), 7:15-8:00 P. M.**, Concert, Booker T. Washington Negro High School, Cleburne, Texas; 9:30-10:30 P. M., Coronation of "Queen Ater from Decatur," assisted by the Home Brew orchestra of Decatur, Texas.

**WGI (Eastern, 360), 9:30 P. M.**, Travelogue, David M. Cheney; Concert, Amrad Banjo-Mandolin Club, W. Eugene Hammett, Director.

**WGY (Eastern, 370), 2:00 P. M.**, Fashion talk, "Monograms on Smart Apparel," courtesy Modern Priscilla; 7:40 P. M., Health talk, "Start Hay Fever Prevention Now," N. Y. State Dept. Health; 7:45 P. M., Concert, N. Y. State Dept. the American Legion; Talk, "American Legion and Its Future," A. S. Callan; Talk, "The Disabled and the War," Col. Cornelius W. Wickersham; Address, "The Three Hundred Year Struggle Toward the Pole," Capt. Donald McMillan, arctic explorer.

**WHAS (Central, 360), 4:00-5:00 P. M.**, Alamo Theater organ, H. C. Conrad; Three-minute biography of Old Testament characters, "Daniel"; Piano solo, Margaret Hammerstein; Recitation, Mary Angela Sweeney; "Just Among Home Folks," from Louisville Courier-Journal; Daily short story, from Louisville Times; 7:30-9:00 P. M., full concert auspices Mrs. Jane Webster Murrell, dedicated to all grandmothers, music prior to 1860; Reading, "An Interesting Historical Episode"; Setting-up exercises.

**WJZ (Eastern, 360), 3:00 P. M.**, Concert, Steinway Piano Company, direct from Steinway Hall; 5:30 P. M., "Foreign and Domestic Commerce Report" issued by United States Department of Commerce; 5:50 P. M., Conditions of Leading Industries, by Magazine of Wall Street; 7:30 P. M., Dance music, Vincent Lopez "Red Cap" orchestra, direct from Hotel Pennsylvania Grill; 8:30 P. M., Program arranged by Columbia Musical Club; 9:30 P. M., Literary evening conducted by the Outlook, Harper Bros., and Scientific American.

**WMAQ (Central, 400), 4:35 P. M.**, Program by Columbia College of Expression; 7:00 P. M., Musical, "Hearing American First"; Lecture, Mrs. Marx E. Oberlander; 9:15 P. M., Concert, Buddie William's orchestra, Univ. of Chicago.

**WOC (Central, 400), 3:30 P. M.**, Talk, C. C. Flanagan; 7:00 P. M., Concert, P. S. C. orchestra; 8:00 P. M., Lecture for farmers, Hon. Smith W. Brookhart, U. S. Senator from Iowa.

**WSB (Central, 400), 7:15 P. M.**, Concert, Ritz Harmony Boys; 10:45 P. M., Concert, Atlanta Kiwanis Club.

**WWJ (Eastern, 400), 9:30 A. M.**, "Tonight's Dinner"; Talk by woman's editor; 7 P. M., The Town Crier; Detroit News poet; Detroit News orchestra; Vocal recital furnished by Mrs. Earl F. Chase.

**Saturday, April 21**

**KGW (Pacific, 400), 3:30-4:00 P. M.**, Children's Program; Violin, Grace Astrup; Accompanist, Dorothy Clark; Stories by Aunt Nell.

**KHJ (Pacific, 400), 8:00-10:00 P. M.**, Dance music, Donald Campbell's orchestra.

**KDKA (Eastern, 360), 6:00 P. M.**, Organ recital, H. R. Webb, Cameo Motion Picture Theater; 7:00 P. M., "One Day Trip by Automobile," Pittsburgh Automobile Club; 7:15 P. M., "Under the Evening Lamp," stories of the Youth's Companion, including "In the Pound," "Hospitality to Ideas," "Till the Day of Judgment," "Baseball for all the Family," "Not on the Time Table"; 8:00 P. M., Men's fashions, furnished by J. G. Bennett Co., Pittsburgh, Pa.; 8:15 P. M., "Spring House Cleaning Your Automobile," by Ray McNamara, of the Pittsburgh Post; 8:30 P. M., Concert, Whistler, Elizabeth Drake; Violin, Oscar Schwarm; Piano, Mrs. Edwin Denham.

**KSD (Central, 400), 8:00 P. M.**, Concert, Galligher orchestra; 8:30 P. M., Piano, Helen Peck; Reader, Marie LeMaster; Soprano, Mrs. Hazel Epping Herligers.

**KYW (Central, 400), 8:00-9:00 P. M.**, Concert, W. W. Kimball Co.; Selections on Kimball pipe organ; Dance music, Isham Jones orchestra; 9:05 P. M., "Under the Evening Lamp," articles and humorous sketches furnished by Youth's Companion.

**WDAP (Central, 390), 10:00 P. M.-2:00 A. M.**, Popular music program, Jack Chapman's orchestra.

**WGI (Eastern, 360), 8:00 P. M.**, Talk on New England Problems, direction of New England Business Men; Concert, Coyne's orchestra of Lawrence, Matthew T. Coyne, Director.

**WGY (Eastern, 370), 9:00 P. M.**, Dance music, Cain's Castle orchestra.

**WHAS (Central, 360), 4:00-5:00 P. M.**, Alamo Theater organ, H. C. Conrad; Three-minute biography of Old Testament characters, "Syrus, the Great"; Concert, Georgetown College orchestra; "Just Among Home Folks," from Louisville Courier-Journal; Daily short story from Louisville Times; 7:30-9:00 P. M., Concert, the Town Club of Louisville Conservatory of Music; Readings, Mrs. Billy Nash Perry and Martha Frances Brantley; Setting-up exercises.

**WJZ (Eastern, 360), 1:15 P. M.**, Concert, Bill Stanler's Novelty Orchestra of East Orange, N. J.; 2:00 P. M., "Pung Chow," a Chinese Game, by Harper Bros.; 7:00 P. M., "Uncle Wiggily Stories," by Howard R. Garis, author; 8:30 P. M., "Fashions," by Harper's Bazaar; 8:45 P. M., Concert, by Elfrieda De Roda Helmut, coloratura soprano; 9:00 P. M., Program by Good Housekeeping Magazine; 9:30 P. M., U. S. Army night.

**WMAQ (Central, 400), 7:00 P. M.**, Lecture, "Worlds in the Making," Arthur D. Carpenter; 9:15 P. M., Piano, Emil Borg; Violin, Elmer Swansen.

**WOC (Central, 400), 3:30 P. M.**, Talk, C. C. Hall; 6:30 P. M., Sport News; 6:35 P. M., Sandman's visit; 7:00 P. M., Concert, Kiwanis Club of Rock Island, Ill. Soprano, Mrs. J. T. Mordy; 9:30-10:30 P. M., Dance music, P. S. C. orchestra.

**WSB (Central, 400), 7:15 P. M.**, Special for Shut In Invalids; Concert, Old Maid Artists.

**WWJ (Eastern, 400), 9:30 A. M.**, "Tonight's Dinner"; Talk by woman's editor.

**Sunday, April 22**

**KDKA (Eastern, 360), 10:45 A. M.**, Church services, Emory Methodist Episcopal Church, Pittsburgh, Pa., Rev. W. Woford T. Duncan; 2:30 P. M., Bible story for children, Rev. W. A. Logan, of Alpha Lutheran Church, Turtle Creek, Pa.; 4:00 P. M., Organ Recital, Dr. Charles Heinroth, direct from Carnegie Music Hall, Pittsburgh, Pa.; 4:45 P. M., Vesper Services, Shadyside Presbyterian Church, Pittsburgh, Pa., Rev. Percial H. Barker; 8:30 P. M., Concert, Carnegie Tech Symphony orchestra, direction of Vick O'Brien, direct from Carnegie Music Hall.

**WBAP (Central, 400), 11:00-12:15 P. M.**, Church service, First Methodist Church, Fort Worth; 3:30-4:30 P. M., Sacred concert.

**WDAP (Central, 390), 9:00-10:00 P. M.**, Concert, Henry Sellinger and Drake Hotel concert ensemble, assisted by other artists.

**WGI (Eastern, 360), 8:30 P. M.**, Federation Church Service, Rev. Fred Alban Weil, Pastor of First Parish Church of Quincy; 9:00 P. M., Musical, Quartette of First Parish Church of Quincy.

**WGY (Eastern, 370), 10:30 A. M.**, Church service; Sermon, Rev. Frank T. Rhoad, Second Presbyterian Church, Amsterdam, N. Y.; 4:00 P. M., Concert, WGY symphony orchestra; Boy soprano, William DeMorest; Accompanist, Mrs. Katherine Chamberlayne; 7:30 P. M., Church service; Sermon, Rev. Frank T. Rhoad, Second Presbyterian Church, Amsterdam, N. Y.

**WHAS (Central, 360), 10:00 A. M.**, Church services auspices First Unitarian Church of Louisville, Rev. R. Ernest Aikin, pastor; 4:00-5:00 P. M., Sacred concert Ella Sharrard violin quartette.

**WJZ (Eastern, 360), 11:00 A. M.**, Church services, St. Thomas' Church, New York City, sermon by Rev. Ernest M. Stires; 3:45 P. M., Concert by Ruth Beard Addis, contralto; 4:15 P. M., Concert, Abraham Goldberg, violinist; Mr. Gain, pianist; 6:30 P. M., Readings and Records from the "Bubble Books That Sing" by Ralph Mayhew, Harper Bros.; 7:00 P. M., "Coming events cast their shadows before—what present world shadows augur," an analysis by the New York Times Analyst; 7:15 P. M., Organ recital direct from Estey Auditorium; 8:00 P. M., Betty Blythe, motion picture star, will sing a selection; 8:15 P. M., Symphony Concert by American Orchestral Society, Inc., Chalmers Clifton, conductor.

**WSB (Central, 400), 5:00 P. M.**, Musical program, Senior Christian Endeavor; 7:30 P. M., Church services, Wesley Memorial Church.

**WWJ (Eastern, 400), 2:00 P. M.**, Detroit News orchestra; Tenor, Walter Bates; Soprano, Edith Pickles; Pianist, Harrison Burch.

**Monday, April 23**

**WBAP (Central, 400), 7:15-8:00 P. M.**, Concert, Hawaiian guitars, Edith and Grace McDowell, Dallas, Texas; 9:30-10:30 P. M., Dance music, Owen Crockett's Texans Supreme Dance Orchestra.

**WGY (Eastern, 370), 7:45 P. M.**, Concert, violin, Alexander Kozalka; Reading, "Cohan on the Radio," Lillian Fisher; Humor from "Topics of the Day," courtesy Pathe Exchange; 9:30 P. M., Program St. George's Society, Albany, N. Y.; Baritone, John Dick; Address, "Your Australian Cousins," Capt. Kilroy Harris; Piano, T. Frederick Candlyn; Address, "Mutual Relationship Between United States and Great Britain," Judge Frederick Crane; Address, "The Heritage from the Motherland," Rev. Paul Hickok; Tenor, Samuel Whittam.

**WHAS (Central, 360), 4:00-5:00 P. M.**, Alamo Theater organ, H. C. Conrad; Three-minute biography of Old Testament characters, "Zerrubabel"; Piano, Julia Woods; "Just Among Home Folks" from Louisville Courier-Journal; Daily short story from Louisville Times.

**RECEIVING RECORDS? SEND 'EM IN—**

**SEVERAL** new records were made during the past week, but R. J. Gall, of Blythe, California, seems to have the most records in this time. Keep account of the stations you hear and see if YOU won't be the lucky one next time. Have you any records over 2,300 miles that have not been entered? See if you can't hold the record in your state for receiving the longest distance. Hurry up and send 'em. LET'S GO.

Below are the records made this week:

**Station—Miles Away—Who Heard It**

CFCN—2100, E. J. Cuddy, Dedham, Mass.  
 DD5—1550, C. V. Bell, Ottawa, Can.  
 KDZR—1050, W. C. Wolverton, Linton, N. D.  
 KFBL—1050, W. C. Wolverton, Linton, N. D.  
 KFHL—1250, E. J. Cuddy, Dedham, Mass.  
 KFJH—1250, J. E. Bradley, Justin, Tex.  
 KLS—1400, J. E. Bradley, Justin, Tex.  
 KNV—1725, A. C. Flint, Chicago, Ill.  
 KNX—1775, J. E. Bradley, Justin, Tex.  
 WAAW—2125, R. J. Gall, Blythe, Calif.  
 WFAH—1925, Paul Glaister, Napanoch, N. Y.  
 WFAW—1025, J. H. Wall, Rensselaer, N. Y.  
 WGA—1100, Kenneth Steele, Northumberland, Pa.  
 WGAQ—1025, W. J. Wolverton, Linton, N. D.  
 WHAI—1100, Paul Glaister, Napanoch, N. Y.  
 WHAY—1700, R. J. Gall, Blythe, Calif.  
 WIAF—1325, C. V. Bell, Ottawa, Can.  
 WJAG—1200, Paul Glaister, Napanoch, N. Y.  
 WKAS—1075, Paul Glaister, Napanoch, N. Y.  
 WLAG—4150, H. A. Crowe, S. S. Ethan Allan, South of Hawaii.  
 WLA—1575, Vinson Crowder, Houston, Tex.  
 WLAK—1950, R. J. Gall, Blythe, Calif.  
 WMAW—1400, R. J. Gall, Blythe, Calif.  
 WOS—1100, Louis Raymond, Pullman, Wash.  
 WOS—1825, G. L. Harms, Portland, Ore.  
 WPAC—1325, L. C. Hopkins, Enfield, Conn.  
 WQAM—1400, C. V. Bell, Ottawa, Can.  
 WTAC—2025, R. J. Gall, Blythe, Calif.  
 WWI—1800, R. J. Gall, Blythe, Calif.

**Admiral Freemantle Sets**

**Up Ship Cabin to House Set**

LONDON ENGLAND.—Admiral Sir Edmund Freemantle has had the old captain's cabin of his former flagship "Impregnable"

taken ashore and set up on the premises of the Autovoyers, Ltd., as a Radio demonstration theatre. He formally opened it recently. The cabin was carefully restored with the aid of naval experts and makes a unique rendezvous of both historic and scientific interest, with its fine acoustic properties for the reception of Radio broadcasts.

The Impregnable was built and launched in 1840 as The Howe, and was the largest and last of the "wooden walls of England."

**RADIO At Cut Prices**

Standard parts only in original packing. Sold on a "money-back" basis.

PHONES	
\$ 8.00 Brandes Superior	5.95
12.00 Nathaniel Baldwin Type C Double	8.95
7.50 Modell's special	3.95
TUBES	
1 1/2 Volt Peanutt Tube	2.00
U. V. 201	5.50
1 1/2 Volt Mercury	4.95
CABINETS	
Made in our factory	
7" x 10"	1.45
7" x 18"	2.15
7" x 24"	2.95
MISCELLANEOUS	
Solderall, Tube	.25
\$12.00 Amplitude, Nickel Horn	4.95
25.00 Aerex Crystal	9.95
DURATEK Permanent Crystal Detector	2.00
W.D.-11 Adapter	.65
\$1.50 Lightning Arrester, Indoor and Outdoor Type	.95
5.50-130 Degree Variocoupler on Bakelite, Silk Wound Wire	2.45
2-inch Bakelite Dials	.25
4-inch Electros Dials	.75
3-inch Bakelite Dials	.35
\$ 1.00 Freshman Variable Grid Leak and Condenser Combined	.75
1.00 Bakelite Socket	.50
5.00 W. D. 12 Audio Frequency transformer	3.75
3.00 Owl Radio Frequency transformers	1.50
5.50 Coto coil Radio frequency transformer	3.45
5.00 Sleeper Radio frequency transformer	1.95
5.00 Acme Audio and Radio transformer	3.45
8.00 Dayton Variometer	5.45
8.00 Dayton Variocoupler	5.45
5.50 Murdock variable condenser, 23-plates	2.95
8.50 Murdock variable condenser, 43-plate	3.25
132.00 Radiola R. C. set	79.50
The new Morrison Siren loud speaker	18.50
5.00 Multi-Radioscope	1.50
Little Gem set	6.50
50.00 Turney single tube set	18.50
1.25 Western Electric Ammeter for testing B batteries	.46
2.00 22 1/2 volt B. battery	1.00
New radio map	.35
When Ordering by Mail Add Postage by the Following Scale	
PURCHASES	
Up to \$1.00	add 10c
\$1.01 to \$2.00	" 15c
2.01 to 3.00	" 20c
3.01 to 5.00	" 25c
5.01 to 7.00	" 30c
7.01 to 10.00	" 40c
Money Order or Personal Check Accepted	



**RADIO STORES**

Dept. F, 8, 191 Fulton Street, N.Y.C.

**"First Under the Wire"**

**ROBBINS RADIO DESK**

The Ideal Furniture Provision to Accommodate the Entire Radio Set For Sale by First Class Furniture and Radio Dealers or Write

**Robbins Woodworking Company LIBERTYVILLE, ILL.**

**YOU—YOU—YOU T-Tell—Tell 'Em I-I-I Use the Famous Neutrodyne Circuit**

- 1: It is the first to employ a 4-1 ratio Radio frequency step-up transformer the SUPERAMPLIFIER.
- 2: Two dials do most the tuning, last two read nearly same as second dial.
- 3: It is a four-tube reflex, too—2 RF. Det. 2 AF.
- 4: It is convenient, using only a 50-ft. indoor aerial.
- 5: Squeals and howls of regenerative circuit neutralized.
- 6: Same station always gotten on same dial settings.

**Because**

**18 Stations** From Coast to Coast brought in in 3 1/2 hours with Loud Speaker intensity.

**Parts for \$5.00** 3 Four to 1 SUPERAMPLIFIERS 2 "Neutrodyne" Special Condensers Instructions and Blue Print of Circuit in Detail

Send only money orders—no checks **Superamplifier Co.** 514 FULLERTON PKWY. CHICAGO

# RADIO COPS WATCH AIRPHONE TRAFFIC

## A.R.R.L. TO HELP CONTROL BROADCAST JAM

300 Volunteer Deputies Stationed Through Land to Turn "Stop and Go" Signs on Signals

By Kenneth Bolles

If you can imagine the panic that would exist in the principal streets of New York City should all traffic squads be relieved from duty, when traffic was at its highest point of congestion, you can imagine the chaos that exists in the air traffic as a result of the unprecedented popularity of broadcasting.

You are not aware, ordinarily, of course, of the air traffic, because the telegraph messages and the music passing over your head are of a too high rate of vibration for human ears. This is known as Radio frequency. It is not until you, like a million others, have obtained a Radio receiving set which can be tuned to these higher frequencies, that you begin to appreciate the problem that faces the modern Radio engineer—the need for a traffic man of the air.

They "Get in Way"

Then you realize that Radio transmitting stations get in each other's way in the same manner that one automobile blocks another.

It is for reasons such as the foregoing that the American Radio Relay League, the national organization of telegraphing amateurs, has a traffic manager. His work may be compared to the city traffic expert, who studies the peculiar conditions that exist in the territory under his jurisdiction and suggests regulations for the orderly movement of motor vehicles and pedestrians. The striking difference is that where one is dealing with a tangible problem that can be seen and recognized by the layman, the other faces what at the outset would appear an even more difficult situation since he is dealing with a medium which the most learned students of Radio science are not sure exists—the ether.

Many Work Simultaneously

The chaotic condition of the ether is obviously due to the fact that it is being used simultaneously by thousands of naval, commercial and private telegraphing stations in addition to about 600 broadcasting stations. It is generally admitted that the growth of Radio has been an unhealthy one. There is not a corner of the United States that does not have a transmitting station sending out its quota of waves.

As its contribution to the general scheme to make the ether an efficient medium for the broadcast listener, the amateur and the various classes of transmitting stations, the American Radio Relay League through its traffic manager, F. H. Schnell, and its operating department, is about to launch a plan for gathering data on interference by establishing 300 official observing stations. The operators of these stations will listen for and record interference on broadcast waves of every description, government, commercial, private and atmospheric, as well as conflicts between broadcast transmitters and broadcast receivers themselves.

Information Gathered

The problems of 1912, when the first Radio law was enacted, are not by any means the problems of 1923 and the Radio "stop and go" signs for controlling the ether are not adequate, for the original law failed to take into account the huge traffic that was to develop in the air. With Radio legislation still pending, a number of commercial organizations and the A. R. R. L., which is a non-commercial organization of amateurs who regard Radio as a hobby, are doing their utmost to relieve ether traffic with present legislative backing.

## WGY RUNS VOICE FILM BACKWARD AS NOVELTY

Listeners In Hear Queer English from Pallophotophoned Speech

SCHENECTADY, N. Y.—Listeners of WGY who had never heard English spoken backward heard this unique demonstration by Radio recently, when WGY, the Schenectady station of the General Electric Company broadcast two paragraphs of an inspirational speech by Dr. Frank Crane on a Pallophotophone film by reversing the film.

The Pallophotophone is an instrument which photographs or records sound on motion picture film. The film looks just like motion picture film but the photographed image consists of a series of up and down lines of varying degrees of amplitude and frequency. Everyone is familiar with the result obtained by reversing the motion picture; falling buildings are rebuilt; the man jumping off the wall is seen jumping back when the film is reversed. The same thing occurs when a speech film is reversed, the speech is given backward.

# POLA NEGRI, PARAMOUNT STAR, TURNS FAN



Pola Negri, beautiful Paramount Star, spends all her spare time listening in on the ether waves. Her first interest in Radio was awakened when she arrived on the coast recently and found a beautiful set installed in her bungalow

## THIRTY-FIVE CENTS COST OF THIS SET

### Boston Fireman Builds Cheap Vest Pocket Receiver with Low Expenditure

BOSTON, MASS.—Firemen at the Mason street fire station, in the downtown shopping district here, are obtaining much enjoyment as the result of the ingenuity of one of their number, James J. Harrington, who has built a number of miniature radio sets. These are able to pick up concerts from stations WGI and WNAC. The set developed by Harrington is remarkable for its small size and low cost. Exclusive of the headset the material for each set cost 35 cents. The completed set is no larger than a watch.

The good results obtained with this set are attributed to the winding of the coil which consists of twelve feet of No. 26 wire wound on a piece of a cigar box wood, three-eighths by one-eighth inch thick. There is about one-eighth of an inch space between each parallel wire and each layer is wound in the opposite direction. The coil is contained in a box one and one-half inches long, one and one-half inches wide and seven-eighths of an inch deep, made of cigar box wood.

