

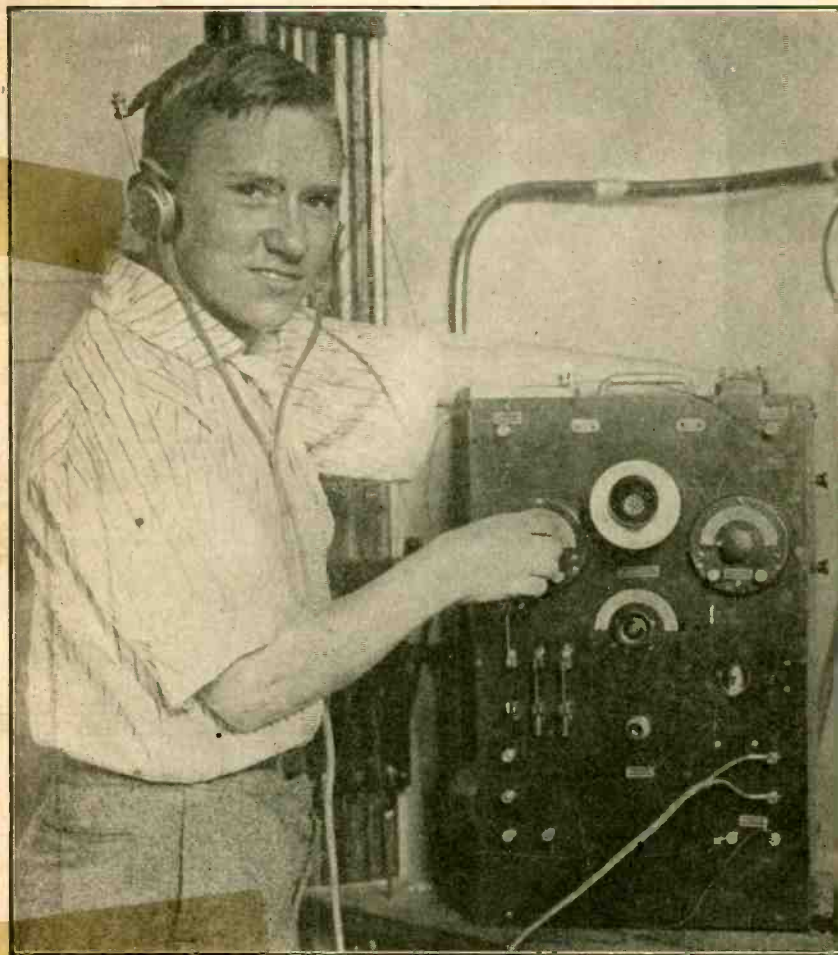
THIS EDITION 70,000 COPIES—15c A COPY

RADIO WORLD

ILLUSTRATED

Entered as second-class matter, March 28, 1922, at the post office at New York, New York, under the act of March 3, 1879.

ISSUED EVERY 7 DAYS. QUESTIONS ANSWERED



(c. Underwood & Underwood)

On another page of this RADIO WORLD, is a photograph of the tower John Iringle built. He has one of the best-equipped amateur radio outfits in Chicago. He constructed his own plant, even the batteries, and was broadcasting long before radio became popular.

MAY
SIXTH
1922

15c
A COPY
1 year, \$6.00
6 mos., 3.00
3 mos., 1.50



Drilling rotor with drill press in the Radio Class of the Lane High School, Chicago. (See illustrated article inside this number.)

READ "ADVANTAGES OF RADIO FREQUENCY"

TRADE **URSA** MARK

RECEIVING SETS
PARTS and SERVICE
FOR DEALERS and PUBLIC

Write us for what you want. Mail orders
given prompt attention

**UNIVERSAL RADIO
SERVICE ASSOCIATION**

300 MADISON AVE., DEPT. A.
NEW YORK CITY

**THE BEST PROTECTION
AGAINST LIGHTNING**



**"JACOBUS"
VACUUM**

**TYPE J. S. W. AERIAL
PROTECTOR**

This improved lightning arrester is absolutely positive, efficient protection against the heaviest lightning storms. Approved by the National Underwriters to replace lightning and ground switches. Its simplicity, easy installation and forget-proof feature recommends it especially for the amateur.

ELIMINATES SWITCHES

Receiving stations with JACOBUS Protectors do not require lightning or ground switches. Protection every minute of the day and night. No worry about throwing switches.