The crystal holder, bought for ten cents, is on top of this box, the holder being made of fiber, with the usual cat whisker and two binding posts. A third binding post (double) is placed between the two single posts. Harrington's home is at 19 Rowell street, Dorchester, Mass.

Conductors Call WHN as Stop NEW YORK.—"Cypress Avenue, WHN Broadcasting Station" is the new announcement of the Brooklyn Rapid Transit street car conductors on the Myrtle Avenue line in Ridgewood, this city. Especially on Thursday evenings when WHN listeners go to the station in large numbers, there have been so many requests for directions to the broadcasting studio that the carmen have decided upon the new plan as easier for themselves.

Patents Procured and Trade-Marks Registered. Advice and terms upon request. ROBB, ROBB & HILL, 1417 Hanna Bldg., 956 McLachlan Bldg., Cleveland, O. Washington, D. C.

**DONT PASS THIS-BUY**



**World Radio Batteries SAVE YOU 50%**

WRITTEN 2 YR GUAR

**Every World User Is a Booster**

**WRITTEN 2 YEAR GUARANTEE**

Because you deal direct with a manufacturer who is responsible for the performance and quality of the Battery.

**World-Radio-Batteries**

6 Volts—40 Amps.,	6 Volts—80 Amps.,
<b>\$8.50</b>	<b>\$12.50</b>
6 Volts—60 Amps.,	6 Volts—100 Amps.,
<b>\$10.00</b>	<b>\$14.50</b>
6 Volts <b>\$16.00</b> 120 Amps.	

Full Rating Guaranteed

MAIL YOUR ORDER TODAY. WE SHIP EXPRESS C. O. D., SUBJECT TO INSPECTION, OR WILL ALLOW 5% FOR CASH WITH ORDER. ALL ORDERS SHIPPED SAME DAY AS RECEIVED.

**WORLD BATTERY COMPANY,**  
60 E. Roosevelt Rd., Dept. L, Chicago, Ill.

## Japan to Permit Private Owned Broadcast Plants

### Licensed Companies Will Charge Subscribers for Ether Service

WASHINGTON, D. C.—Public broadcasting in Japan has been placed in the hands of private enterprise due to a relaxation of the Government's policy governing communications, according to a report from Commercial Attache Abbott, at Tokyo.

Many applications to operate stations have been received by the Government but for the present only three or four financially sound companies in the larger cities, such as Tokyo and Osaka, will be licensed. These companies will be required to pay a tax and will be permitted to collect for their service direct from subscribers. The Government will charge users a yearly registration fee and turn over a part to the broadcasting companies.

The Bridgeport (Conn.) Telegram says that the newspapers should welcome Radio as a useful ally, rather than a dangerous rival.

## 975 Meters Used in Turkish Waters

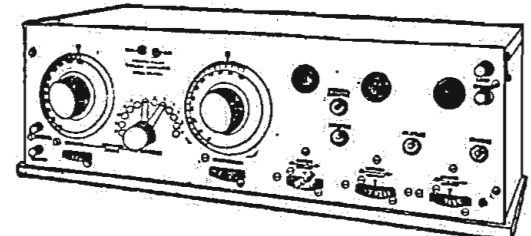
The United States Shipping Board has given the information that by agreement of the Allied Communication Officers the wave length of 975 meters is assigned to United States naval vessels operating in Turkish waters. This wave length and no other is used by United States vessels. In view of this fact, it is believed that the difficulties which have appeared from time to time will disappear. The station at Constantinople does not call, receive, nor send on any wave length other than 975 meters.



"ALLOW the ear to hear what it likes, the eye to see what it likes."  
Kwan-Yi-Wu.

The Grebe Receiver delights both ear and eye, for the ear enjoys good music,—the eye beautiful craftsmanship.

*Doctor Wu*



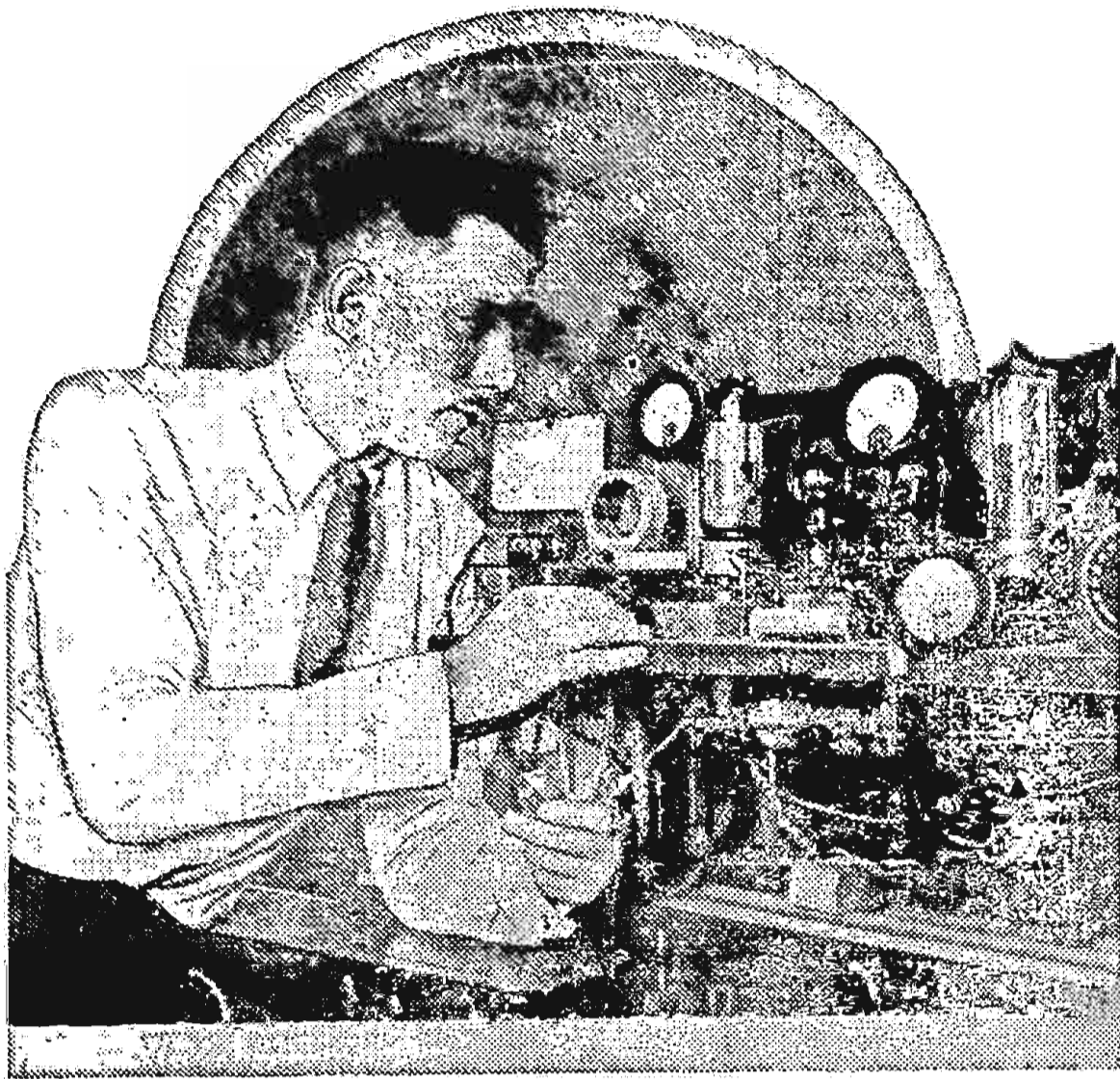
Licensed under Armstrong U. S. Pat. No. 1113149

**A. H. GREBE & CO., Inc.**  
Richmond Hill, N. Y.  
Western Branch—451 East 3rd St., Los Angeles, Cal.





**FREDRICK B. OSTMAN WINS CUP**



The Hoover cup, awarded annually to the owner of America's best amateur Radio station, under the auspices of the American Radio Relay League Board of Direction, this year went to Frederick B. Ostman of Ridgewood, N. J. Mr. Ostman is shown in the above photo making a repair on his station 2OM. This plant is one well known to amateurs and it is a safe bet that you can pick him up any night. © K. & H.

**NEW JERSEY FAN WINS HOOVER CUP**

Operator of 2OM to Keep Coveted Trophy for One Year

HARTFORD, CONN.—The Hoover cup, awarded annually to the owner of America's best amateur Radio station, under the auspices of the American Radio Relay League Board of Direction, this year went to Frederick B. Ostman, of 180 Broad street, Ridgewood, N. J. Announcement that 2OM, his station, had been chosen as the winner for 1922, was made at the league headquarters here today by the committee of three judges selected by Hiram Percy Maxim, president of the A. R. R. L.

This trophy is the highest honor in amateur Radio and is awarded by the Department of Commerce through Secretary Herbert Hoover to the best all-around amateur station, the major part of which is home-made. The entries are judged not alone on station arrangement or equipment, but on nine factors which the A. R. R. L. Board of Direction considers necessary in an ideal station.

The essentials considered in making the award include extent to which apparatus is home-made, ingenuity in design, construction and arrangement; efficiency of transmitter, consistent transmitting range, efficiency of receiver, obedience to United States laws and local co-operative regulations, quality of operator's sending, amount of traffic handled, accuracy, completeness and neatness of station log.

In making the award two other stations among the list of entries were considered particularly, 2FZ, operated by F. Frimerman, of 740 Prospect avenue, New York, and 5ZA, operated by Louis Falconi, of Roswell, N. M. The latter was the winner of the Hoover cup last year. Any licensed amateur Radio station in the United States or its possessions is eligible to participate in the contest.

A movement is under way to provide Toledo, Ohio, with a radio broadcasting and receiving station for its police department.

**SOMETHING NEW**  
**B-Metal**  
 Guaranteed  
**SUPER CRYSTALS**

Anyone who has spent most of an evening and lost the best part of a concert trying to find a live point on a cheap crystal, will appreciate B-Metal. It is the king of crystals, to a class by itself. Fully guaranteed loud talking. Over 22,000 in use in Detroit. Buy one today at any dealer. If your dealer hasn't B-Metal yet, write us and get one.

**B-Metal Refining Co.**  
 3134 Trumbull Ave.,  
**DETROIT, MICHIGAN** **50c**

**Mrs. Edward M. Munzer Is Only Woman Radio Engineer**

HEWLETT, L. I.—Mrs. Edward M. Munzer, of this city, enjoys the distinction of being the only woman Radio engineer in the world. She is a graduate of the Massachusetts Institute of Technology with the degree of electro-chemical engineer.

During the war Mrs. Munzer took a special Radio course at Hunter college, New York, and was granted a grade "A" license as Radio operator. She later was appointed government inspector at the DeForest Radio station at Highbridge, N. Y., where she remained through the war making various experiments and tests.

Mrs. Munzer now is affiliated with the Davidson Radio corporation and is engaged in special research work in the Radio field.

**AERIOLA SR. STYLE TUNER UNIT**  
 Green silk on Bakelite Tubes with diagram \$5.65.  
**REINARTZ ULTRA CIR. ALL PARTS \$29.90**  
 Ultra Reinartz Tuner Unit & Diag. \$4.95 wound to H. J. Marx' spec'f. March 24th Radio Digest. Ruby Mica-Copper-Bakelite mounted Condensers N. P. binding posts .0015 50c; .0015 60c; .0025 70c. Reinartz coil Doub. green silk-Bakelite Spider \$1.65. Reinartz plate circuit chokes (triple adjustable) \$1.70. Complete set Reinartz tuner & detector parts \$10.65. Tuor, Det. & 2 Stage \$17.95. Two stage outfit \$3.35.

**GOV'T RADIO STORAGE BATTERIES**  
 New Signal Corps Edison 3 cell type BB-4 \$4.50; Single Cells for W. D.-11 tubes \$1.50; 60 A. H. for W. D.-11 tubes \$5.25; 6 Volts Edison \$7.75; Edison "B" battery single elements 4c ea.; double 10c.

**HI-POWER AMPLIFYING TRANSFORMERS**  
 Best! Loudest! No-burn-outs. \$2.65 with spec'l diagram.

**GENUINE PEANUT TUBES**  
 Wonderful Det. & Amplifier. Smallest tube made (aeroplane style) 1 V. 1/4 amp. 1/2" dia. x 2 1/4" long.

**FLEWELLING .006 COND'RS & PARTS**  
 .006 Bakelite-Ruby Mica-Copper Calibrated Cond. 85c. Spider coils, green silk oo Bakelite, \$1.75 ea.

**NEW SPECIALS**  
 20 OHM RHEO. FOR 201-A OR W. D.-11 tubes \$1.00. Variable grid leaks 1/10 to 5 Megohms 75c. HI-POWER LOUD SPEAKER & PR. BALDWIN PHONES \$10.90. Variable grid Cond. .00025 or .0005 max. 45c. Vernier Attachment for sny Var. Condenser 95c. Armstrong Super. New 3 tube outfit. Owner sacrificing.

QUALITY RADIO SHOP, RICHMOND, IND.

**CONGRESS RADIO CO.**  
 503 So. State St., Chicago, Ill.

- Brandes Superior Phones.....\$5.95
  - Baldwin "Mica Diaphragm" Units.....4.65
  - Master Baldwin Headsets.....7.25
  - Grebe Type Dials, 2 and 3 inch......25
  - V. T. Composition Socket......37
  - Glass Enclosed Crystal Detector......40
  - Fada Switch Levers......25
  - CRL Adjustable Grid Leaks.....1.20
  - CRL Leak and Condenser.....1.70
  - CRL Rheostats, 75c List......45
  - Burgess Large 22 1/2 volt B Bat......2.45
  - 90 degree Variocouplers.....1.10
  - 3-Plate Variable Condensers.....1.00
  - 11-Plate Variable Condensers.....1.25
  - 23-Plate Variable Condensers.....1.45
  - 45-Plate Variable Condensers.....1.65
  - 23-Plate Vernier Condensers.....3.35
  - 47-Plate Vernier Condensers.....3.75
- Mail Orders Receive Immediate Attention  
 EVERYTHING GUARANTEED AS REPRESENTED

**Largest Radio Store in America**  
**Radio**  
**BUY HERE FOR LESS**  
**Largest Radio Store in America**

Radio Supplies purchased here are sold under a positive guarantee of satisfaction. We carry the largest new stock of first quality merchandise.

- Complete Parts for Ultra Audion Circuit (Known as the Wonder Circuit) \$11.90
- FREUND'S WONDER CIRCUIT . . . . . \$13.20
- COMPLETE PARTS FOR REINARTZ SETS . . . \$11.45
- COMPLETE PARTS FOR 2 STEP AMPLIFIER . . \$12.45
- Moulded Variometers .....\$3.45
- 180° Moulded Variocouplers.....\$3.45
- Mahogany Variometers .....\$1.95
- 180° Bakelite Variocouplers .....\$1.75
- Freshman Variable Grid Leak and Condenser .....75c
- CRL Adjustable Grid Leak and Dubilier Condenser .....\$1.35
- Master Baldwin Type C Units with Cord .....\$3.95
- Master Baldwin Type C. Head Sets.....\$6.95
- Brandes Superior Headset.....\$5.75
- Antenella Aerial Plug.....\$1.15
- 3 Coil Honeycomb Mounting .....\$3.45
- 2 Coil Honeycomb Mounting .....\$2.60
- WD-11 Bakelite Sockets.....50c
- Barchass Coils .....\$1.95
- Firth Cord Tip Plugs.....60c
- Thordarson Amplifying Transformers.\$2.95

**Complete Parts for Knocked Down Receiving Set \$17.95**  
**COMPLETE PARTS FOR FLEWELLING CIRCUIT \$12.45**

- VARIABLE CONDENSERS**
- \$4.30 Value, 43 PLATE, now.....\$1.75
  - \$3.70 Value, 23 PLATE, now.....\$1.45
  - \$3.30 Value, 11 PLATE, now.....\$1.35
  - \$3.10 Value, 5 PLATE, now.....\$1.25
  - \$2.70 Value, 3 PLATE, now.....\$1.15
  - \$7.00 Value, 43 PLATE Vernier Variable Condenser.....\$3.95
  - \$6.50 Value, 23 PLATE Vernier Variable Condenser.....\$3.45
  - \$6.00 Value, 11 PLATE Vernier Variable Condenser.....\$2.95

**U.S.A. SIGNAL CORPS (Aviation Type 194-W) WESTERN ELECTRIC PHONES, \$7.95**

Each Phone Cap is covered with soft rubber ear cushions, and an aviation leather helmet goes with each set! These are the only phones to pass the Government specifications for sensitiveness and loudness, the requirements called for in aircraft reception.

**ORIGINAL BALDWIN PHONES**

These are the Genuine Nathaniel Baldwin "Mica Diaphragm" Phones, complete with silk cord and headband. Special at.....\$9.95

Genuine Baldwin "Mica Diaphragm" Type "C" Loud Speaking Units. Special .....\$4.65

**3000 Ohm GUARANTEED HEADSETS, \$8.50 Value \$3.65**  
**MAGNAVOX, LOUD SPEAKERS, Type R3 . . . \$27.45**

- JACKS**
- Pacent Single Circuit.....\$0.35
  - Pacent Double Circuit......50
  - Federal Single Circuit Filament Control .....35
  - Federal Double Circuit Filament Control .....50
- HONEYCOMB COIL**
- 1,500 Turns .....\$1.50
  - 1,250 Turns .....1.50
  - 1,000 Turns .....1.25
  - 750 Turns .....1.00
  - 250 Turns .....75
- CABINETS MAHOGANY AND WALNUT**
- 6x 5 1/2" by 6" deep.....\$1.45
  - 6x 7 1/2" by 6" deep.....1.95
  - 6x14" by 6" deep.....2.45
  - 6x16 1/2" by 6" deep.....2.95
  - 6x22" by 6" deep.....2.95
  - 9x12 1/2" by 7" deep.....3.95
  - 9x10 1/2" by 5 1/2" deep.....2.95
  - Rheostats .....45c
  - Sponge Rubber Ear Caps, Pair.....50c
  - Dials, 2, 3 and 3 1/2 Inch.....25c
  - Grewol Detectors .....\$1.65
  - Signal Corps Super Sensitive Microphone Transmitters.....\$2.45
  - Solid Copper Aerial Wire, 100 ft.....35c
  - Spaghetti Tubing, yard.....10c
  - Lightning Arresters .....95c
  - 2-Slide Tuning Coils, at.....\$1.95
  - Phone Caps, for mostly all phones....25c
  - Anti-Capacity Switches.....\$1.50
  - Lightning Switches .....\$2.65
  - Hydrometers, now at.....45c

**Formica Panel, 1/8" thick, black or brown, square inch . . 1 1/2c**

*We guarantee all merchandise purchased of us  
 Mail orders receive immediate attention*

- Complete Parts for Single Tube Reflex Circuit . . . \$32.65**
- |   |               |                |
|---|---------------|----------------|
| Consisting of   | Regular Price | Our Price      |
| 43-Plate Vernier Variable Condenser.....  | \$7.00        | \$3.95         |
| Radion Loop Aerial.....   | 7.00          | 5.95           |
| Cunningham C301-A Tube.....   | 9.00          | 5.95           |
| Grewol Glass Inclosed Detector.....   | 2.00          | 1.65           |
| All American Radio Frequency Transformer.....   | 4.50          | 3.45           |
| All American 5 to 1 Radio Audio Frequency Transformer.....  | 4.75          | 3.95           |
| 2 .001 Micon Condensers.....  | .70           | .50            |
| 1 .002 Micon Condensers.....  | .45           | .35            |
| Howard Potentiometer.....   | 1.50          | 1.35           |
| Howard 25 Ohm Rheostat.....   | 1.10          | 1.00           |
| 8 Binding Posts.....  | .80           | .40            |
| 9x10 1/2" Formica Panel.....  | 1.42          | 1.20           |
| 9x10 1/2" Genuine Solid Mahogany Cabinet with hinged top.....   | 5.00          | 2.95           |
| Complete instructions for drilling, assembling and wiring furnished so that anyone with no technical knowledge can easily follow. |               |                |
| Regular Price, \$45.22. Our Price.....  |               | <b>\$32.65</b> |

**BUY HERE FOR LESS**  
**CHICAGO SALVAGE STOCK STORE**  
 509 South State Street Chicago, Illinois

# Radio Digest

## Illustrated

REG. U. S. PAT. OFF.

Published by the Radio Digest Publishing Company, Inc.  
123 West Madison Street  
Telephone State 4844-4845  
Chicago, Illinois

E. C. RAYNER, Publisher  
Chas. F. Smisor, Editor  
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, 2126 Broadway, New York  
Telephone Endicott 2390

Pacific Coast Representatives  
E. J. Wood, 251 Kearney St., San Francisco  
Telephone Kearney 1472  
H. M. Morris, 417 Western Mutual Life Building, Los Angeles  
Telephone 12011



58 PUBLISHED WEEKLY

SUBSCRIPTION RATES  
Yearly.....\$5.00 Foreign.....\$6.00  
Single Copies, 10 Cents

Vol. V Chicago, Saturday, April 21, 1923 No. 2

### Stolen Goods

How to Keep Equipment Well Locked

NATURALLY the petty burglar picks up goods that are readily turned into money. Recently there have been many complaints about stolen apparatus. A super set gone, a loud speaker stolen. These things are "as good as gold" to the pilfering person or shoplifter. There is no special reason why Radio materials should be made the object of these thefts, only that they are now a ready means of exchange for money.

While this equipment is so desirable at present dealers should use some care where it is stored and keep the most expensive apparatus in vaults or in well-protected storage places.

### Tired Typists Get a Rest

Broadcasting Keeps the Weary Worker at Home Evenings

MUSICAL shows are usually dedicated to the "tired business man," but entertainment by Radio is claimed as a boon of the "weary" working woman, who is characterized no longer as the "poor working girl" since the listening privilege came to her.

Many tired workers stay home nights and rest up while listening in. Before the Radiophone many of these workers took enjoyment in dancing or at the movies, adding more fatigue to the tired eyes and constitution. It is now easy to get entertainment staying at home, obtaining rest as well.

### Working Out Its Own Future

Who Knows What Is in Store for Radio?

A REVIEW of the accomplishments of Radio the past year and of the prophecies of experts for its future but cause one to ponder upon the inadequacy of any possible foretelling of what this great gift of nature is to accomplish. We can but gasp and wonder.

In view of the fact that Radio has always been with us, excepting for the invention of some apparatus of importance small in comparison with the natural elements used, who can answer the question, "What of the future?" Radio for the transmission of power has such tremendous possibilities within its scope that the most confirmed dreamer and the scientist of the widest vision can only guess in a feeble way.

Radio, now that it has been recognized in the abstract, will work out its own destiny. Such a force once started at work is not to be stopped, but it will go on and on, along its destined course. We can only hope that the course will run along smoothly and in peaceful channels, and for the benefit of the greatest number of the world's people.

### Farmer's Growing Interest

Much Equipment Found in Rural Homes

ACCORDING to a survey recently conducted by the United States Department of Agriculture, Radio market news is proving of national practical use. Almost 50 per cent of the hundreds of returns to an inquiry sent out by Radio were from farmers who had Radio receiving apparatus, the remainder were from grain dealers, mills, elevators, banks, telephone companies, co-operative organizations, farm bureaus, and other agencies which disseminate the reports among large groups of farmers.

Greatest interest was shown in the grain market reports, which inform farmers of wheat, corn and oats prices at the leading grain markets. Next in importance came the livestock reports of prices and movements at the principal livestock markets of the country. The weather reports came next, following by reports on poultry products, fruits and vegetables, dairy products, hay, cotton and other farm products.

The first survey made by the department was to determine how widely its Radio market reports are being received and used by farmers, and it afforded much valuable information for developing the service to the maximum of efficiency. It had been known in a general way that the service has been of value to producers and other agricultural interests in the marketing of crops and to consumers through the regulating of market supplies, but definite data were not available until developed by this survey.

## Condensed

By DIELECTRIC

We have not reached the point in this country yet where we have our members of legislatures inspired by the Radio reception of some light dance music or talks on dressmaking. There has been some suggestion of the advisability of letting our representatives listen in, in preference to so much broadcasting on their part. But then we are no more backward in this respect than are our English cousins. Members of the House of Commons recently requested the installation of a receiving set and were denied this privilege, on the ground that it would serve as a counter attraction and seriously interfere with the orderly processes of law. Not so very long ago it was announced that one of the largest manufacturers of Radio sets was gratuitously supplying our Senators at Washington with receiving sets—for what reason? Of course, I for one do not venture to say, because while the White bill was reasonably sure of coming before the last session of Congress it stood a good chance of being passed, still a set or two in the hands of a novice can produce considerable interference. It would seem preferable to provide a receiver rather than a transmitter though, and then it would be desirable for we amateurs to do the transmitting.

A great many fans are experiencing considerable difficulty in tuning in the Government broadcasting station, NAA. This is unfortunate. That station is giving some excellent service in the form of talks by the United States Bureau of Education. Its period of broadcasting is not a long one in the evening but is very much worthwhile. The inability to tune in is not due in every instance to the wave length of 710 meters, for many able to reach that wave length cannot seem to select the station. It is just as true that there are stations on the lower wave lengths which fans find difficulty in getting in spite of being favorably located with reference to these. Perhaps someone can supply a formula to be followed that will insure the reception of these illusive broadcasters.

Among a certain class of people in this country the broadcasting station is looked upon as a most convenient and cheap means of sending news. They consider a transmitting station as a specially constructed apparatus for giving to the world exactly the information they conceive to be most appropriate. Hence we learn of some very amusing incidents connected with broadcasting. No one doubts the sincerity of the proud father's wish to announce all over the land news of special importance to himself, yet it would hardly cause a real "ham" to hold on to a station which gave the color of hair, eyes, weight and chest tones of a new infant. Just such a request was received by Station WGY, and they also had a letter asking the station to broadcast news of the state of health of an entire family for the benefit of aged parents in the West, not once but three times for, as was explained, the parents might be out on two of the nights. This seems a trifle ridiculous to the majority of us and yet it tends to show the feeling of intimacy between the listener in and the announcer. The voice from the air carries a conviction to some that it is speaking solely to that individual.

One large group of Radio concerns has been annexing all the patented features of any value obtainable and it is not yet through acquiring. John Hayes Hammond, Jr., has been devoting his inventive genius to developing several important devices which have a great value to our Government. These he has sold to the group referred to, although the Government retains an option on all of them for military and experimental uses. What principally concerns us as amateurs is the system Mr. Hammond is said to have perfected to eliminate our old enemy static. If this actually works and is really OWNED by certain interests, how much will it cost the average fan to avail himself of its service? There is one consolation for you and me and that is Dr. Steinmetz's assertion of several experts about to succeed in establishing a static remover. We may have the advantage of knowing what to do to rid our sets of this evil without riding our purses as well.

Several fans have confessed to me that the most alluring part of owning a receiving set was to be able to tune in stations which gave lectures on various subjects of a truly educational character. Many there be who keep their tubes warm for the lighter features and turn a cold filament toward the oncoming waves of brain exhilarators. Yet the numbers will increase of ardent seekers for knowledge, and to them the educational programs from many of our universities and colleges will present valued opportunities for securing it. Another of our schools has entered the list of broadcasters, Washington State College, and while the usual entertaining features will appear on their programs, lectures will also be given in a regular educational course. My prediction of several months back is being realized today, which was that the colleges would see the tremendous possibilities latent in the use of Radio for educating the masses and avail themselves of this large lecture room.

There is still one suggestion which has been repeatedly made by listeners in to the broadcasting stations that remains disregarded by them. I refer to the custom of announcing the station immediately following a number. It is usually a long intermission between numbers and the listener likes to know to what station he is listening. Compliance with this request will be appreciated by the DX fans.



## RADIO INDI-GEST

(This column is open to all aspiring Radioknuts who tender suitable contributions. Try to "make" the column if you can. All unsuitable manuscripts are turned over to the Office Squirrel who does not guarantee their return or anything else for that matter.—Indi.)

### The Radio Tramp

By Walt Drummond

(Continued from April 14 issue)

"The other night I had a dream.  
A strange form came to me  
And said, 'You've rambled all your life;  
Your punishment shall be—

"When Death calls time your spirit shall  
In no one place abide,  
But with the speed of light shall move—  
The Radio shall ride.

"And all your friends upon the earth  
Will hear a g-r-r-r! and clack!  
Each time you start to go somewhere  
And when you're coming back.'"

Now, Jack thought this a happy fate,  
And when he said good-bye,  
His heart was in his hand-clasp and  
A glad light in his eye.

That night he fell beneath a train  
Out on the Santa Fe.  
A trackman found his lifeless form  
At dawning of the day.

So, when you hear these noises queer,  
It's my friend, Happy Jack—  
He's either on his way somewhere,  
Or else he's coming back.

### Now Lil, You Stop It

Indigest—The first taxi driver to equip his cab with Radio deserved success. "None but the brave deserve the fare."—LILLIAN G.

### It Was Black Bawled

"We want to keep our eyes open for dis class legisla-tion," said Rastus, at a meeting of the Sons of Africa. "I see they's a White Radio bill bein' introduced in Congress."

### Maybe It Doesn't Oscillate?

Indigest—One fan wrote to a broadcasting station that he had the "bug" so bad that his head was beginning to resemble a vacuum tube. Sort of light-headed, probably.—Don A.

### Betcha There's Alota QRM

Dear Indi—I fear that Radio weddings may lead to bigamy. While women are as attractive as they are and proposals as easy as that by Radio, man will certainly be sorely tempted.—Spark Gap.

### We'll Say You Do

Dear Indi—A couple a nites ago I thought I'd horn in on the atmosphere, and the first thing I heard was "The ushers will now collect."

Right away quick, I plugged in two more bottles, and was just in time to hear an announcer at Jefferson City, Mo., saying that the convicts' band of the State Pen. would now play.

And here's what they played—

"The land of the free, and the home of the brave."  
Do I "make" it? —Baker.

### You're Bad as Lillian G.

Dear Indi—"It is more blessed to give than to receive" is a good motto for a broadcasting station.—SPIDER WEBB.

# A. B. C. Lessons for Radio Beginners

## Chapter XVI—The Reflex Circuit

By Arthur G. Mohaupt

**T**HE REFLEX circuit is a form of amplifier circuit that has recently come into use and been found very effective and satisfactory. In the reflex circuit an entirely new principle is employed, for here the amplifier tubes are designed to serve a double duty—the same tubes act first as amplifiers of the Radio

tal detector, if properly adjusted, gives excellent rectification with a minimum amount of this distortion. If a detector of this type is thus used in connection with a single amplifier tube, a circuit can be arranged consisting of one step of Radio frequency amplification, a detector, and one step of audio frequency amplification, and all this is accomplished with a single tube. If two amplifier tubes are used in connection with a crystal detector the equivalent of a five-tube set can be arranged, consisting of two stages of Radio frequency amplification, a detector, and two stages of audio frequency amplification. The use of dry cell tubes in connection with a reflex circuit thus forms a very economical and efficient Radio receiver.

Although the reflex circuit employs no really new fundamental principle or idea, it merely employs the facts already known in a more novel and economical manner. We will now consider a few interesting reflex circuits and observe how the various effects just described are obtained. The circuits presented here are not original with the writer, but have been tried out and found quite satisfactory and effective.

### A Single Tube Reflex

The simplest form of reflex circuit is that employing a single amplifier tube in conjunction with a crystal detector. A circuit of this type is thus equivalent to a standard three-tube circuit employing one tube for Radio frequency amplification, a detector tube, and one tube for audio frequency amplification. The general scheme of connections is illustrated in Figure 55.

As shown, the receiving circuit is tuned to the wave length of the incoming signals by means of the antenna series condenser C-1, and L-1 the primary of a standard variocoupler. The series condenser C-1 should be of the 43-plate variable or rotor of the coupler is a 23-plate con-

necting in the input circuit of the tube. **Radio Frequency Transformer**  
Into the output circuit of the tube is connected the primary of a standard Radio

connected a 200- or 400-ohm potentiometer for obtaining the necessary stabilizing voltage for the grid circuit of the tube. The single tube reflex circuit is tuned

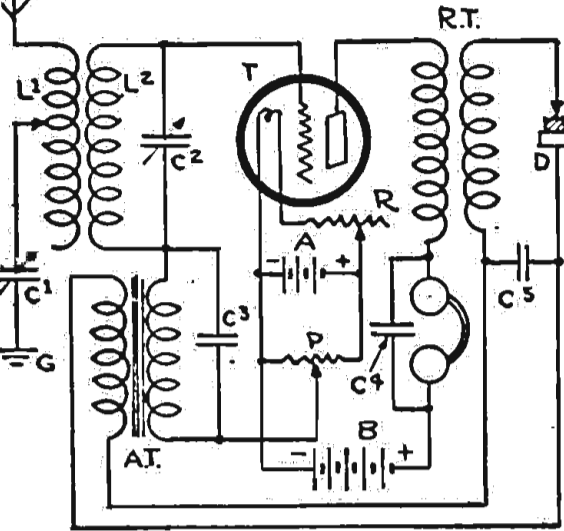


Figure 55

frequency oscillations and then as amplifiers of the rectified audio frequency oscillations. In this manner great economy of tube operation is effected, because, instead of having to use one tube for intensifying the incoming oscillations before they are impressed upon the detector circuit and another tube for amplifying the audio frequency oscillations from the output circuit of the detector tube, the same results are accomplished by "reflecting" the latter oscillations back through the first tube and having this single tube do the work of both.

### Comparison of Circuits

The reflex circuit differs from the regenerative circuit in that in the latter the

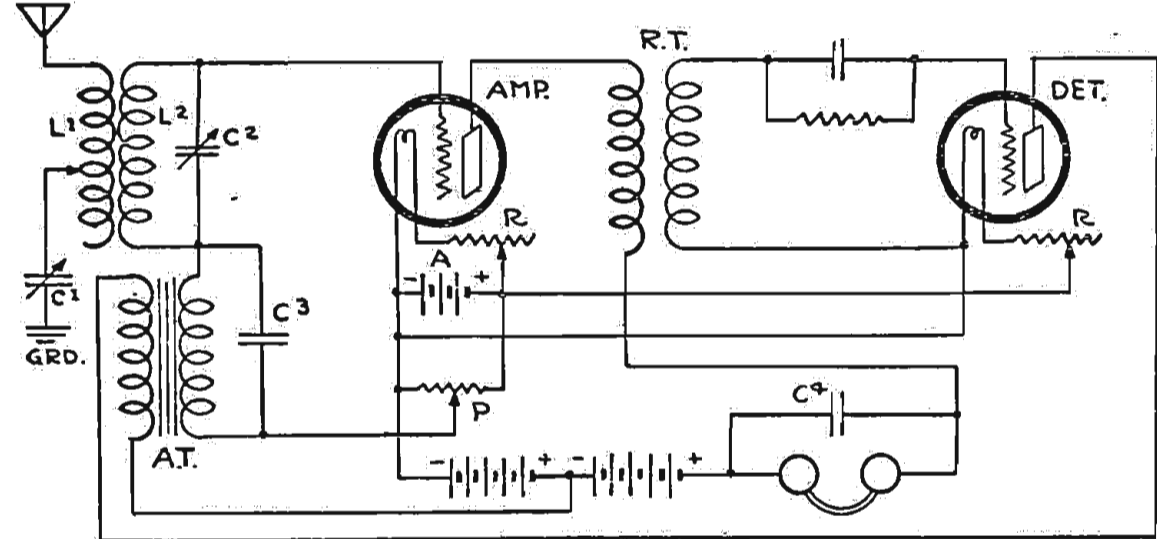


Figure 56

oscillations of the output circuit of the detector tube are tuned into synchronism with those in the input circuit, with the result that one group reinforces the other. In the reflex circuit, however, two groups of oscillations, one at a Radio and the other at an audio frequency, actually flow through the same tube at the same time. In this manner the number of tubes required is greatly reduced, and the drain on the A battery is also greatly decreased. Furthermore, it is known that the crys-

tal detector, if properly adjusted, gives excellent rectification with a minimum amount of this distortion. If a detector of this type is thus used in connection with a single amplifier tube, a circuit can be arranged consisting of one step of Radio frequency amplification, a detector, and one step of audio frequency amplification, and all this is accomplished with a single tube. If two amplifier tubes are used in connection with a crystal detector the equivalent of a five-tube set can be arranged, consisting of two stages of Radio frequency amplification, a detector, and two stages of audio frequency amplification. The use of dry cell tubes in connection with a reflex circuit thus forms a very economical and efficient Radio receiver.

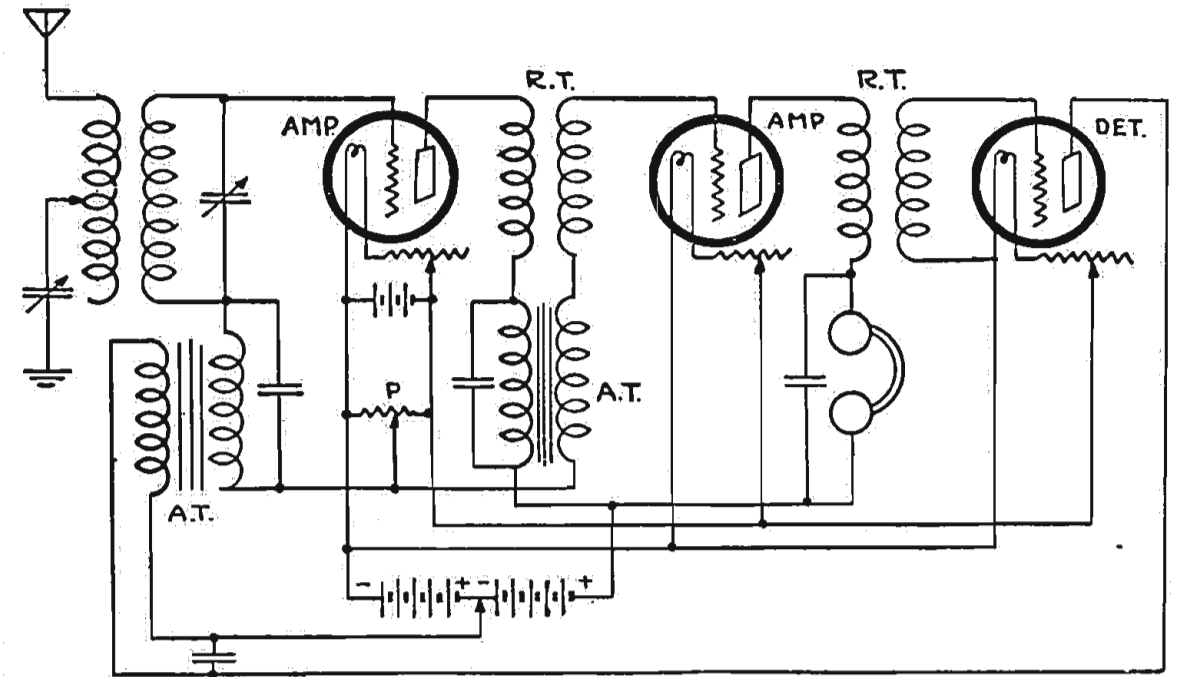


Figure 57

frequency transformer RT. In series with this primary are the telephone receivers and the 45-volt B battery which supplies the positive potential to the plate of the tube. The phones are also shunted by the by-pass condenser C-4 of .002 mfd. capacity. Across C-5 finally is connected the primary of the audio frequency transformer AT. Across the A battery is con-

necting in the input circuit of the tube. **Radio Frequency Transformer**  
Into the output circuit of the tube is connected the primary of a standard Radio

**HIDDEN COIL CRYSTAL SET**  
Receives plainly 10 to 25 miles. All wires concealed by handsome leatherette cover. Exceptionally sensitive crystal. Easily and accurately tuned by concealed rods and sliders. Most compact and neatest appearing receiving set made. Easily installed. 5 inches high. Price \$4.50, Postage Prepaid. Sold on money-back guarantee. AGENTS WANTED.  
**George Radio Co**  
Chamber of Commerce Bldg.  
Minneapolis, Minn.

**Carter "TU-WAY" Radio Plug**  
take two head sets and all types cord tip terminals. Price \$1.50. Write for Bulletin on Carter "HOLD-TITE" Jacks and other products. **CARTER RADIO COMPANY, 209 South State Street, CHICAGO**

**Just Consider**  
—the essential features necessary to make an audio frequency transformer a good one—

1. High Amplification.
2. Minimum Distortion.
3. Low Interstage Linkage.
4. Convenient Mounting.
5. Compactness.

Cotoco transformers make these ideal features facts. And the finish will surely please you.

"Built First to Last"  
**\$5.00**  
At Your Dealer's

**COTO-COIL CO. PROVIDENCE**

**Most for the Money in Radio**

**"SENIOR" SET**

When you buy a Michigan "Senior" Regenerative Receiver for \$125.00 or a "Junior" Receiver for \$57.50, you get the clearest, most satisfactory long distance service that an equal investment ever brought.

These sets are licensed under Armstrong U.S. Pat. 1,113,149 and pending Letters Pat. No. 807,388. This means that they represent the highest achievement in Radio Engineering.

**"JUNIOR" SET**

Factory Branch: 9 South Clinton Street, Chicago, Illinois  
H. O. Rugh, Radio Engineer, in charge

**MICHIGAN RADIO CORPORATION**  
GRAND RAPIDS, MICHIGAN

Send for Illustrated Circular

# Dial Mounting for Spider Web Coils

## External Controls for Internal Inductances

This way to mount coils is exceedingly efficient and the coils are controlled by knobs on the panel front. I am using this

### WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if he only knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in securing such material. Send them in with full details, including stamped envelope so rejected copy may be returned. The work must be entirely original, not copied.

RADIO KINKS DEPARTMENT,  
Radio Digest  
123 West Madison St., Chicago, Ill.

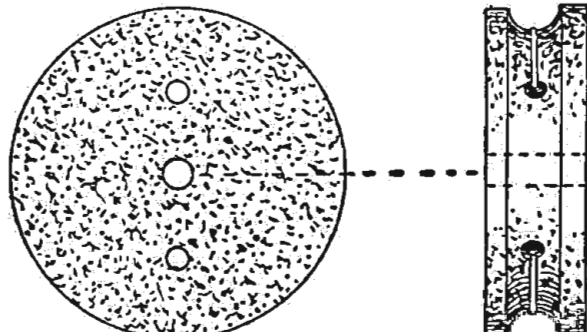
style mounting on my three-circuit tuner and get excellent results.

The two outside coils are actuated by the crank on the rod 1 and through the pitman 2. A hinge 3 allows the pitman to work freely. A small spring 5 keeps the shaft and dial snugly in place. Small collars with set screws 5 are used on the rod 1 for adjusting the parts. A regular panel bushing is used for the rod bearing. Small machine screws 8 are used for the hinge mounting. The parts used and manner of construction is clearly shown in the illustration.—Chas. A. Cothran, Covington, Tenn.

### Home Made Rheostats

The following home made rheostats have been used throughout a four step amplifier and detector and have proved very economical and efficient.

The form is made of plaster of paris mixed with water. In mixing stir the cement into the water until it is quite thick, then pour this into an old baking powder can cover, previously painted with melted paraffine and allowed to cool. The



cement should be allowed to set for at least thirty-six hours. It will appear to be quite dry and hard in much less time, but experience has taught me that it is not safe to work until absolutely hard. After allowing this to dry, it may easily be removed from the tin by heating until the paraffine is melted.

The form may be shaped as follows: Bore a hole in the center, and screw it down to a board or bench. The form should fit loosely on the bench that it may be turned by hand while cutting it. It is cut by turning with one hand and holding a knife or file against the plaster of parts.

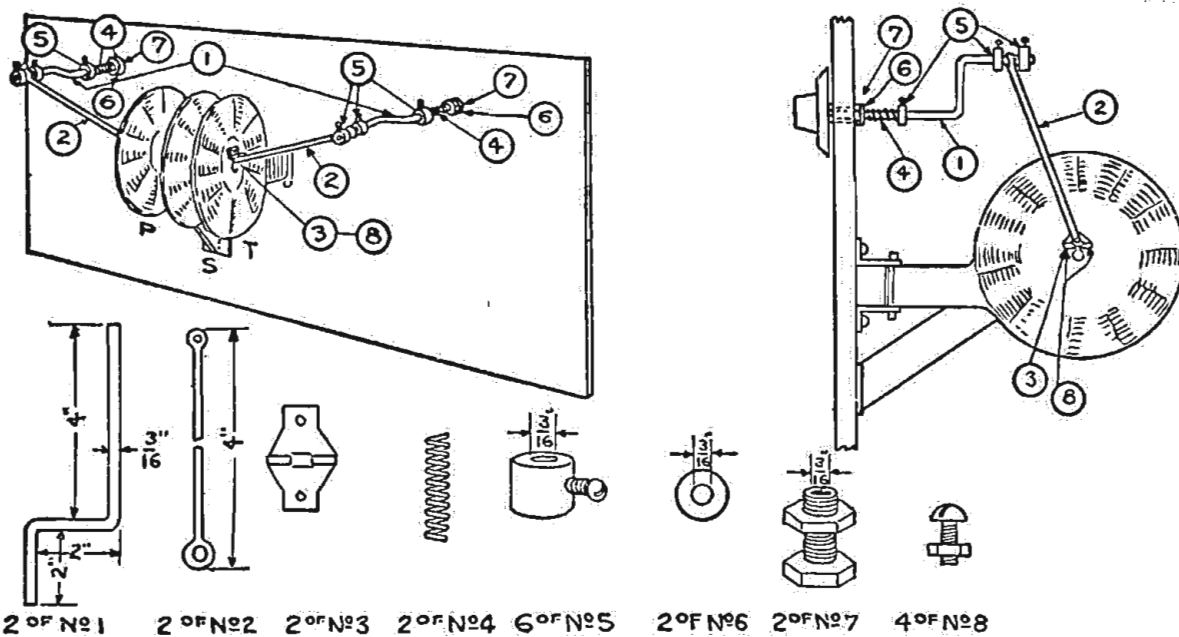
### RADIO PARTS

At a Big Saving—Mail Order Only

- \$12.00 Baldwin Phones, Double.....\$7.85
- 10.00 Long Range Phones..... 4.70
- 6.50 1 1/2 Volt Tubes, Standard base. 5.80
- 5.50 Imported Detector Tubes, Better than Cunningham (guaranteed)..... 4.25
- 2.00 Grewol Crystal Detector..... 1.50
- 1.00 Earla Socket..... .55
- 1.00 Hydrometer..... .63
- Electric Soldering Iron, complete..... 2.50

SPECIAL PRICES TO DEALERS  
ENGINEERING SERVICE BUREAU  
832 Windsor Avenue. Chicago, Ill.

## ASSEMBLY OF MOUNT AND PARTS



It will turn down very easy and quickly. It should be turned down to 1/2-inch in thickness and 2 inches wide. A groove is cut in the side a trifle nearer the top than the bottom to a depth of 1/4 inch. This is to hold the resistance wire.

The resistance wire is the same as that used in electric toasters, etc. A piece 4 1/4 inches may be bought or salvaged from any electric shop's repair box for a few cents. At one end of the element turn one of the spirals to right angles with the other turns thus forming a loop. Bore two 1/2-inch holes in the circular groove in the form 1 inch apart. Put a 6-32 bolt 1/2 inch long, through the loop on the wire and plaster it into one of the holes in the form, allow this to set four hours and then fasten the other end of the wire to the other hole in the same manner.

The shaft is made of an 8-32 bolt, 1 1/2 inches in length. The contact arm is made from a piece of spring brass 3/8 inch in width and 1 1/2 inches in length. A hole is bored at one end to fit over the shaft, and it is held on the shaft by an 8-32 nut. The other end of the contact arm is bent over to make contact with the element.

A strip of sheet brass 1/2 inch wide is bent around the shaft to form a bearing. This bearing is fastened in the form by means of a thin plaster of paris cement. It has been found to make the rheostat more sturdy to extend this bearing through the panel also.

The rheostat is fastened to the panel by means of 6-32 bolts through the rheostat and the panel. A brass strip 1 1/2

inches long and 3/8 inch wide is bored at one end to fit loosely over the shaft. Place a washer on the shaft, then this strip, and the shaft through the rheostat and panel and fasten just tight enough that the shaft will turn smoothly. It is fastened on the front of the panel by means of a washer and an 8-32 nut. The washer and nut will be hidden from view by the knob. The last mentioned brass strip is used for the connection with the shaft and also for a stop for the contact arm.—E. A. Johnstone, Pocatello, Idaho.

### Holding Dials on Shafts

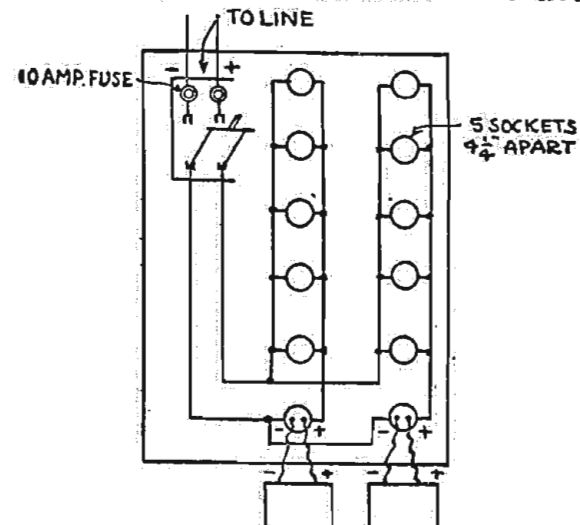
Remove the dial from the shaft and cut a piece of emery paper the proper size to fit in the dial as a bushing. Insert the emery paper so that the abrasive side will face the shaft, then tighten the set screw.—J. Hovey, Sylvan Beach, N. Y.

There are 33 Radiophone stations in the United States broadcasting religious services. The territory covered, it is estimated, represents 65.2 per cent of the total area of the country.

## Diagram Shows Method for Charging Battery

The accompanying hook-up should prove valuable to the many Radio enthusiasts who live in several large cities where D. C. current is available. By screwing a 100 watt 32 candlepower, carbon filament lamp into one of the sockets, allows about 1 amp. of current to pass. If 1/2 amp. is required, use a lamp of one-half the capacity mentioned. This is seldom necessary as 1 amp. is sufficiently close for this kind of work.

More sockets can be added if a greater charging capacity is required. But not



more than 15 can be supplied on a number 14 wire. Number 12 wire will handle 20 amperes of current.

To determine the polarity of the wires, dip the ends into a glass containing a little electrolyte. The one which gives off the bubbles is the negative.—Lloyd W. Symons, Laurium, Mich.

The Radiophone is becoming a serious "menace" to the safety of the herring off the Swedish coast. The fishermen out at sea soon will be told from the Gothenburg Radio central the exact location of the herring schools, which will tend to eliminate wasteful waiting on the part of fishermen and doubtless mean a considerable increase in the catches of herring.

### Spirola BETTER LOUD SPEAKERS \$3.85

TRUE CABINET TYPE, like the finest modern phonographs, with all their beauty and perfect tone. Makes your two-step set a real ENTERTAINER for family and friends. SPIROLA DUPLEX uses any headset. SPIROLA SIMPLEX uses Baldwin or other unit. Either type, black with nicked fittings, \$3.85; mahogany finish with bronzed throat, \$4.85.

At dealers or postpaid (C. O. D. if preferred). Absolutely guaranteed.  
L. H. DONNELL MFG. COMPANY. Dent. D. Box 70. ANN ARBOR, MICH.

## How to build the Remartz Receiver

is told, complete with illustrations and diagrams, in the latest addition to the "Chi-Rad" Handbook-Catalog.

Our Handbook also includes:

1. Technical discussions of standard radio apparatus and equipment.
2. Radio definitions, wireless codes, wire tables, definitions, etc.

Pin this ad to your letter and mail it together with a dime for your copy of the Handbook.

Send for it, today!

**CHICAGO RADIO APPARATUS CO.**

415 South Dearborn Street, Chicago.

R. D.

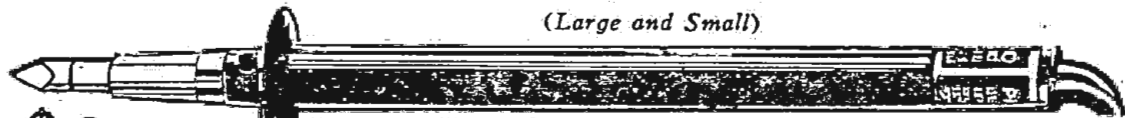
## Delicate Soldering

Both the manufacturers' and amateurs' problems on all fine work are readily solved by the instrument constructed for this particular purpose.

### THE POST SOLDERING IRON

Platinum Heating Unit—Interchangeable Tips—Universal Current

(Large and Small)



\$6

ONE-HALF ACTUAL SIZE  
Awarded Certificate of Excellency, N. Y. Evening Mail Radio Institute  
From your Dealer, or write

POST ELECTRIC COMPANY (Dept. 509), 30 E. 42nd St., New York

## Memo Pad

What I will need to make a good tube set

- A Kellogg No. 501 variocoupler
- A Kellogg No. 605 variable condenser
- A Kellogg No. 2 tube socket
- A Kellogg No. 505 miniature condenser
- A Kellogg No. 503 mounting
- A Kellogg No. 609 radio resistance
- A Kellogg No. 502 dial
- A Kellogg No. 69A head set
- A Kellogg No. 501 rheostat
- A Kellogg switch and switch points
- A and B batteries and cabinet
- A Detector tube

Kellogg radio equipment is recommended for several reasons

First — It is easy to install and simple to operate.

Second — It is built of the highest grade material to give the best possible results.

Third — It is electrically and mechanically correct and will last a life time.

Fourth — It is built by the Kellogg Switchboard and Supply Co., who have manufactured high grade telephone equipment for the past 25 years.

Fifth. — Every Kellogg radio part is GUARANTEED by the manufacturer.

"Use, is the test."

# How to Construct a Variable Grid Leak

## Contact Relieves Wear on Variable Resistance

The large cylinder A is made of wood or some other insulating material with cardboard glued around the periphery. In the center of this cylinder an India ink line B is drawn almost around the block. At one end of the ink line, as shown in the diagram, a metal strip is held down with the screw C which serves also as a stop. The metal strip D is then brought down to the screw E.

Another small cylinder F is made to face the first one. This cylinder is made of brass with an 1/8-inch shoulder turned down on each end. Both of these cylinders are mounted on the back of the panel G. The large cylinder is held against the panel with the shaft of the dial H. The small cylinder is held in place with the screw I. It is adjusted so that it will turn freely.

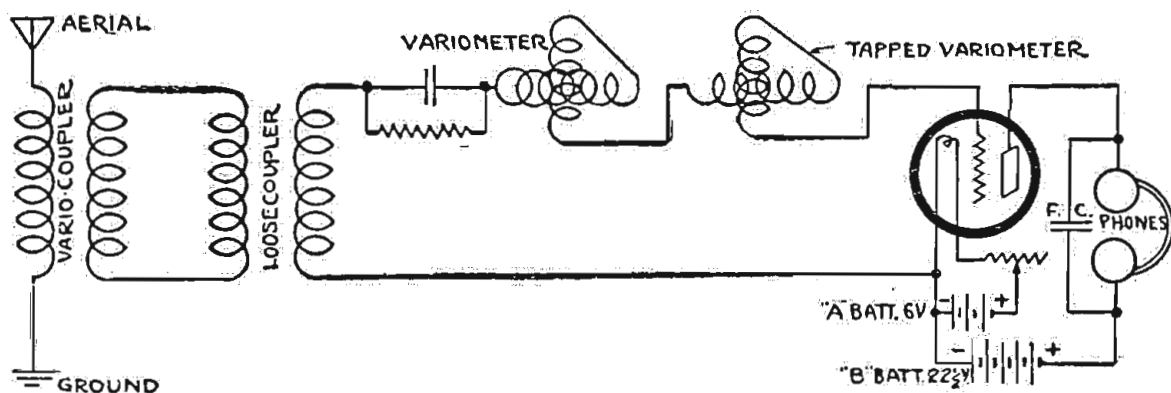
To keep a slight tension on the two rollers a fiber strip is employed with a binding post on each end, J and K. Under each post is a spring brass strip which presses against the rotor screw on each of the cylinders. Between the panel and the rollers are washers L and M.

When the knob is turned to the left the large cylinder rotates with it and the brass roller rotates towards the right as if they were geared together, causing the leak to become smaller.—R. H. Van Buskirk, Detroit, Mich.

## Regenerative Hook-Up

This regenerative hook-up was evolved after considerable experimenting. The variometers are made as follows:

Procure a cardboard tube 3 inches in diameter and wind on 40 turns to make the stator. Either make or purchase two rotors 2 1/2 inches in diameter. Each should

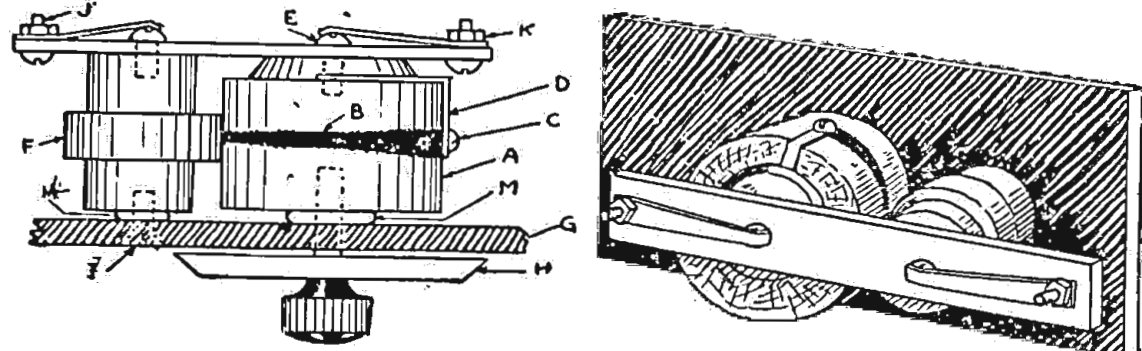


be wound with 40 turns of wire. One of the variometer stators is tapped at every 10 turns. The other stator is untapped.

The loose coupler can be of any ordinary type of from 150 to 2,000 meters. The variocoupler has 80 turns of wire on a 4-inch stator tube. The rotor can be made or purchased and should be wound with 60 turns of wire. Tap the stator of the coupler every 10 turns. Make the connections as shown. There is no variable condenser in the circuit, but a fixed condenser of .001 mfd. capacity is placed across the phones.—Ellsworth E. Myers, Oregon City, Ore.

Use a mat under your storage battery unless you are boss around the house as the acid might get on the rug and ruin it.

## PLAN OF ROTARY GRID LEAK



## Mica Diaphragms

Secure enough mica to make two diaphragms. The mica can be purchased in sheets 3 by 5 inches. A sheet of this size will make two disks. Secure the mica about the same thickness as the metal diaphragms.

Take the metal diaphragms out of the phone and make a circle on the mica, using the metal diaphragm as a templet. In the center of the mica make a hole about 3/16 inch in diameter.

Procure a piece of tin, the thin kind used in cartons, and cut out a piece the size of a dime. Tin one side of this and place it tinned side up on the top of the work bench. Place the mica disk over the tin disk with the small hole in the mica disk over the center of the tin disk. Weight the mica disk down in place so that a soldering iron can be used easily with both hands.

Drop a small ball of solder in the 3/16-inch hole large enough to cover it. After it has cooled off hit it several times with a small riveting hammer to make the contact tighter.

The small tin disk extends below the surface of the mica when in place in the phone. In order to keep this from touch-

ing the magnet poles use a large cardboard or fiber washer the thickness of the small tin disk. Insert a washer in the phone with the mica diaphragm on the small disk side of the diaphragm. If it does not function right heavier or thinner cardboard washers must be used until the proper distance between the magnets and tin disks has been found.

The first night I tried this out I received Havana, Cuba, and Los Angeles, using the phone containing this mica diaphragm and a small portable talking machine horn for a loud speaker with three stages of audio frequency.—Leo C. Krell.

## Paraffin Used in Sets

Paraffin is less used in Radio work than in almost any other branch of electrical work. The beginner who makes his own set would profit by the use of more paraffin. Its insulating properties are well known, especially to those in the telephone industry. It repels moisture, is an excellent insulator, and very inexpensive.

Wooden rotor balls and paper tubes should be boiled in paraffin before winding to prevent shrinkage and to further improve their insulating properties.

## Gives Advice on How Best to Operate Set

Forget everything you ever knew about the art, doubt anything that is told to you, light up your tubes and turn everything that is turnable. You will probably get just as good results as the expert, while they last, but if you want steady, consistent reception, get busy and work for it! No detail is too trivial to overlook. Study the theory of Radio, find out just what each part does when you give the knob a turn to the right or left and why it does it. If you assemble your own set, solder everything tight. Shield your set, not just on the back of the panel, but each separate piece of tuning apparatus, every transformer, and, to make it complete, every tube. Then shield the sides and top of the cabinet. Keep the A and B batteries in perfect condition. Install the aerial high and make connections to the ground as deep and wet as possible.

Place the set on a solid foundation to prevent vibration, then and not until then can you invite your friends in for a given concert and give it to them.—J. Hovey, Sylvan Beach, N. Y.

At the Beach station, San Francisco, better reception is being obtained over tofore when antennae were used. Loop aerials than has been possible here—

## 1000-1500 MILES ON ONE-TUBE - ONE-CONTROL

150-25,000 METERS  
Rheostat, Storage Battery, Variocoupler, Variometer, 3-coil Mounting, Variable Inductance, Taps, Dead End Losses or Radio Frequency, Complete hook-up, cuts, instructions, everything. Price \$1.00. No checks. Nothing left for you to guess about. Build your own Receiver and save 50% or more and get better results. Radio Experimental Lab'y, Box 194F, Berkeley, Cal.

**AGENTS WANTED** for our guaranteed Radio Apparatus. Liberal Commission. We handle all high-grade lines.  
**BADGER RADIO CO.** MILWAUKEE WISCONSIN  
495 E. WATER STREET

**RUSONITE**  
CRYSTAL RECTIFIER  
MULTIPOINT (Patent Pending)  
A Synthetic CRYSTAL DETECTOR sensitive over its entire surface  
Eliminates all detector troubles. Extraordinary clearness and volume. Endorsed by Radio experts and press. Sold in Sealed Packages only. Join the ever increasing Rusonite fans.  
Price, Postpaid, mounted 50c  
Sensitivity guaranteed  
**RUSONITE CATWHISKER**  
14 Karat Gold Multiple Contact Super Sensitive..... 25c  
Order from your dealer or direct from us.  
**RUSONITE PRODUCTS CORP.**  
19 Park Row, N. Y.

**FORMICA**  
A Laminated Phenolic Condensation Product  
SHEETS TUBES RODS  
**RADIO PANELS**  
POLISHED BLACK FINISH  
CUT PERFECTLY SQUARE TO ANY SIZE  
1/32" THICK 1/2¢ PER SQ. INCH  
1/16" THICK 3/4¢ PER SQ. INCH  
3/32" THICK 1¢ PER SQ. INCH  
1/8" THICK 1 1/2¢ PER SQ. INCH  
3/16" THICK 2¢ PER SQ. INCH  
1/4" THICK 2 1/2¢ PER SQ. INCH  
3/8" THICK 4¢ PER SQ. INCH  
1/2" THICK 5 1/4¢ PER SQ. INCH  
SEND FOR COMPLETE PRICE LIST  
PROMPT ATTENTION TO MAIL ORDERS  
DEALERS PRICES ON APPLICATION  
**STARRETT MFG. CO.**  
519 SOUTH GREEN ST. CHICAGO

**ATWATER KENT**  
IMMEDIATE DELIVERY  
Dealers LITERATURE AND DISCOUNTS ON REQUEST  
**HUDSON-ROSS**  
123 W. Madison St. Chicago

**STANDARD APPARATUS**  
AT ATTRACTIVE PRICES. Watch This Column EACH WEEK. It Will Pay You Complete Parts to Build Your Own TUBE SET \$15.00

Shamrock Variocoupler	Socket	Switch lever and switch points
3-inch dial	Grid leak and Grid condenser	23-plate variable condenser
1x12 Bakelite panel	Rubber binding posts	(made by Jern Firth)
Klosner rheostat	12 feet buss bar wire	Complete book of latest circuits

A GUARANTEED 1 1/2 Volt TUBE FREE with ABOVE PARTS

These are carefully constructed of genuine mahogany, hand rubbed. The tops are hinged for easy access to interior. They are made to fit your parlor.

7x10, \$3.35.	7x12, \$3.50	7x4, \$3.75	7x18, \$4.00.	7x24, \$4.50.
---------------	--------------	-------------	---------------	---------------

W. & K., German manufacture, 6000 ohms resistance. Nowhere at any price can you equal the supreme sensitiveness of these phones, and we stand ready to demonstrate this claim to your satisfaction \$5.75

List Price	HEAD SETS	Our Price	List Price	AUDIO TRANSFORMERS	Our Price
\$ 8.00	Brandes-Superior	5.50	\$7.00	Federal	\$5.60
8.00	Dictograph	5.75	7.00	Radio Corp. U. V. 712	5.60
8.00	Federal 2200 Ohms	4.95	6.50	Rasla	5.10
7.50	Stromberg Carlson	4.75	4.50	Thordarson	3.00
6.00	Frost 3000 Ohms	4.25	6.00	Amplex W. D. 12	3.95
6.00	Royalfone	3.75	5.00	General Radio	4.35
5.50	Murdock Type 57	4.10	6.00	Jefferson	5.00
12.00	Western Electric 509W	9.50	7.00	Amertram	5.95
12.00	Baldwin Type C, Master	8.50	5.00	Acme	4.10
6.00	Baldwin Type C, Single	4.00			

**LOUD SPEAKERS**

\$161.00	Western Electric	\$145.00
53.00	Western Electric	50.00
45.00	Magnavox (New Type)	31.50
40.00	Callophone	30.00
20.00	Dictograph	15.00
15.00	Brittania	12.50

**MISCELLANEOUS SPECIALS**

Firth 23-Plate Condenser	1.30	Three Coil Mountings	3.50
Firth Triple Sockets	.90	Two Coil Mountings	2.75
Firth Double Sockets	.70	Single Coil Mountings	.50
Millard Rheostats	.45	180° Variocoupler	2.79
Double Phone Cords	.60	Variometers	2.75
Fada Type Switch Levers	.23	Vernier Rheostats	1.35
Firth Crystal Detectors	1.00	11-Plate Condenser	1.35
Brach Lightning Arresters	1.25	43-Plate Condenser	2.15
Bulldog Phone Plugs	1.00	W. D. 11 Sockets	.30

Full Line of All Standard Sets and Accessories at Greatly Reduced Prices.  
Write for Our Quotations  
All Mail Orders Shipped on same day as received. Send Money Order including Postage  
**STUYVESANT RADIO CORPORATION**  
15 E. 14TH STREET, NEW YORK CITY Bet. 5th Ave. and Union Square

**How to Make a Flewelling Receiver**

**COMPLETE Blue Prints**  
for the construction of a Flewelling Receiving Unit and two step amplifier.  
Instructions for Assembly  
Description of apparatus and accessories and details of tuning.  
**CABINET DIMENSIONS  
PANEL LAYOUTS  
LIST OF PARTS**  
Send only money orders—no checks or stamps. Coins at your own risk.  
Book Department  
**Radio Digest**  
123 W. Madison Street, Chicago, Ill.  
**Only 50¢**

# "How" of Flewelling Super

## Part XI—Inductance vs. Capacity

By E. T. Flewelling

IT IS not a bad idea to branch out a little in our discussion about the Flewelling Circuit. We might, for instance, consider why we have specified 50 and 75-turn coils for the set. While these values were selected as giving the best all around results, yet it will be found that with an antenna or ground system of small capacity, for instance, that we can very profitably use coils of a larger size.

### Coils of a Larger Size

It is suggested that when the set is first tried out, to use neither antenna nor ground. Try at this time to use a 100-turn tickler coil and a 65 or 75-turn tuning coil. The 65-turn coil is easily made by removing 10 turns from a 75-turn coil. You will find such a coil of value many times, even if not used in the Flewelling Super.

In order to use these larger coils successfully, it is better to cut down the

antenna or ground, give reliable reception over a distance of from 100 to 200 miles at night. It is possible to carry the set around in your hand and comfortably listen to nearby local stations.

### Long Distance Receiver

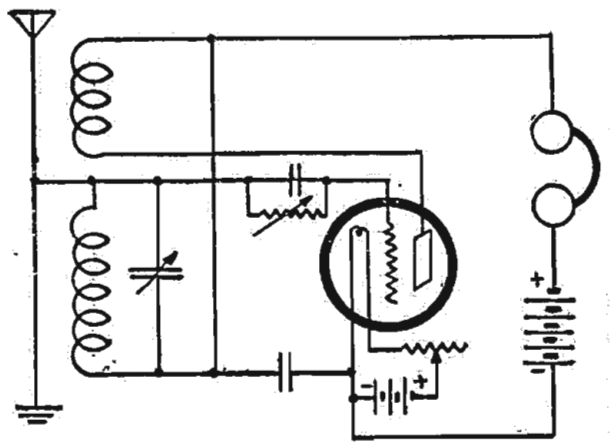
The Flewelling is essentially a long distance receiver. On local stations that are easy to bring in, it is not much superior to a good regenerative receiver, but where the regenerative receiver weakens, because of distance, you will find that the Flewelling will be at its best. This does not mean that an antenna is useless with the set. Best results will always be secured by using a good antenna. An interesting point may be of help here.

The Flewelling will give excellent results when connected to the ground alone or to the antenna alone. Why not, then, connect the antenna and the ground together, and then by connecting them to the set, secure the benefits of both? It really does prove of value to do this, and greatly increased results have been reported by those that are using such a connection.

### Energy Collector

No appreciable results are secured by connecting an energy collector to the bottom or filament side of the tuning inductance; so our connection is always to the grid side of the inductance, as shown in the sketch.

If you find that upon connecting your set to the energy collector (antennae and grounds are energy collectors) that the little whistle stops and the set refuses to work, then you may be sure that you are using a tuning inductance with the wrong number of turns. In such a case simply change this coil until you find the correct value. Then, in tuning, be careful to turn your condenser dial slowly, and carefully adjust the distance between the two coils. Slow, careful adjustment will give much better returns than a quick or rapid manipulation of the control knobs.



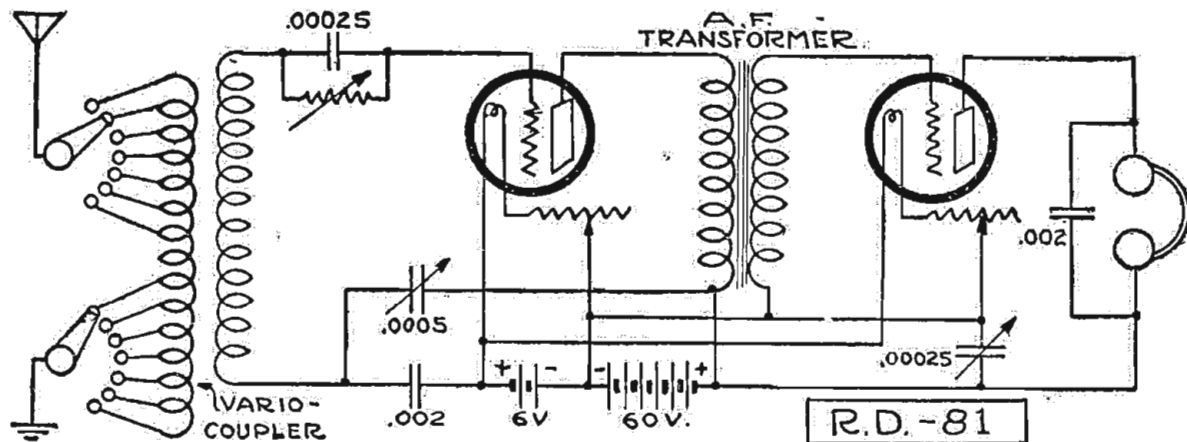
size of the variable condenser from a 23-plate to an 11-plate. This change too, will be found of general value.

### Use More Inductance, Less Capacity

The point that we are trying to bring out is this:

It is of importance in any Radio receiver to use as much inductance and as little capacity as possible. Much better results are obtained in this way, but of course it cannot be carried too far, and the values that we speak of above have been found to be about the limit; that is, a 65 or 75-turn tuning inductance, a 100-turn tickler coil and an 11-plate variable condenser. The values are given for the ordinary honeycomb coil, so that if you wind your own coils on larger diameter tubing, you will have to use a smaller number of turns on, say, a four-inch form, in order to get about the same value that you would obtain on the two-inch honeycomb form. A Flewelling set, using values as given should, without any an-

## DOUBLE REGENERATION IN R.D. 81



THIS rather unusual form of regenerative hook-up has the additional feature of using regeneration, to a certain extent, not only in the plate circuit of the first tube, but also in the plate circuit of the second tube. Its amplification power is exceptionally good, but it requires considerable practice before the skill of the Radiophan is sufficient to get the full benefit of its possibilities.

A variocoupler is used with a double tap switch arrangement on the primary circuit. A condenser can be placed in series, shunt, or omitted, depending upon the conditions under which the set will operate. A variable grid leak is used in order to obtain maximum results on the grid potential. The grid condenser has a capacity of .00025 mfd.

A .002 mfd. blocking condenser is used in the lower side of the secondary circuit. If a 1½-volt tube is used, the dry cell battery should be substituted in place of the 6-volt battery indicated in the diagram. Sixty volts are used in the plate circuits of both tubes. Because of the high plate voltage, naturally a hard or amplifier tube is necessary for both stages.

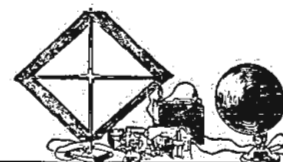
A 23-plate variable condenser is connected in series between the plate circuit of the tube and the grid circuit. This controls the regenerative feed-back and in this way reinforces the grid circuit with all the energy that can possibly be thrown into it. A similar plan with a smaller condenser is followed in the first audio frequency tube where the plate circuit is connected to the grid circuit, again feeding back the plate energy in its secondary or grid circuit.

This method of regeneration makes the grid adjustments rather critical but at the same time takes advantage of every opportunity of reinforcing the grid control in each tube.

## Hear Atlanta On Crystal

We receive programs from Atlanta, Minneapolis, Davenport, Fort Worth, Dallas, Kansas City, St. Louis, Denver on Crystal without batteries. Usual crystal set requires only easy, inexpensive changes. Send stamp for further information or \$1 for copyright drawings and instructions. Everything clearly explained. Satisfaction GUARANTEED. Leon Lambert, 501 South Volusia, Wichita, Kan.

## Operate a Loud Speaker on One Tube



## Erla Reflex Transformers Make This Possible

The entire family listens to broadcasting, with the new Erla Duo-Reflex circuit, the most powerful single-tube circuit ever built. Through a loud speaker, ample tone volume is provided, except for the most distant stations. And, for local reception, a loop aerial is effectively employed.

The cost of this circuit is so modest as to make it available to every American home. Also it is so simple to construct and operate as to present no difficulties for even the most inexperienced individual.

Tuning is extremely sharp and selective, undesired stations being eliminated almost at will. Remarkable as well is the purity and clarity of tone, achieved through perfect modulation, plus the effective damping of parasitic noises.

The heart of this and other guaranteed Erla circuits is the Erla radio frequency transformer. Overcoming the high capacitance of domestic vacuum tubes in unique degree, and with lowest inherent capacitance, it provides unequalled magnification without distortion.

Our bulletin No. 13, giving diagrams and instructions for building the Duo-Reflex circuit may be obtained gratis from leading radio dealers. Or write us direct.

Electrical Research Laboratories  
Dept. A 2515 Michigan Ave., Chicago

# ERLA

Erla sockets stand alone in quality of workmanship and beauty of finish. All parts triply nickle. Polished Radion base. Price each, \$1.

**FLEWELLING**  
ALL PARTS NECESSARY  
DEALERS: ATTRACTIVE DISCOUNTS  
**HUDSON-ROSS**  
123 W. Madison St. Chicago

## REAL RADIO BARGAINS

- VARIOMETERS:**  
Feri (Revolving stator).....\$2.25  
Raysol (Kiln dried parts).....2.50  
Atwater-Kent.....Special Price
- VARIOCOUPERS:**  
Raven (Greensilk wound).....1.55  
Eastern greensilk wound.....1.80  
Queens (180 degree).....2.50  
Moradio (Cotton covered).....2.25  
Moradio (Enameled).....2.00  
Eastern Long Wave coupler (150-3200 meters) 7.25  
Atwater-Kent.....Special Pr.
- CONDENSERS:**  
Regal 43 pl. .001 mfd. Cap.....2.65  
Regal 11 pl. .00025 mfd. Cap.....1.65  
Dubilier condensers, all types and capacities including Variadons, in stock.....Special Price  
American Bell 43 pl. with Vernier.....5.50  
American Bell 23 pl. with Vernier.....4.50  
Malone-Lemmon 23 pl. Vernier.....6.00  
Malone-Lemmon 43 pl. Vernier.....7.00  
Arrow 23 pl. Vernier.....4.25
- RHEOSTATS:**  
Regal (High quality 6 ohm)......85  
Klosner Vernier......75  
Paragon Standard.....1.05  
Framingham......70  
Bradleystats.....1.85  
Roberts (6 ohm standard)......70  
General Radio (Any and all resistances) Special Pr.  
Radio Corp. 2.....Special Pr.  
Fada.....Special Pr.
- POTENTIOMETERS:**  
Radio Corp. PR 536 (200 ohm).....Special Pr.  
General Radio (400 ohm).....Special Pr.  
Atwater-Kent.....Special Pr.  
Framingham (200 ohm).....1.10  
Paragon (200 ohm).....1.60  
Amsco (150 ohm).....1.10  
Bradleyometer, 400 ohms.....3.00
- SOCKETS:**  
Regal (all nickle)......75  
Bell (Moulded Bak. Panel or Base Mounting)......90  
Rameco (Fine quality)......40  
Turney (All metal fine finish)......25  
De Forest (Moulded).....Special Pr.  
General Radio.....Special Pr.  
Radio Corp. (UR 542).....Special Pr.  
Double (Fada).....Special Pr.  
Triple (Fada).....Special Pr.  
WD 11 (Rameco)......40  
WD 11 (Bell Panel or Base Mtg.)......90
- TRANSFORMERS (Audio Freq.):**  
Betts & Betts (13 to 1 Ratio).....5.50  
Amertrans (Best transformer on market, limited supply).....7.00  
Radio Corp. UV 712.....Special Pr.
- TRANSFORMERS (Radio Freq.):**  
Tricoil (of Subway Reception fame).....1.50  
Radio Lab. RT-1 (Limited supply).....3.90  
Murad T-II (Djd standard).....3.80  
Radio Corp. UV 1714.....Special Pr.

- DIALS:**  
Kesco 3½-in. Moulded.....\$0.30  
Kesco 3-in. Moulded......25  
Kesco 2½-in. Moulded......25  
American Hard Rubber 3-in......75  
American Hard Rubber 4-in......85  
Electrose 4-in. Fada Knob......75  
Emaloid 3-in. Unbreakable......35  
Emaloid 2-in. Unbreakable......25
- CABINETS:**  
(Mahogany) **PANELS:** (Gen. Bak.)  
(Knockdown for immediate assembly)  
7x10.....\$3.60 7x10.....\$1.40  
7x12.....3.85 7x12.....1.65  
7x14.....4.15 7x14.....1.95  
7x18.....4.50 7x18.....2.50  
7x24.....5.25 7x24.....3.35
- HEAD TELEPHONES:**  
Baldwin (Single Units) Gen. Type "C".....6.00  
Western Electrics (Type 509 W).....10.00  
Frost (2000 ohm).....5.00  
Brandes Superior (2000 ohm).....6.20  
Telephone connectors for Three pair phones......95
- TUBES:**  
Meyers Hi-Mu (Last Lot).....4.35  
All Standard Tubes in stock at.....Special Pr.  
Murdon ½ Volt Detec. and Amp.....4.75
- BATTERIES ("B" only):**  
Volton 22½ V. Small size......90  
Volton 22½ V. Medium size.....1.14  
Volton 22½ V. Large size.....1.55  
Volton 45 Volt.....1.98
- MISCELLANEOUS:**  
Phonograph Attachments ("v" Shape).....1.25  
Radiophone Adapter (Rubber).....2.00  
Solderette (Soldering iron to attach to standard plug).....1.50  
Single Cct Jacks......25  
Double closed Cct Jacks......35  
Telephone plugs......65  
Telephone plugs (for two phones)......70  
Vernier Dial adjustments......40  
Brach Indoor Lightning Arrester.....1.25  
Argus Lightning Arrester.....1.00  
Bus Bar Wire.....Per ft. .015  
Spaghetti (Any color).....Per lgt. .08  
Reinartz Spider Web Coil.....1.75  
All De Forest DL Coils at.....Special Pr.  
De Forest Triple Coil Mounting.....Special Pr.  
Single Coil Mounting......45  
Double Coil Mounting.....2.25  
Triple Coil Mounting.....3.25
- We also carry in stock at all times all parts for Flewelling, Reinartz, Reflex and Hazeltine Neutrodyne Circuits. Write for prices. Also plans and instruction for completion and successful operation of Armstrong Super-Regenerative Receiver. Parts for this also ready for immediate shipment.

All merchandise guaranteed by both the manufacturer and ourselves. Will be shipped upon receipt of purchase price. Orders of not less than \$5.00 sent prepaid east of the Mississippi River—all others must include postage.

**RADIO & MECHANICAL TRADING CORPORATION**  
23 WARREN STREET, NEW YORK CITY

# How to Construct Good Loud Speaker at Home

## A Design Embracing Moving Coil and Mica Diaphragm

Thomas W. Benson

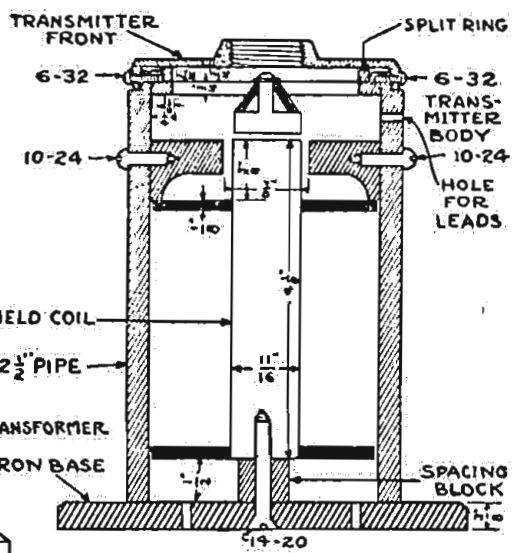
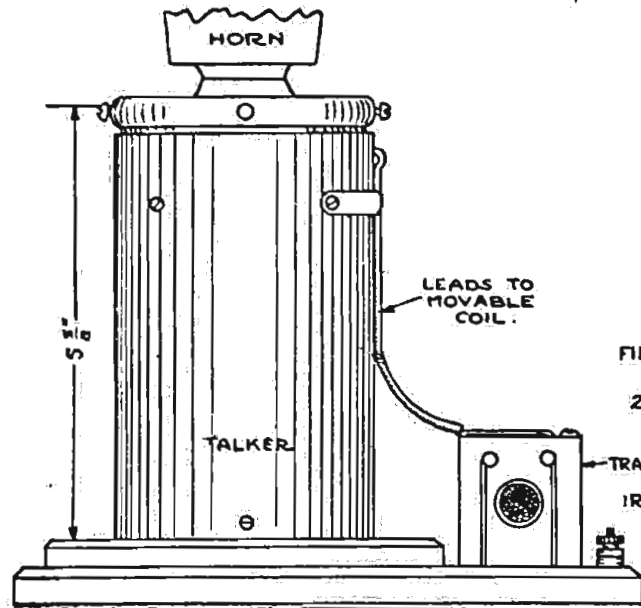
THE POPULARITY of radio entertainments has in a sense created a demand for loud talking receivers to the end that a number of persons may be entertained without the necessity of

magnetic field. The coil being rigidly attached to a mica diaphragm, imparts the motion to the diaphragm and thus to the column of air in the horn, thus producing sound.

down so that the front of the transmitter will fit over the outside of the pipe. To hold the diaphragm rigidly a narrow split ring is made so that when it rests on the diaphragm it will touch the front of the transmitter. Details of this arrangement will be made clear by the illustrations.

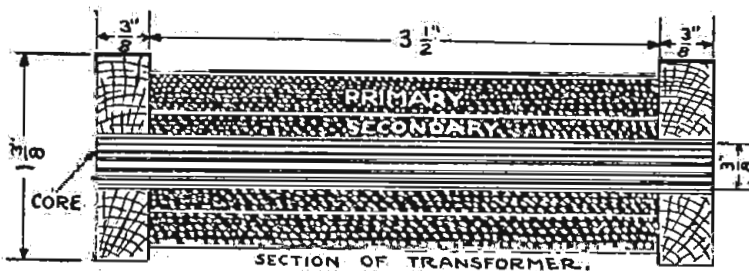
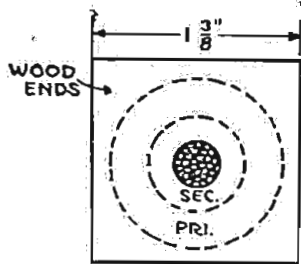
as little solder as possible to sweat the ends together.

The three strips are then bent together and the ends bent so that they will fit around a 2-56 hexagon brass nut to which



### Housing for Mechanism

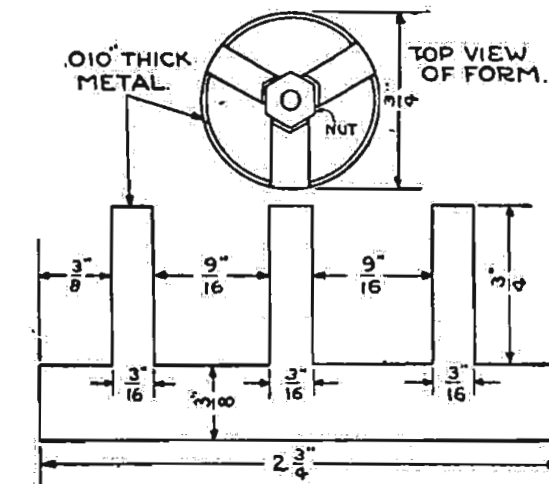
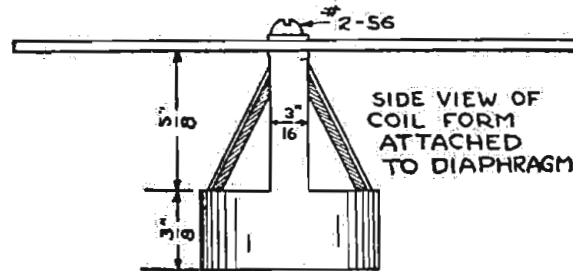
The housing for the mechanism is made from standard 2 1/2-inch wrought iron pipe 5 1/2 inches long. The ends of the pipe should be squared up in a lathe if possible. A disk of soft iron 3/8 inch thick has a



each one wearing a headset. The use of the so-called loud speaker also permits of dancing and exercising, pastimes practically impossible when headsets are used. There are numerous methods for making a gramophone serve as a loud speaker by connecting the headset to the tone arm, but these are at best but makeshifts and render impossible the use of the phonograph as a source of music.

On the other hand, the idea of constructing a loud talker apparently presents many difficulties that seem to discourage the otherwise clever constructor or experimenter. There is but little available data on the subject. Even books purporting to give full details are too indefinite for the average man. However, with a little experimenting and not a little search of the technical press, the loud speaker pictured herewith was built and works very satisfactorily.

The appended data and dimensions are



hole 3/8 inch in diameter drilled in its center and is turned down to fit into the pipe. A recess is cut in one side to make the pole pieces 3/8 inch thick. This disk is slid into the pipe and fastened with its top face 1 inch from one end of the pipe as shown.

### Field Magnet

The field magnet for the speaker is wound on a soft iron core 11/16 inch in diameter and 4 1/4 inches long. Heads cut from fiber are mounted on the core leaving one end of the core project 3/8 inch. After insulating the core with two or three layers of fish paper or heavy waxed paper the winding is put on. This consists of nearly two pounds of Number 20 D. C. C. magnet wire. Eighteen layers of wire are wound on with twenty turns to the layer. This completes the field winding which should then be laid aside, and the housing for the speaker finished.

### Mounting for the Diaphragm

As a mounting for the diaphragm an old telephone transmitter was used. It is usually possible to pick up one such from the repair department of the local telephone company. The inner ring supporting the transmitter diaphragm is turned down a little and the inside of the pipe is turned out so that the ring will fit inside the pipe as shown in the illustration. The outside of the pipe is then turned

given not in the sense that they represent the ideal design for this type of apparatus but simply as the details of a device that works, is easily constructed with limited facilities and is inexpensive.

### Action of Loud Speakers

The various details of the construction are given in the illustrations and are complete enough to serve as working drawings. The loud speaker is of the electro-dynamic type that employs a coil suspended in a dense magnetic field as in the best types of loud talkers. The suspended coil is connected to the output circuits of the vacuum tubes and any variation in current strength resulting from an incoming signal will result in the coil moving back and forth across the

BUYERS OF RADIO MERCHANDISE CAN SEE THE EXHIBITS OF NEARLY A HUNDRED LEADING MANUFACTURERS OF RADIO MERCHANDISE AT THE

## Radio Fair

Don't Miss the Radio Sensation of the World

AT THE

Permanent Radio Fair, Inc. HOTEL IMPERIAL Broadway and 32nd St., New York

**Vario-Coupler**  
\$1.95 or Variometer  
.006 Mica Condensers, 30c; Mica Phone or Grid Condensers, 20c; 23 Plate Condenser, \$1.45; 43 Plate, \$1.70; 3 Plate Vernier, 75c; Bakelite V. T. Socket, 40c. Any size dial with Knob, 25c. Variable Grid Leak, 35c. Panels Drilled Free, 1/8, 1/4, 3/8, 1/2, 5/8, 3/4, 1 in. 2 1/2 per square inch. Every article guaranteed.  
STAR RADIO SUPPLY & MFG. CO. 2061 East 102d, Cleveland, Ohio

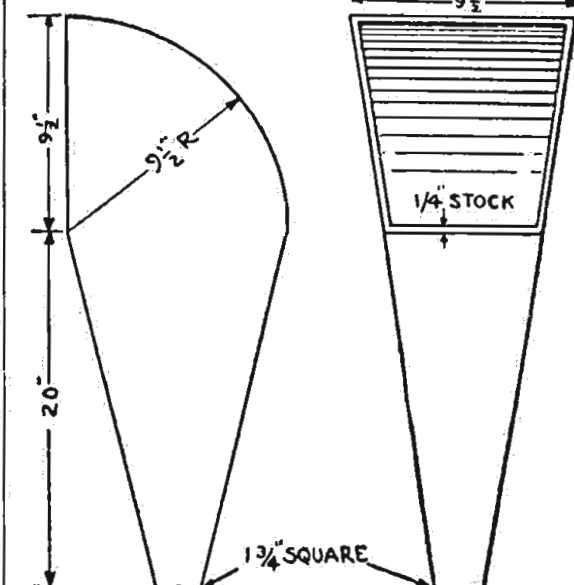
### Base Plate and Assembly

A base plate is necessary for the speaker. In this case one having a base 3/4 inch thick and 5 inches in diameter was used. Holes are drilled through this plate to pass the leads from the field winding and a center hole countersunk to pass the long flathead screw holding the device together. It will be noted that a 1/2-inch square block is placed between the coil and the bottom or base plate. This block is long enough to reach across the pipe and machine screws pass through the side of the pipe into the ends of this block.

It will then be clear that when the coil is inserted in the pipe, the block slipped into place and fastened with the screws into the ends of the block, the unit can be assembled with the long screw up through the base into a solid unit. A hole 1/4 inch in diameter is drilled in the side of the pipe above the pole pieces to pass the leads to the small moving coil. This hole should be bushed with a short length of soft rubber tubing glued into place.

### Moving Coil Construction

The moving coil will be next to receive attention. Details of its construction are



they are soldered. This is a rather delicate job and care should be taken to do it right. The top of the nut should be close to 1 inch from the bottom of the form, filing the nut if necessary and being careful not to get solder into the threads of the nut. The threads may be filled with clay while soldering to protect them.

A thin strip of waxed paper is then glued around the form and the winding started. Leaving a long end of the wire (Continued on page 16)

given in the illustration. From .010 inch thick brass or copper a piece is cut as shown. This is wrapped snugly around a mandrel 3/4-inch in diameter and the 1/2-inch overlap on the ends is soldered, using

STOP THAT NOISE!  
SAVES YOUR TUBES  
**AMPERITE**  
AUTOMATIC FILAMENT CURRENT ADJUSTER  
EXPELS ALL NOISY RHEOSTATS  
TUBE TROUBLES  
RADIALL COMPANY  
99 WARREN STREET NEW YORK \$1.10 WITH MOUNTING

## "MAKE PERFECTION YOUR SELECTION"

We Carry Only STANDARD Advertised Radio Equipment. Every Product Sold on a MONEY BACK GUARANTEE.

FREE A \$1.25 VOLTMETER OR AMMETER GIVEN WITH EACH PURCHASE OF \$5. OR OVER FREE

KLOSNER VERNIER RHEOSTAT, SQUARE SHAFT.....	75c
CUTTING & WASHINGTON REGENERATIVE 3 TUBE SET WILL RECEIVE 3000 MILES. LIST \$125.	\$59.50
SPECIAL.....	
MAGNAVOX LOUD SPEAKER, NEW TYPE R. 3.....	\$28.75
DICTOGRAPH PHONES, 3000 OHMS; NONE BETTER MADE. LIST \$8.00.....	\$5.95

VACUUM TUBE SETS—Fully Assembled		FILAMENT RHEOSTATS	
List Price	Our Price	List Price	Our Price
Tuska Regenerative one-tube set—Armstrong circuit.....	\$50.00	Porcelain Rheostat—DeForest Type, 6 Ohms, 1 1/2 Amperes.....	\$1.20
Cutting and Washington Regenerative 3 tube set will receive over 2,000 miles—Armstrong circuit.....	125.00	Moulded Rheostats.....	1.00
<b>LOUD SPEAKERS</b>		Klesner Vernier Rheostats.....	1.50
Bristol Loud Speaker.....	22.50	Framingham Vernier Rheostat.....	1.50
Pathe Loud Speaker. Made by the well known Pathe Phonograph Co.	22.00	Amsco Potentiometers—360 Ohms Resistance.....	1.75
Woodhorn Loud Speaker—for perfect reception.....	7.50	<b>JACKS</b>	
Magnavox Loud Speaker, newest model.....	45.00	Firco Jacks, Open Circuit.....	.70
<b>HEAD SETS</b>		Firco Jacks, Closed Circuit.....	.85
Potter Precision Phones—2200 Ohms.....	9.00	<b>PLUGS</b>	
Nathaniel Baldwin Phones—Type C.....	12.00	Flat Plugs.....	1.00
Baldwin Single Phones—Type C.....	6.00	Round Plugs—Bulldog Grip.....	1.25
N. & K. Phones, 6000 Ohms, made in Germany. The best made.....	16.00	4 Way Plug.....	1.50
<b>TRANSFORMERS</b>		<b>DIAL AND KNOB</b>	
Thorjardson Audio Frequency Transformer.....	4.50	3 inch Composition Dial and Knob.....	.75
W. D. 12' Audio Frequency Transformer.....	5.00	3 1/2 inch Unbreakable Dial and Knob—1/4 inch hole.....	1.00
Acme Transformer—Type A-2S.....	5.00	4 inch Composition Dial and Knob—1/4 inch hole.....	1.25
<b>VARIABLE CONDENSERS</b>		Knob—Extra fine quality.....	.75
3 Plate Vernier Condenser, moulded ends.....	1.50	<b>V. T. SOCKETS</b>	
11 Plate Condenser, moulded ends, .00025.....	2.50	Single Sockets—Brass Tubing.....	1.00
23 Plate Condenser, moulded ends, .0005.....	3.00	W. D. 11 Socket—extra fine quality.....	1.00
43 Plate Condenser, moulded ends, .001.....	4.00	<b>VARIOMETERS</b>	
Franco 23 Plate Variable Condenser with Vernier.....	6.60	Fisher Mahogany—150 to 500 meters.....	5.00
Franco 43 Plate Variable Condenser with Vernier.....	7.70	Franco Mahogany.....	5.00
<b>CABINETS</b>		Pathe Moulded.....	6.00
Mahogany Cabinet—hinged top 7x10.....	2.35	Raven Red Moulded Bakelite Variometers—Silk Wound.....	7.00
Mahogany Cabinet—hinged top 7x18.....	2.95	Columbia Black Moulded Bakelite Variometers—Silk Wound.....	5.50
Mahogany Cabinet—hinged top 7x24.....	3.45	Eagle Red Moulded Bakelite—the best made.....	8.00
<b>PANELS</b>		<b>VARIOCOUPLER</b>	
Hard Rubber Panels, unbreakable, 7x10.....	.90	Franco Mahogany—Silk Wound Fibre Tubing.....	5.00
Hard Rubber Panels, unbreakable, 7x18.....	1.60	Fisher Mahogany Variocouplers.....	5.00
Hard Rubber Panels, unbreakable, 7x24.....	2.30	Fisher 180° Variocoupler.....	5.00
Genuine Formica Panels—Cut any size at 2 cents per square inch. All Panels 3/16 inch thick.		Eagle Moulded Red Bakelite—the best made.....	8.50
Silk Wound ALL WAVE Coupler.....	9.00	Franco 180° Variocoupler Bakelite Silk Wound.....	5.00
Silk Wound BAKELITE Variometer Tuner.....	12.00	<b>HONEYCOMB COIL MOUNTINGS</b>	
A. B. C. Make—Trio Best Made.....	7.50	Triple Mountings with leads—screw adjustment.....	5.00
<b>PHONE CONDENSERS</b>		Double Mountings with leads—screw adjustment.....	3.50
All Capacities Fixed Condensers, grid leaks, etc.....	.30	Single Mountings.....	.55
Freshman Variable Grid Leak.....	.75	<b>BATTERIES</b>	
Freshman Variable Grid Leak and Condenser combined.....	1.00	EXIDE "A" Storage Battery, 6 V., 40 Amperes Hours, Type 3 LXL5.....	17.85
		EXIDE "A" Storage Battery, 6 V., 80 Amperes Hours, Type 3 LXL9.....	23.10
		EXIDE "A" Storage Battery, 6 V., 120 Amp. Hours, Type 4 LXL-13.....	31.50
		Bright Star "B" Battery, 2 1/2 V.....	1.75
		Bright Star "B" Battery.....	3.00
		Bright Star "B" Battery.....	5.00
		2 1/2 Volts, Variable, 5 Positive terminals.....	1.75
		Bus Bar Wire (2 ft. lengths).....	.03

PERFECTION PAYS PARCEL POST  
PERFECTION RADIO CORPORATION, 121 West 23rd St., NEW YORK CITY  
STORES ALSO AT 59 CORTLAND ST. AND 128 CHAMBERS ST., NEW YORK CITY

A. B. C. LESSONS

(Continued from page 11)

brilliance by turning the rheostat to the right, the antenna circuit is tuned by means of the coupler primary L-1 and the antenna condenser C-1. The potentiometer P is then adjusted until all noises have disappeared. Finally the tuning condenser C-2 and the coupler secondary L-2 are adjusted until the desired signals or music are heard in the phones. In the meantime, of course, it will constantly be necessary to make slight readjustments of some of the various controls in order to bring in the signals with maximum clearness.

Principles of the Reflex Circuit

The underlying principles upon which this reflex circuit operates are these. After the tuning circuit is in resonance with the incoming oscillations, the Radio frequency potential variations set up across the condenser C-2 are impressed upon the grid and filament of the amplifier tube T. In order that the secondary of the transformer AT, which is also in this circuit, cannot choke these high frequency pulsations, it is shunted by the by-pass condenser C-3.

In the tube the oscillations are amplified and relayed to the output circuit in which are the primary of the Radio frequency transformer RT and the head phones PH. But since the windings of the phones have a high inductance and would thus choke the high frequency pulsations, they must also be shunted by a by-pass condenser so as to provide an easy path. In the secondary circuit of the Radio frequency transformer the induced oscillations are rectified by the crystal detector, and finally sent into the primary of the audio frequency transformer AT. This also is shunted by a fixed condenser which serves as a low resistance by-pass.

Through Amplifier Tube Second Time

In the transformer AT the oscillations are stepped up to a higher pressure and again sent through the closed oscillation circuit and into the amplifier tube for a second time. But this time they enter the tube at an audio frequency. In the tube they are again amplified and relayed to the output circuit. The transformer primary RT, however, offers no opposition to these audio frequency oscillations, and hence they are free to flow and operate the telephone receivers. None will this time pass through the condenser C-4, because the phones form a path of lower impedance than does the condenser, and an electric current we know will always take the path of least resistance.

It is evident that in several parts of the circuit both Radio frequency and audio frequency oscillations flow at the same time, but these two groups are entirely independent and hence will in no way interfere with each other.

The potentiometer P is a very important factor, but by means of it the necessary stabilizing potential is impressed on the grid, and the tube is thus prevented from oscillating.

Operation of Reflex Circuit

The successful operation of a reflex circuit depends to a great extent upon the arrangement of the various parts. The transformers and other apparatus should be so arranged that all connecting leads will be as short as possible, and so that all inductive interference will be minimized. It is advisable to use parts only of the best material and workmanship, for inferior apparatus may cause endless trouble and bother.

In the two-tube reflex circuit one tube is used as an amplifier and the second tube as a detector. The principles of operation are very similar to the single tube circuit, except that instead of a crystal detector a tube detector is used. The amplifier tube should be of the 201 or hard type, while the detector should be a 200 or soft tube.

Two-Tube Reflex Circuit

The circuit arrangement of such a two-tube reflex circuit is illustrated in Figure 56. As in the previous case, the receiver is tuned to the frequency of the incoming waves by means of the series condenser C-1 and the coupler primary L-1. The circuit is then thrown into resonance by adjusting the tuning condenser C-2 and the coupler secondary L-2. In order to provide a low impedance path for the Radio frequency oscillations in the grid-filament circuit, the secondary of the transformer AT is shunted by a fixed condenser. The value of this condenser will depend to a great extent upon the transformer used, and the correct value needed can be determined best by experiment.

From the output circuit of the amplifier tube the oscillations enter the input circuit of the detector tube through the Radio frequency transformer RT. The phones which are in series with the primary of this transformer are again shunted by a by-pass condenser in order to reduce the high frequency impedance. From the output circuit of the detector tube, the audio frequency oscillations are again fed back into the amplifier tube through audio frequency transformer AT. The amplifier tube thus at the same time acts as an amplifier both for the Radio frequency and audio frequency oscillations. But, as was stated before, these two groups act entirely independent and do not interfere with each other.

A very important adjustment, it must be remembered, is the potentiometer P

which controls the stabilizing potential on the grid of the amplifier tube.

A Three-Tube Reflex Circuit

A very desirable three-tube reflex circuit is illustrated in Figure 57. Here we have employed two amplifier tubes and a detector tube. The entire circuit is thus equivalent to a five-tube set. The incoming oscillations, after being received through the tuner, are passed through the first two tubes and here undergo amplification at a Radio frequency. They then enter the detector tube where they are rectified and reduced to an audio frequency. Finally these audio frequency pulsations are again sent through the two amplifier tubes and again undergo amplification, but this time at an audio frequency. The three tubes thus perform the same functions as are ordinarily accomplished by means of five tubes. It is due to this economy in the number of tubes required that has rapidly brought the reflex circuit into such great favor. The details of operation of the circuit illustrated in Figure 57 are very similar to those given for the previous circuits and hence need not be reviewed again at this time.

It will be noticed that between the first and second amplifier tubes the Radio and audio-frequency transformers are connected in series. This is permissible and the operation is satisfactory for the following reason. The inductance of the primary and secondary of the Radio frequency transformer is sufficiently low so as not to offer any serious opposition to the passage of the audio frequency pulsations coming from the plate circuit of the detector tube. Similarly the distributed capacity existing between the windings of the secondary of the audio frequency transformer is sufficient to permit the passage of the Radio frequency pulsations without any serious opposition. Across the primary of the audio frequency transformer, however, it is necessary to shunt a by-pass condenser in order to provide a path of low impedance for the high frequency pulsations. Likewise the phones must be shunted by a similar condenser. A capacity of .002 mfd. will generally be found quite suitable for these by-pass condensers, but since different makes of transformers have somewhat different characteristics, condensers of different capacities should be tried out until the best results are secured. As with the previous circuits, the potentiometer should be remembered as a very important element in the tuning process.

Another Two-Tube Reflex

The three-tube reflex circuit just described can readily be converted into a two-tube circuit which is equivalent to an ordinary five-tube circuit by replacing the detector tube with a crystal detector. It is true that with a crystal detector, although a better quality of rectification is secured, considerable signal strength is lost, and it is for this reason that it is more advisable to employ a tube instead of a crystal where tone volume is sought.

It is never advisable to employ more than two stages of audio-frequency amplification with a reflex circuit, for otherwise the resulting distortion will be too great, and the quality of the tones received will be very inferior.

In general, however, a reflex circuit, if properly arranged and constructed of good quality apparatus, will give surprisingly good results and is well worth being tried out by the person in search of a new circuit or experiment with.

Chapter Seventeen

Chapter seventeen, which will appear next week and will be the last article of the A-B-C's of Radio, will be devoted to the subject of Radio storage batteries—their operation, construction, selection, and care.

With a variocoupler, two variometers and a couple of variable condensers, most any kind of hook-up can be experimented with when the set is not in a cabinet.

A 25-turn inductance has been satisfactory as a loading coil for the short-wave regenerative sets in order to pick up NAA on 710 meters.

RITTER GRAND \$2.50 CRYSTAL SET



The best set for beginners or others desiring a real good set for little money. Tunes up to 600 meters; can receive up to 50 miles radius under normal conditions. Has received 100% ratings from Technical departments of many publications. Sold by reliable dealers, or sent direct. RITTER RADIO CORP. 230 Canal Street, New York. Dealers write for details.

HOW TO MAKE SPEAKER

(Continued from page 15)

for a lead, 360 turns of Number 40 enameled wire are wound on the form in as even layers as possible, fastening the wire in place with liquid collodion. A coating of this substance should be applied to the entire coil, after it is wound, to hold the wires firmly in place. The leads are run halfway up two legs of the spider and tied with fine silk thread fastening finally with a few drops of collodion. Winding on a nail the leads can then be coiled into a small, close spiral.

Making the Diaphragm

The diaphragm is cut from a clear sheet of mica .004 inch thick and a small hole is punched in the exact center. The coil is then attached to the diaphragm by a short 2-56 brass machine screw. Before assembling the speaker it is well to construct the transformer and wire it into place.

Reason for Transformer

A transformer is necessary with this device for the following reason. It is well known that the resistance of the output circuit of a vacuum tube should approach that of the plate to filament resistance of the tube itself. This implies the use of a 2000 or 3000-ohm headset. In our case were we to connect the movable coil to the plate circuit of the tube it would have to be of that resistance, which, to say the least, would mean a bulky coil.

The disadvantage of a large movable coil lies in the increased inertia of the cell and diaphragm from the additional weight and that the air gap would be longer, requiring a larger field coil and heavier currents to force the same number of magnetic lines of force across the gap. Therefore a transformer is used having a primary with a high resistance to be connected into the tube circuit and a low resistance secondary to match the low resistance of the movable coil which in this case is fifty ohms.

Constructing the Transformer

In constructing this transformer use was made of an old telephone coil of the dimensions shown in the illustration. A coil of this size can be readily made if an old telephone coil is not available. The windings are all taken from the coil. For the secondary winding there will be required 225 feet of Number 38 S. C. C. magnet wire wound into smooth layers and with leads brought out at one end of the coil.

Wrap two or three layers of paraffined paper over the secondary and wind on the primary. For this winding an old 1000-ohm ringer was obtained and wire wound onto the transformer to form the primary winding. These ringers can be bought very cheaply and serve the purpose nicely. Leads from the primary are likewise brought out to terminals on the coil.

Mounting the Loud Speaker

The speaker proper and the transformer are mounted on an oval wood base 6 inches wide and 8 inches long. Two wires run direct from the secondary of the transformer up the side of the talker and through the bushed hole in the talker shell. These should be fairly heavy wires, say Number 20, enclosed in soft rubber tubing clipped to the side of the talker shell with a strap held under the screws fastening the outer pole piece in place. The ends of the wires are bared inside the

shell and the fine wires leading from the movable coil are soldered to them.

Then the diaphragm can be dropped into place. The split ring is placed on top of the diaphragm and last, the cover is put on. The cover is held firmly in place, holes are drilled through the outer edge as shown, and 6-32 screws are tapped into place. This holds the cover in place. Terminals are arranged on the base to connect to the field coil of the talker and to the primary of the transformer.

Making the Horn

The horn can be purchased or made from thin wood as in the one described. Dimensions are given for the horn, although they may be changed to suit the constructor's taste. A brass transmitter mouthpiece is cut off and inserted into the throat of the horn, fastening it with machine screws. This mouthpiece screws into the transmitter face and holds the horn securely.

It is important that the moving coil should not touch the pole pieces. This can be detected by pressing lightly on the diaphragm with the finger. The friction between the coil and pole pieces, if present, can be easily felt. If the device is assembled carefully, being sure that the center pole piece is in the center of the hole and that the coil is directly below the center of the diaphragm, no trouble will be encountered.

Battery Connections

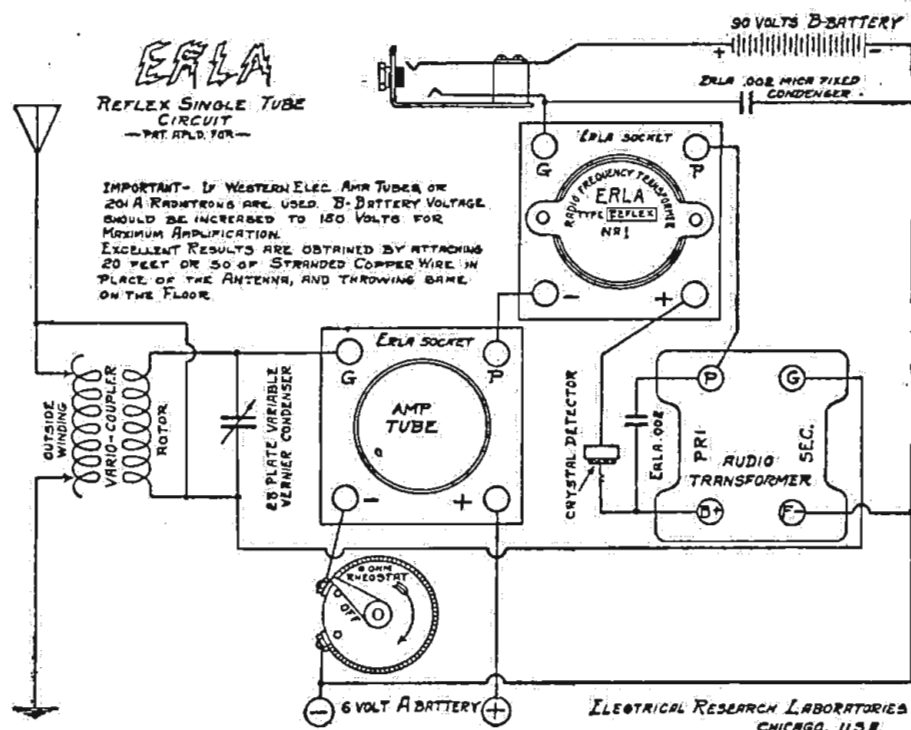
The field coil is connected to a 6-volt storage battery and will draw about 1 ampere. No resistance is necessary in the circuit. The primary winding of the transformer is connected into the circuit in place of the phones by means of a plug or other switching arrangement.

This device will be found to function entirely satisfactorily when properly constructed and is well worth the trouble and expense of construction. The music is clear and free from metallic sounds and with two stages of audio frequency amplification quite loud. It would appear that slightly louder signals might be obtained if the resistance of the transformer primary was wound to 2000 ohms, but since the device is working up to expectations the change has never been made.

An amateur should not expect too much from a cheap, ready-made set.

LOUD SPEAKER FREE. The wonderful SHELTON LOUD SPEAKER with every original NATH. 8 1/2" High - Beautiful Rubberized Finish. BALDWIN Type C Headset Complete. I PERSONALLY test every pair of phones to GIVE YOU a headset that has no equal. YOU CAN USE HEADSET IN REGULAR WAY ALSO. My price on these special selected \$12.00. Phones is, postpaid. Cash with Order or C. O. D. WALTER SCOTT, 10 St. Lukes Place, Montclair, N. J.

SINGLE TUBE REFLEX



ERLA REFLEX TRANSFORMER

MAKE IT POSSIBLE TO OPERATE A LOUD SPEAKER ON A SINGLE TUBE

DEALERS: SEND FOR BULLETIN 13 WITH OUR COMPLETE CATALOGUE AND DISCOUNTS

WHOLESALE ONLY

HUDSON-ROSS 123 W. Madison St. Chicago

PHONE RANDOLPH 2 1 0 0



# Practical, Easily Made Single Tube Reflex Set

## Part I—Circuit and Panel Layout

By H. J. Marx

ALTHOUGH much is being published about reflex circuits, it is quite evident that most of the things said are but a rewrite of previous material. Multi-stage reflex circuits are rather difficult to balance, and considerable experimental work must be carried through before such can be put on a sound, practical basis for amateur use. The greatest percentage of Radiophans have but little patience to experiment with a complicated circuit in order to develop its working efficiency. For this reason the fan is advised to start low with reflex circuits and after working for a time, more thought can be placed towards building multi-tube sets. Unfortunately, after a short period of Radio reception the new fan begins to dream about one of the nine-tube outfits with an elaborate switchboard control, all the developments of circuits incorporated, and a world-wide receiving range. Possibly the only check rein on his plans is

- LIST OF PARTS**
- 1 Cabinet
  - 1 Panel 7x9 1/2 Inches
  - 1 Variocoupler
  - 2 Inductance Switches
  - 1 Vernier Variable Condenser (.0005 Mfd.)
  - 1 Tube Socket
  - 1 Amplifier Tube
  - 1 Rheostat
  - 1 Crystal Detector
  - 1 R. F. Transformer (Reflex Type)
  - 1 A. F. Transformer
  - 2 Fixed Condensers (.002 Mfd.)
  - 1 Open Circuit Jack
  - 6 Binding Posts
  - 25 Ft. Tinned Wire

the immediate cost, and the least thought of is the circuit to be used. These are the fans who are always writing for more circuit. The more apparatus required the greater will be their delight. For the sake of the fellow who would like to do a little distance work with a simple circuit, without incurring unnecessary expense in purchasing apparatus the following single tube reflex panel is recommended.

**The Single Tube Reflex Circuit**  
The hook-up diagram is shown in Figure 1. A variocoupler is used for the tuning unit. The primary circuit is tuned by means of a double set of taps for both rough and fine adjustment. The secondary is tuned by means of a variable condenser shunted across the rotor. Six volts are required for the A battery inasmuch as 1 1/2-volt tubes are not always efficient in reflex circuits. The plate voltage should be about ninety, but if 201-A, VT-2 or 216-A tubes are used, the voltage can be

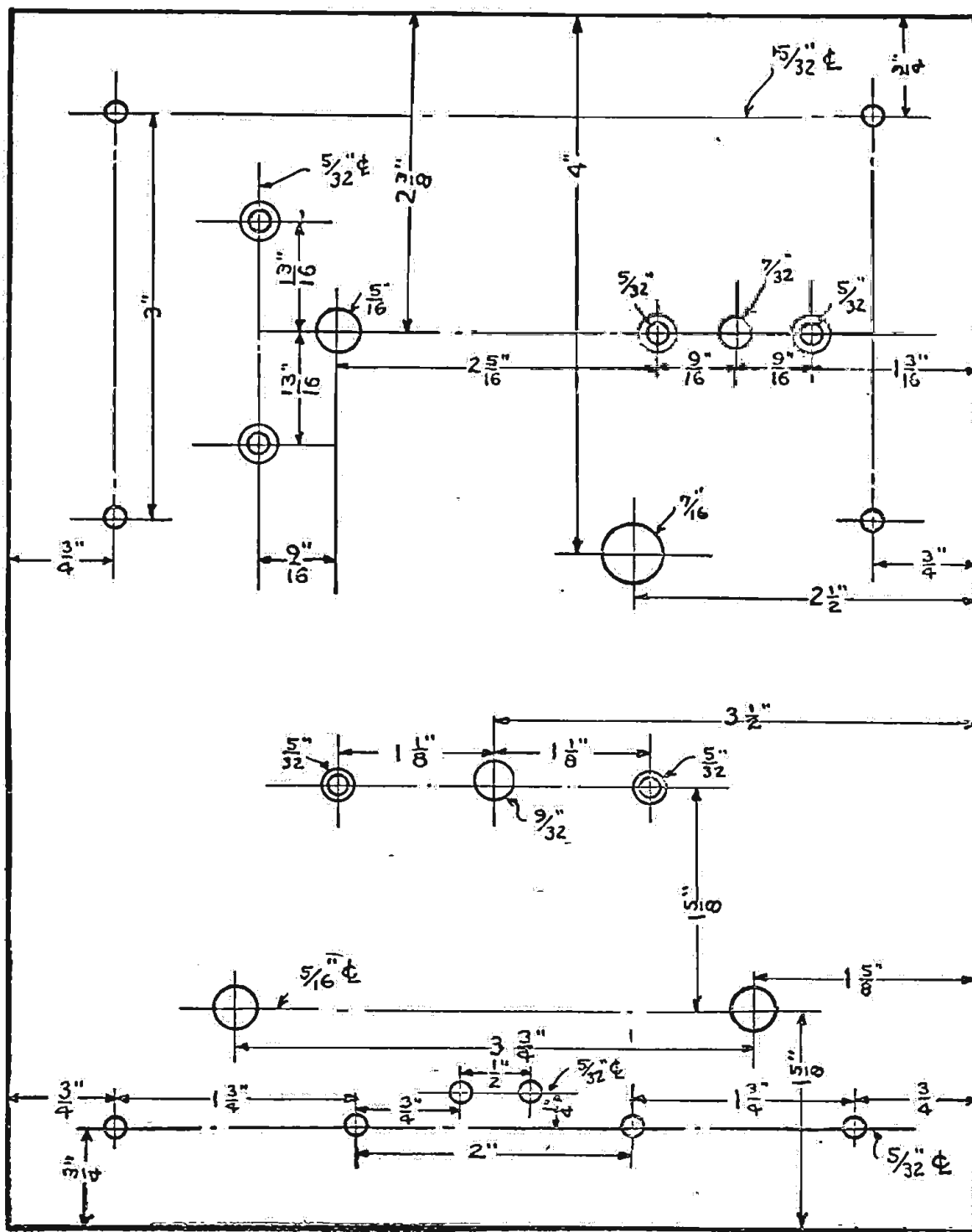


Figure 2

action of the phone impedance on the Radio frequency oscillations.

**Apparatus Required**  
As was said, the variocoupler used in the original set has two sets of taps for both rough and fine adjustment. Rather

If a UV-201, VT-2 or 216-A tube is used, the usual form of 6-ohm rheostat is required, but with 201-A tubes it is necessary to use a 25-ohm rheostat for proper control of the filament current.

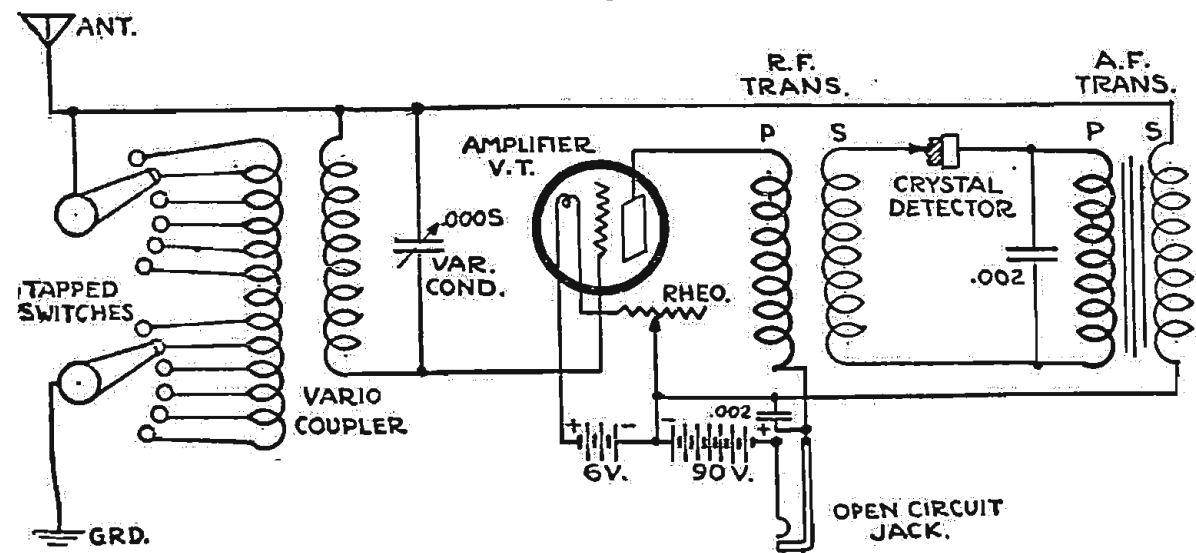


Figure 1

increased considerably. In this way the volume is improved.

The primary of the audio frequency transformer is shunted with a .002 mfd. fixed condenser which acts as a Radio frequency by-pass. Likewise the phones and the B battery are by-passed with a fixed condenser in order to avoid the choking

than put the usual form of contact points and lever switches on the panel, the form of inductance switches with the contact points assembled on the unit in the rear of the panel, were used.

The variable condenser should be of the vernier type for selectivity in tuning. No potentiometer is required in this circuit.

The panel required can be either formica, hard rubber, or any other good panel stock. The dimensions are 7 by 9 by 1/8 inches. The cabinet should be constructed to suit oneself. The one described for the Flewelling set will also serve here.

**Panel Layout**

The layout of the panel for the mounting of the apparatus is given in Figure 2. Part two of the article will show a view of the rear of the set with the apparatus in position.

The two 5/32-inch holes in the left upper side are for the antenna and ground binding posts. The two in the right upper side are for the phones or loud speaker if it is desired rather than plugging in on the jack. The four holes along the lower edge are for the battery connections. Reading from left to right these should be A-, A+, B-, and B+. No holes are indicated for fastening the panel to the set, as these will depend on the cabinet construction employed by the builder.

The two 5/16-inch holes, one in each of the lower corners, are for mounting the inductance switches on the panel. The two 5/32-inch holes between the latter two are for the crystal detector mounting.

The variable condenser is mounted in the upper left corner and the rheostat in the upper right corner. The large 7/16-inch hole is for the jack. The variocoupler is mounted in the center of the panel.

Variations in the make and type of apparatus used may necessitate alterations in the mounting holes. The shaft locations in most cases can be kept as indicated. In the set the main purpose in mind was simplicity, compactness and reasonable cost of construction.

The second article, describing the completion of the single tube reflex set, will appear next issue.

### REAL RADIO VALUES!!! SPECIAL FOR 2 WEEKS ONLY

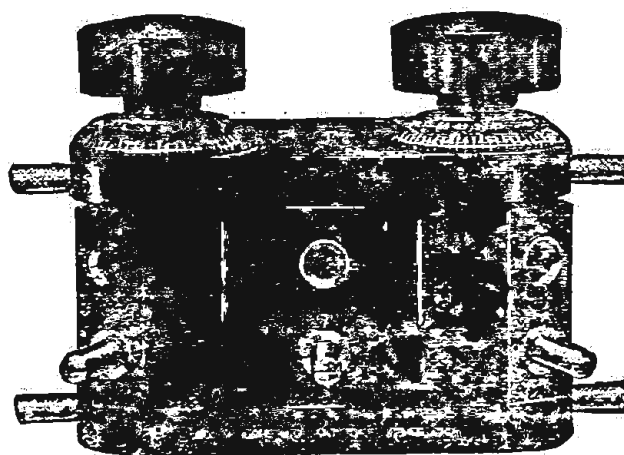
- \$5.00 Ames Audio Transformers, 4-1 ..... \$2.95
- 5.00 Acme Transformers ..... \$3.45
- 8.00 4000 Ohm Phone with Headband Plug..... \$2.95
- 2.00 60 Turn Tapped Coil for new Greene Circuit..... 35c
- 9.00 Potter Phones ..... \$4.50
- 15.00 Sorsinc Tunits ..... \$6.75

Bakelite Panel..1 1/2 per sq. inch  
Every Item Guaranteed Perfect and Original  
**WILLIAMSBURG RADIO SUPPLY CO., INC.**  
801 Flushing Ave. Brooklyn, N. Y.  
Stagg 1707

### BEST RADIO BARGAINS

- \$132.50 Westinghouse R. C. Now ..... \$79.00
  - 165.00 K. C. Detector and 2-step Amplifier now... 35.00
  - 7.50 Stromberg Carlson 2A Phones now ..... 3.89
  - 4.00 Stromberg Carlson Single Phone now..... 1.00
  - 8.00 Federal 2200 Ohms Phones now ..... 4.98
  - 20.00 Dictograph Loud Speaker now..... 12.49
  - 6.50 Cunningham 301 Tubes now ..... 5.25
- Send Money Order. All Goods Guaranteed  
Wils-n's Radio and Electrical Shop  
Corner 3rd & Pike St., Seattle, Wash.

### FLEWELLING RECOMMENDS



### CROWN Triple Coil Mountings

- as being especially adapted for his circuit.
- Used also by many manufacturers as standard equipment on sets.
- A Few of Its Many Features**
1. Special Locking Device to keep the coil in place, thus preventing it from being thrown out of adjustment.
  2. Special Adjustable Bearing feature.
  3. Specially constructed Calibrated Dial, showing the stations tuned. Can be mounted inside of cabinet as well as outside.
  4. Positive Connections on rear of blocks.
  5. Complete with Flexible Leads.

LIST PRICE **\$5.00**

To be sure of the best results, you must equip your set with Crown Coil Mountings. Manufactured under ideal conditions, they are scientifically correct, mechanically perfect and ruggedly constructed.

At your dealers—otherwise postpaid on receipt of purchase price

WRITE FOR FREE CIRCULAR AND CATALOGUE

**Crown Radio M'fg. Corp.**

78 FIFTH AVENUE

NEW YORK

### THE ARTHUR PUDLIN VARIABLE HIGH RESISTANCE

Especially designed adjustable Grid Leak to be used in critical circuits where adjustment depends upon an accurate leak, endorsed by E. T. Flewelling and other leading radio engineers of the country.

1/10—5 Megohms.....Price 75c  
With .00025 Condenser.....\$1.00

For sale at all dealers or Mail Money Order

**ARTHUR PUDLIN ENGINEERING CO.**

329 EAST 29TH STREET

NEW YORK

The Reader's View

Use of Telephone Batteries

V. H. of Geneseo, Ill., in question and answer No. 2209 of March 17th, Radio Digest, in criticising your statement in regard to plate voltage said: "Do not use ignition or telephone batteries for the construction of B batteries on account of the High Amperage."

How does he get that way? I can't see it, as my idea of it is that the resistance of the circuit will take care of the current flow. He wouldn't need to worry about that "High Amperage" if he will just keep his eye on his voltage.

Would suggest Mr. V. H. that you study ohms law.

Am I right, answer man?—John Davison, St. Petersburg, Fla.

Silent Night

In response to your inquiry as to how I like the "Silent Night" I will say that I am very greatly enthused with it and if I were inclined to be selfish, would wish for a number of "Silent Nights" every week; not that our Chicago programs are not just as good as the out of town programs, but I have a number of far range sets and naturally like to try them out. However, I consider the rights and desires of the users of crystal sets and am thankful for the one "Silent Night" a week.

I wish that some of our local broadcasting stations were as considerate of the people of Chicago as they are of the residents of distant parts. They are anxious to be heard at a great distance and to get messages and telegrams from far away stations, but they make it almost impossible for Chicago fans to get any but the most efficient and powerful distant stations by their almost incessant broadcasting at night. I suppose that the gentlemen of the Chicago Board of Trade have too much "pull" to have anybody make any effective criticism of the broad wave on which they are apparently transmitting, but they ought to be good enough sportsmen not to want to take up the whole ether and leave something for somebody else.

I am curious if there is any "under the surface" reason for restriction of broadcasting by the various stations to 360 and 400 meters. It seems to me that with the hundreds of wave lengths available, more than two wave lengths could be given over for the enjoyment of probably not less than two million owners of receiving sets in this country.

As to my suggestion for a "Silent Hour" each day instead of an entire "Silent Night," I can see that it might be a difficult innovation to inaugurate all over the country but I notice Alderman Tolman, to whom I also wrote, has broached the matter to the fans, and I really think that even if restricted to Chicago, it would possess obvious advantages over the "Silent Night." However, rather than complicate the issue, I am willing to "sing low" on the subject.

In concluding this long letter, I wish

to congratulate your publication to which I am a subscriber. In my humble opinion it is really the best of them all. I am not saying this because I am writing to you but I really mean it.—Oscar C. Miller.

Reinartz Receiver

Having built a Reinartz receiver complete as described in one of the November numbers of Radio Digest, I thought you might be interested in learning of my success. I am using only the detector unit, but expect to build the amplifier soon. I certainly like the set, and I think its performance is exceptional.

With my detector set, during a period of four weeks, I have received one hundred and fifty-five stations in the United States and Canada, and PWX at Havana, Cuba. Of these, at least twenty-five are over one thousand miles distant from Rapid City.

I have an aerial thirty feet high, 90 feet long with a thirty-five foot lead-in, and a thirty-five foot ground to a water pipe. I am using a Radiotron tube and 22½ volts on the plate. I am not using a phone condenser, but with Ft. Worth, Kansas City, Chicago, Davenport and Denver, I can hear and understand words plainly ten feet away from the phones. This is with the detector. With St. Louis I can hear music plainly twenty feet away from the phones, and can hear the beat of it at the other end of the house. The music often comes in so loud that it is painful to keep the phones on the ears.

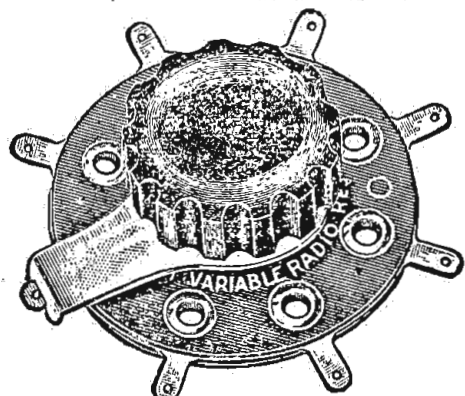
Without a ground I have received Schenectady, N. Y., and with ground but without aerial have received Davenport, 700 miles away. With neither aerial nor ground I have received the Night Hawks at Kansas City. Using a davenport spring for aerial, I have received Los Angeles, Portland, Ore., and Atlanta.

I considered my results so remarkable that I thought I would write Radio Digest about it, and let you know what results can be achieved with a Reinartz detector. I certainly am more than pleased with my set. Incidentally, I wound my coil myself.

I would be extremely interested in knowing the results others are getting with Reinartz sets, especially those using only detector.—Harold C. Nystrom.

HERE IT IS

Just What You Have Been Looking For A VARIABLE RESISTANCE THAT MOUNTS ON PANEL



Patents Pending

PRICE \$1.50

Real Radio fans, in the building of their sets, will more than appreciate this device, which gives them a variable resistance which is adaptable for use in all Radio hook-ups—in the grid circuit—as amplifier coupling resistance for both radio and audio frequency—"B" battery resistances—antenna shunts—tuned loop circuits—resistance couplers for both radio and audio frequency, and many other places in the radio hook-up that the amateurs' ingenuity will suggest.

Our complete Parts Bulletin on request. DISTRIBUTORS—Some territory open for live, responsible concerns.

PREMIER ELECTRIC COMPANY Manufacturers Est. 1905 3802-3810 Ravenswood Ave. Chicago, Ill.

Book Reviews

Radio Receivers for Beginners. By Snodgrass and Camp. Answers the universal question, "How can I receive Radio?" Price, \$1.00.

The Radio Amateur's Handbook. By A. Frederick Collins. A new revised edition of this book is just out. It is a complete authentic and informative work on Radio. Fully illustrated. Price, \$1.50.

The Armstrong Super-Regenerative Circuit. By George J. Eltz, Jr., E. E. This is a De Luxe edition of this famous circuit. Profusely illustrated and fully explained. Fifty-two pages. Price, \$1.00.

How to Retail Radio. A new book telling of tested plans and methods and policies for the dealer in Radio. Financing, location, store equipment and arrangement. Price, \$2.00.

Home Radio—How to Make It. By A. Hyatt Verrill. This book is particularly adapted for the amateur who desires to know how to make Radiophones. Twelve full page illustrations and diagrams. Price, 75c.

Elements of Radiotelegraphy. By Elery W. Stone. The text was written for the guidance and instruction of Radio students in the communication service of the Navy. It is an instruction book for Radio schools. Price, \$2.50.

Lefax Radio Handbook. A loose-leaf handbook. This book never grows old or out of date. All of the latest apparatus and hook-ups are added as time goes on. Anything that grows old is taken out and new leaves substituted. Price, \$3.50.

Radio for the Amateur. By A. H. Packer and R. R. Haugh. The underlying principles of Radio thoroughly explained in

simple language and understandable illustrations. This book will teach you how to construct and operate a receiving set successfully. Price, \$1.50.

Radio Reception. By Harry J. Marx, Technical Editor Radio Digest and Adrian Van Muffing. A simple treatise on Radio reception. Beginning with the elementary principles of electricity it carries the reader on into the essentials of Radio telephony. The most successful methods of Radio reception are explained and special reference given to practical tuning. 230 pages, with 130 illustrations. Price, \$2.00.

Radio Simplified. By Kendall and Koehler. New developments of Radio described in non-technical terms. The latest and most efficient hook-ups. Tells about vacuum tune, loose couplers, variocouplers, variometers and everything necessary for those who aim to get the best results in building or operating a Radio outfit. Price, \$1.00.

The book department of the Radio Digest is prepared to send you any of the books on Radio published, whether listed in our Book Review or not. Let us know what book you want, send us your check and we will see that the book is mailed to you. Postage stamps in payment for books not accepted. Send money order or check. Radio Book Department, Radio Digest, 123 W. Madison St., Chicago, Ill.

A study of the broadcasting situation reveals eighty-three Radio stations in the United States broadcasting religious services. These cover a territory that represents 65.2 per cent of the area of the United States.

We Will Mail You One



COMPARE IT WITH WHAT YOU ARE NOW USING IF OURS IS BETTER MAIL US 30 CENTS NOT Return it at Our Expense

ZOBEL-STEIN LABORATORIES 322 9TH ST. BROOKLYN, N.Y. SOUTH 2650

VERNIER VAR. CONDENSERS

COMPLETE WITH KNOB AND 3 IN. RUBBER DIAL

\$5.00 Value 11 plate with 3 plate Vernier.....\$2.00 5.50 Value 19 plate with 3 plate Vernier..... 2.15 6.50 Value 41 plate with 3 plate Vernier..... 2.50

Plain— 3 Plate .....\$0.75 23 Plate .....\$1.25 11 Plate ..... .98 43 Plate ..... 1.50

2½ Amp. Battery Charger with Tungar Bulb, \$15.00 value ..... 9.95 BALDWIN (MICA DIAPHRAGM) HEADSETS 7.95

Include 5c per item for parcel post.

CHI-CITY-RADIO CO. 945 CRESCENT PLACE, CHICAGO, ILL.

WILLARD

4-21-23

WILLARD RADIO COMPANY

Dept. R. D., 291 Broadway, New York City

"The Best for Less"

REINARTZ CIRCUIT

EVERY PART COMPLETE

1 Reinartz wound coil, 1 tube socket, 1 rheostat, 1 23-plate .0005 MFD variable condenser, 1 13-plate .00025 MFD variable condenser, 3 inductance switches, 16 switch points and nuts, 4 switch stops and nuts, 8 binding posts, 2 3" dials, 1 variable grid leak, 1 .002 MFD phone condenser, 23 feet bus bar wire, 1 high-grade Radion panel and diagram and complete instructions ..... \$10.00

FLEWELLING CIRCUIT

EVERY PART COMPLETE

2 honeycomb coils, 1 2-coil mounting, 2 coil plugs, 3 .006 condensers, 1 variable grid leak, 1 grid leak, 1 23-plate .0005 MFD variable condenser, 1 Vernier rheostat, 1 tube socket, 8 binding posts, 20 feet bus bar wire, 1 high-grade RADION panel, 1 3" dial and the Radio Digest Booklet on Operation and Construction of Circuit..... \$11.00

TWO STAGE AUDIO FREQUENCY AMPLIFIER

EVERY PART COMPLETE

1 7x9 Panel, 2 Audio Frequency Transformers (5 to 1 Ratio), 2 Rheostats, 2 V. T. Sockets, 7 Binding Posts, 1 Variable Resistance Leak, Necessary Bus Bar Wire. Can be used with either of the above circuits or any other receiver. \$11.00

CONDENSERS

3 Plate Variable; value, \$1.75.....\$1.05 13 Plate Variable; value, \$2.50..... 1.20 23 Plate Variable; value, \$3.50..... 1.35 43 Plate Variable; value, \$4.50..... 1.85

13 Plate VERNIER; value, \$5.50..... 3.75 23 Plate VERNIER; value, \$6.00..... 4.00 43 Plate VERNIER; value, \$6.50..... 4.25

Honeycomb Coils, 50 turns mounted. \$0.95 Honeycomb Coils, 75 turns mounted. 1.00 Double Coil Mountings..... 2.45 Triple Coil Mountings..... 3.35 Reinartz Coils and Mounting..... 1.75

VARIOCOUPLER—Celeron Condensite and Litz Wire Wound Secondary; Value \$4.50. Special .....\$2.95

Potentiometer with knob; value, \$1.75; special at ..... 1.00 Potentiometer with 2½" dial; value, \$2.15; special at ..... 1.15

BEST QUALITY JACKS, Single Circuit; value, 65c; special at..... .30 Double Circuit; value, 90c; special at..... .45

MULTIPLE POINT INDUCTANCE SWITCH with Knob and Dial (15 switch Points).... 1.75

LIGHTNING ARRESTERS approved by underwriters .....\$0.90

BALL BEARING INDUCTANCE SWITCH—value 75c, special.....\$0.30 V. T. SOCKETS—Nickel, brass sleeve, composition base value, \$1.00; special at... .50 AUDIO FREQUENCY TRANSFORMER—Designed for use with W. D. 11 Tubes, list, \$4.50; price..... 2.75

EXTRA SPECIAL Telephone 3000 Ohms Headsets; \$9.00 value; reduced to.....\$3.50

ALUMINUM LOUD SPEAKING HORN Nickel plated, highly polished; \$8.00 list .....\$3.75

THREE-INCH DIALS—Unbreakable—heat resisting composition—high finish; special...\$0.30

TWO-INCH DIALS—Same design—for rheostats and potentiometer; special..... .25

RAYMOND VERNIER RHEOSTATS—Value, \$1.50; special ..... .95

FILAMENT RHEOSTAT—Condensite base; value, \$1.10; special at..... .70

FILAMENT RHEOSTAT with 2½" dial; value, \$1.50; special at..... .85

TELEPHONE PLUGS ..... .60 FRESHMAN VARIABLE RESISTANCE LEAK and MICON CONDENSER Combined .75

Every article advertised above is guaranteed both by the manufacturer and by us—Mail orders filled immediately—transportation PREPAID on all orders of \$5.00 or over cast of the Mississippi River. All others include postage.

DEALERS!

In addition to our other lines we have taken over the distribution of the following:

Genuine Nathaniel Baldwin Fones (These are not the Master Baldwin manufactured in Chicago)

MURDON 1½ VOLT TUBES. These tubes are sold on an absolute "Money Back" basis. They use from 1.8 to 45 Volts on the plate and consume ¼ ampere current per hour.

DE LUXE MODEL HOMCHARGER SOLDERALL

Write for attractive discounts to

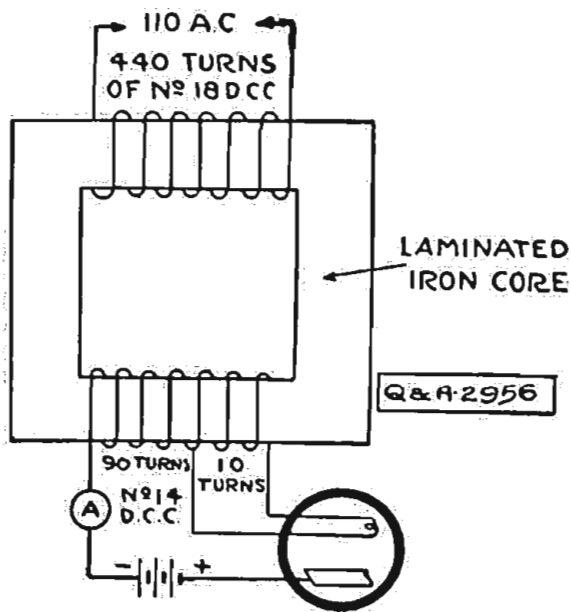
WERNES AND PATCH

159 N. STATE STREET

CHICAGO

# Questions and Answers

**Tube Rectifier**  
(2956), JWK, Marion, Ind.  
Please send me diagram for installing a tube rectifier for charging storage batteries, for Radio use. If you wish you may publish same as I am a weekly reader of Radio Digest.



A.—Complying with your request we are giving on this page a diagram of a rectifier for charging storage batteries. Details of windings are given.

**Tubes**  
(2662) AJR, New York City.

The Flewelling booklet received yesterday. I note in the drawing 3 that you would place the variable grid seal with condenser on the bottom opposite the condenser. Also I see in the illustration on the cover that you have a 3-inch dial for its regulation. I would like to follow your dimensions, therefore will you please let me know the brand used?

Do you think that my range will be larger with a Radiotron 202 than with a 201 or a VT1?

A.—With reference to the Flewelling circuit, would advise that any standard 3-inch dial may be used and are obtainable at any Radio supply dealers.

Would advise using a VT2. If not possible to obtain, then a VT1, rather than the tubes you suggest.

**Commutator Interference**  
(2412) DDC, Madison, S. D.

We have a very good homemade set here in our office, which is situated all on one floor. We have 3 h. p. Kimble variable speed motor on one of our presses. Whenever the motor is running all you can hear in the receivers is a steady roar. We also have 1/2 and 1/4 h. p. Kimble motors which do not seem to affect Radio reception, also two or three other small motors. I am working on aerial and counterpoise, but when I switch over to ground the noise is much worse. I have tried a loop aerial so we could get markets from WFAL, but it works just the same as the other aerial. I discovered today that I could hear the motor with no aerial or ground connection, which would seem to indicate that the sparks from the motor, if this is the cause, were going direct to the set.

Do you think that a shield placed around the motor and grounded would help it any? For a while after I put up my counterpoise about two months ago it was

The Radio Digest Q. & A. Department does not consider it ethical to divulge the circuits of manufactured sets. We would request that all inquiries in such cases be mailed to the manufacturers.

all right, but electricians did some repair work on the motor and since then I have had the trouble on either counterpoise or ground.

If you can give me any idea of how to get away from this trouble I will certainly be very grateful.

A.—Carefully noting the difficulties you are experiencing through proximity of electrical appliances, would advise that it is caused by the sparks given off between the brushes and commutator of motor. While shielding, and grounding shield, will reduce the interference to a great extent, it is doubtful if you will be able to entirely eliminate it. Believe that by shielding it can be reduced to a minimum so that reception may go on with reasonable satisfaction.

**B Batteries**  
(2377) CIW, Washburn, N. D.

Please advise why our B batteries are exhausted after about a week, using two to three hours each night. They are the 22 1/2 volt, used three units on my Reinartz two stage set for detector and amplifiers, disconnected while idle.

The current number of Digest advises recharging dry cell B batteries with rectifier (used as with A batteries) charging three cells at a time. We assume that negative connection and third of positive taps are charged first, then negative and last tap. Is this the proper procedure? What sort of ammeter is used to determine state of charge of B batteries? What amperage should constitute a full charge for 22 1/2 volt B battery?

A.—Noting your experience with batteries would advise that this is not as it should be. Your B batteries should last for several months. There is some faulty connection in your set which short circuits batteries. To test for this, turn tube out and by means of a volt-meter connected in series with B batteries notice if the meter registers. If it does, go over set for faulty connection.

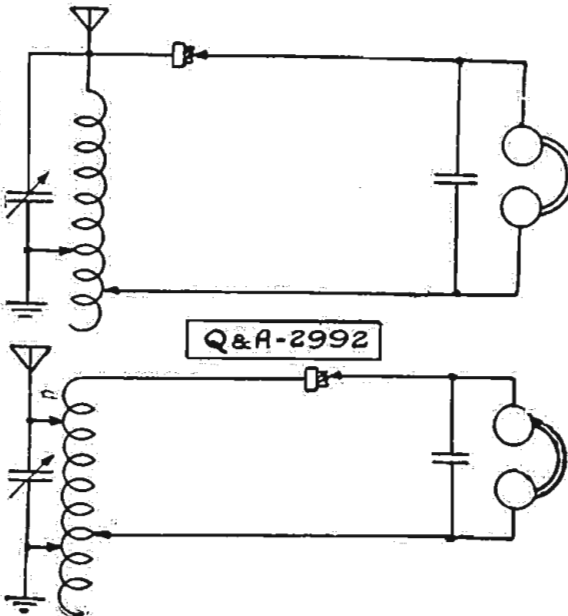
The article to which you make reference has to do with charging of storage B batteries. The dry cell type cannot be recharged.

Test battery with a voltmeter only.

Never use an ammeter as that would vitiate life to almost nothing. In using a voltmeter it should register not less than eighteen volts while the batteries are being used.

**Crystal Circuits**  
(2992), HCH, Fresno, Cal.

Kindly send me two or three hook-ups for a three slide tuning coil, and a two slide tuning coil. What should be the length of these coils?



I am using just the one variable condenser, either across the detector and ground, or across the aerial and ground. Which is best?

Do you think a variable condenser and loading coil is as good as a honeycomb coil?

A.—We are giving herewith diagram of crystal detector circuit which under favorable conditions of electrical perfection should have a range of one hundred millos.

Coil should be ten inches in length. One variable condenser, twenty-three plate, is indicated.

There is no necessity of using a loading coil as tuner will accomplish eight hundred meters wave length.

**Plate Battery Voltage**  
(2310) STD, Houston, Texas.

I have a receiving set which is regenerative, using a variable condenser, two variometers, a variocoupler, W. D. 11 tube and a socket, fixed grid leak and condenser (condenser .00025 M. F.) condenser .0025 M. F. across the phones, 22 1/2 volt B battery and dry cell. I find it necessary to burn the filament so high that the noise is excessive to bring in out of town stations. What shall I do?

A.—Noting specifications and condition experienced in lighting the filament of the tube would advise that it is indicated that your B battery is low. Add about four volts potential, making a total of twenty-six volts, and you will probably overcome the difficulty.

## TWO SUPERSENSITIVE CIRCUITS

(Both Copyrighted)

My Highly Improved Reinartz brings in all important stations on both coasts and Mexican border, loud, clear and without distortion. We dance to music from Atlanta received on one loud Baldwin unit. Build one of these wonderful sets from my blueprints and specifications, price 50c, or with a perfect and complete double wound spiderweb coil, \$3.00 by mail. No other windings used. Photo of my set on a glass panel with every order.

This copyrighted circuit is the most successful of any Reinartz modification yet produced, and is imitated the most. Thousands are in use.

My W. D. 11 Circuit is especially designed for use with the "Pickie" tube and brings out the full value of that little tube as no other circuit can. Stations 1000 miles away come in clearly on one tube. This set is small, complete, portable. For the man who wishes the highest efficiency, this is the set to build. Price of blueprint and specifications, 50c, or with complete and perfect windings, \$3.00. Photo of set with every order.

Either set is easy to build, easy to operate. Everything clearly shown. These high quality silk insulated coils are machine wound on fiber forms. I wind coils to your specifications in lots of 100 or more. Write for prices.

S. A. TWITCHELL  
1925 Western Ave. Minneapolis, Minn.

Just Out!

## PANEL MOUNTING



## FRESHMAN Variable Resistance Leaks

The latest and most essential part of an efficient tube set.

Price complete with either .00025 or .0005 mfd. Micon Condenser

**\$1.00**

Price without Condenser **75c**

Mounted on any panel in a few seconds.

Enables you to get stations that you never heard before.

The only Variable Leak that is entirely sealed.

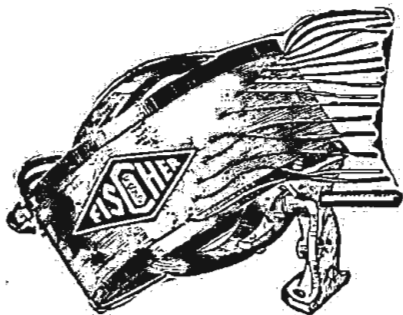
New Construction of FRESHMAN Leaks guarantees permanent resistance, unbroken range of 180 degrees. No pencil markings.

Eliminates hissing. Clarifies signals.

At your dealers—otherwise send purchase price and you will be supplied postpaid.

**CHAS. FRESHMAN CO. Inc.**  
106 SEVENTH AVE., NEW YORK CITY

QUALITY



SERVICE

- Fisher 180° Bakelite Gen. Vario-coupler.....\$2.25
- 3 Plate Vernier Condenser..... .40
- 13 Plate Precision Condenser..... .85
- 23 Plate Precision Condenser..... 1.10
- 43 Plate Precision Condenser..... 1.55
- .006 Fixed Condensers..... .38
- Freshman Var. Grid Leak & Cond..... .75
- Freshman Var. Grid Leak only..... .60
- Spec. Mtd. Audio Transformer..... 2.95
- Switch Levers, 20c. Condensers..... .15
- Reinartz Blue Prints, complete..... .50
- .00025 Grid Cond. & Var. Leak..... .38
- Hard Rubber Panels, 7x10..... .85
- Hydegrade Rheostat, Reg. 65c, Spec..... .35
- Potentiometer, 240 ohms..... .95
- 3000 ohm D. X. Receivers..... 3.85
- Phonograph Attachment, Single..... .75
- Phonograph Attachment, Double..... 1.25
- Rextal Super-Sensitive Synthetic Crystal..... .50

WRITE FOR COMPLETE LIST OF PARTS

## ECONOMY RADIO CO.

132 Nassau St., New York, N.Y.  
Dept. "RD"

# FREE

## Your Choice

BOUND VOLUMES  
Numbers Two or Three  
with One Year's Subscription  
to RADIO DIGEST

POSTPAID  
BY PARCEL  
POST

Limited  
Quantity

Radio Digest  
Illustrated  
Volume Two

Radio Digest  
Illustrated  
Volume Three

Better  
Heavy

# 65 Numbers

13 NUMBERS IN THE BOUND VOLUME  
52 NUMBERS IN YEAR'S SUBSCRIPTION

VOLUMES TWO AND THREE

Now Ready for Delivery. Parcel Post  
Prepaid, Each Only..... **\$2.00**

On account of the limited supply, the sale of these bound volumes is limited strictly to those readers of the Radio Digest who have subscribed for a year.

One year subscription to Radio Digest  
and both bound volumes 2 and 3..... **\$7.00**

By subscribing now for one year to the Radio Digest you get both BOUND VOLUMES 2 AND 3, 25 numbers, with one year's subscription, for \$7.00.

ALL ORDERS MUST BE SENT DIRECT—No orders on this offer will be accepted through subscription agencies, news dealers or other sources. Check, money or express orders (no stamps) must accompany all orders.

**GREATEST COLLECTION OF RADIO INFORMATION EVER PUBLISHED**

VOLUME TWO

Questions Answered.....	300
Simple Instruction Articles.....	30
Receiving Set Diagrams.....	3
How to Make Articles.....	66
New Apparatus.....	48
Pictures and Illustrations.....	350
Hookup Diagrams.....	143
Broadcasting Stations.....	17
Technical Articles.....	10
Book Reviews.....	78

VOLUME THREE

Questions Answered.....	300
Simple Instruction Articles.....	30
Receiving Set Diagrams.....	3
How to Make Articles.....	66
New Apparatus.....	48
Pictures and Illustrations.....	350
Hookup Diagrams.....	143
Broadcasting Stations.....	17
Technical Articles.....	10
Book Reviews.....	78

**COUPON**

PUBLISHER, RADIO DIGEST,  
123 West Madison St., Chicago, Illinois.

Please reserve me Bound Volume Number Two and also Number Three and one year's subscription to the Radio Digest, for which I am inclosing check—M. O. for Seven Dollars.

Please reserve me Bound Volume Number Two or Three and one year's subscription to the Radio Digest, for which I am enclosing check—M. O. for Five Dollars.

Name.....

Address.....

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

# Radio Illustrated



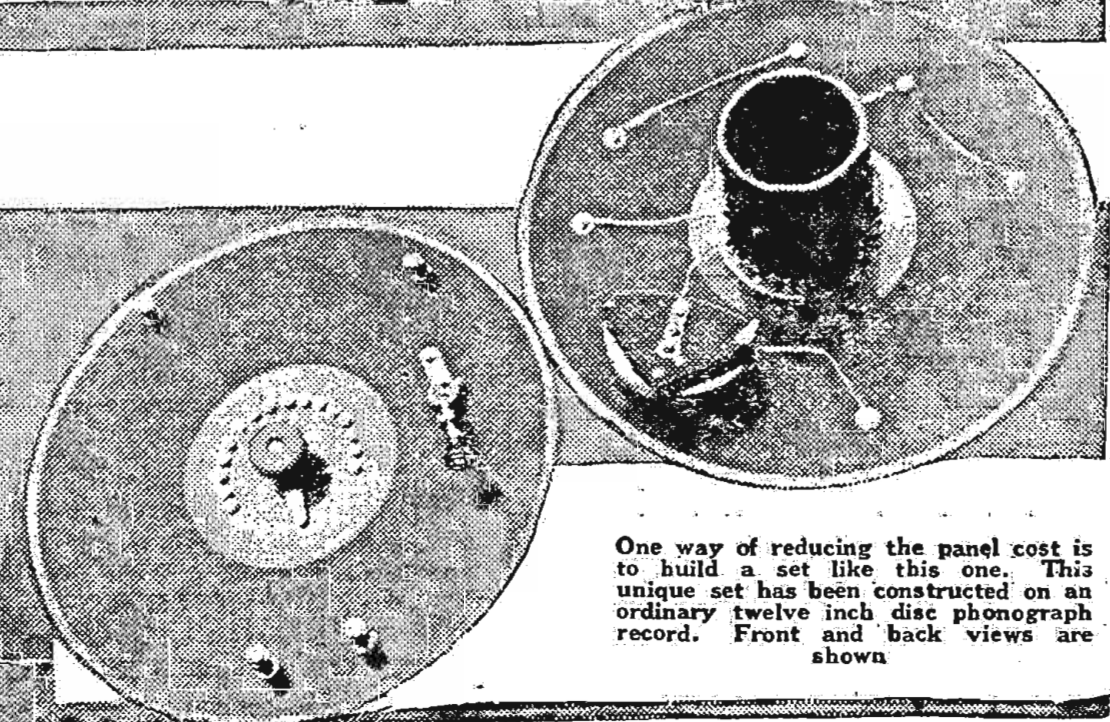
Here she is again—Ganna Walska singing over WJZ via a microphone located at the Waldorf Astoria, New York City. Harold McCormick's new bride has now returned to the continent where she has several opera engagements



The Radio Phonolamp, a new invention by F. W. Hochstetter of Dayton, Ohio, is the latest idea in talking machines and Radio combined. This arrangement is neat and practicable © Fotograms



Judge John Rounds, of the conciliation Court in St. Paul, Minn., with Robert Otte, clerk of the court, is probably the first judge in the world to try a case by Radio. The case being tried was that of Frank Yost suing C. E. Kopp for a Radio set © International



One way of reducing the panel cost is to build a set like this one. This unique set has been constructed on an ordinary twelve inch disc phonograph record. Front and back views are shown