**GOOD FOR INNUMERABLE
DISCHARGE**

Discharges of lightning or static on the JACOBUS do not affect its life. After conducting a discharge to the ground, the tube is ready for another operation. Does not weaken or in any way affect the efficiency of the set.

**\$2.00 From Electrical Dealers
Sent Direct**

APEX ELECTRICAL SPECIALTY CO., Inc.
77-B Orange St., Newark, N. J.

Coming Events

INTERNATIONAL RADIO SHOW
—71st Regiment Armory, 34th St., and
Park Ave., New York City. May 22 to 27.

BROOKLYN RADIO SHOW—
Brooklyn Ice Palace, Bedford and Atlan-
tic Aves., Brooklyn, N. Y. Opens May 6.

**MILO E. WESTBROOKE RADIO
SHOW**—Leiter Building, Chicago. June
25 to July 1.

No One Need Be Shut Off

RADIOTELEPHONE is called a craze because there is no other word in the language to convey the scope and intensity of the interest that it has aroused, says the Newark, N. J., "Ledger." If it is that, it is an inspirational one with which no one can afford not to be in touch.

The very inexpensiveness of the device makes it of universal appeal.

Here is a means whereby isolation of individuals and families from operatic and other music, from lectures, from sermons, from health counsel, from technical training and from all of the greatest forces that make for education, culture and entertainment, but hitherto within the reach of comparatively few, is ended.

The railroads, steamships, telegraph, newspaper and motor car have all helped

Manufacturers & Jobbers.

Write for prices on the new famous

Ritter Rotors
Variometers
Stators

All parts made of mahogany only.

Also wood ends for tuning coils
and loose couplers.

**Ritter Wood Working
Co., Inc.**

232 Canal St. New York

to eliminate distance and make the earth a smaller place. But the radiotelephone goes still further in its elevating and cohesive influence. One may now sing and talk to millions. No one need be shut off from personal contact with the best the world offers.

No one had ever dreamed, in the wildest flights of fancy and longing, of such a factor for human unity, democracy, happiness and progress being made available. But, lo, here it is in our hands—the supreme miracle of an amazing age!

have you a
broadcasting map?
read the **RADIO RED BOOK**
25¢ 406 W 31st ST 25¢

PHONES—

**OUTFITS and PARTS
On Hand.**

"C" RADIO JACK
158 Fulton St., N. Y. C.

ENCO

"B" BATTERY

No wires used in any of its
construction

VARIABLE and REFILLABLE

For refills use standard
flashlight unit cells **17c**

Enco Electric Novelty Co.

603 W. 130th ST., New York City

Keep Up to the Minute On RADIO

Read the three interesting and instructive books by James R. Cameron, whose text books are used and indorsed by the U. S. Army, Navy, and Department of Public Instruction.

HOW TO BUILD YOUR OWN RADIO SET

Full instructions with diagrams and drawings which make it easy for beginners to build his own set. **25 cents**

RADIO DICTIONARY

Words and terms relative to Radio parts and equipment clearly defined, with tables and information. **50 cents**

RADIO FOR BEGINNERS

A book that deals with the subject from A to Z—and so written that the amateur can understand it. **\$1.00**

Buy them from your dealer today or direct from

TECHNICAL BOOK CO.,

130 WEST 42nd STREET, NEW YORK CITY

AMATEURS

VARIOMETERS\$5
TUNING COILS\$3
SWITCH LEVERS50c.
VARIOCOUPERS\$5-\$6
VARIABLE CONDENSERS\$4-\$5
SWITCH POINTS03c., each
Special complete receiving outfit with
phones, antennae and insulators, \$30. Mail
orders filled promptly.

CLARK & TILSON

51 East 42nd Street

NEW YORK CITY

Tel. Vanderbilt 5462

FREE! FREE! FREE!

Energetic boys can obtain one of our famous "Ritter Radiophone Receiving Sets" known to have received concerts at a distance of 35 miles from Broadcasting stations.

Send enclose 2c. stamp for particulars on this wonderful opportunity

RITTER RADIO CORP.
118 Walker St., New York

RADIO WORLD

[Copyright, 1922, by Radio World Co., New York, N. Y.]

A WEEKLY JOURNAL, PUBLISHED EVERY WEDNESDAY AND DATED SATURDAY BY RADIO WORLD COMPANY, FROM PUBLICATION OFFICE, 1493 BROADWAY, NEW YORK, N. Y.

Vol. I. No. 6.

May 6, 1922

15c. per copy, \$6.00 a year

An Editorial Written By Others

We will, this week, permit two of Radio World's patrons to furnish the text for an editorial.

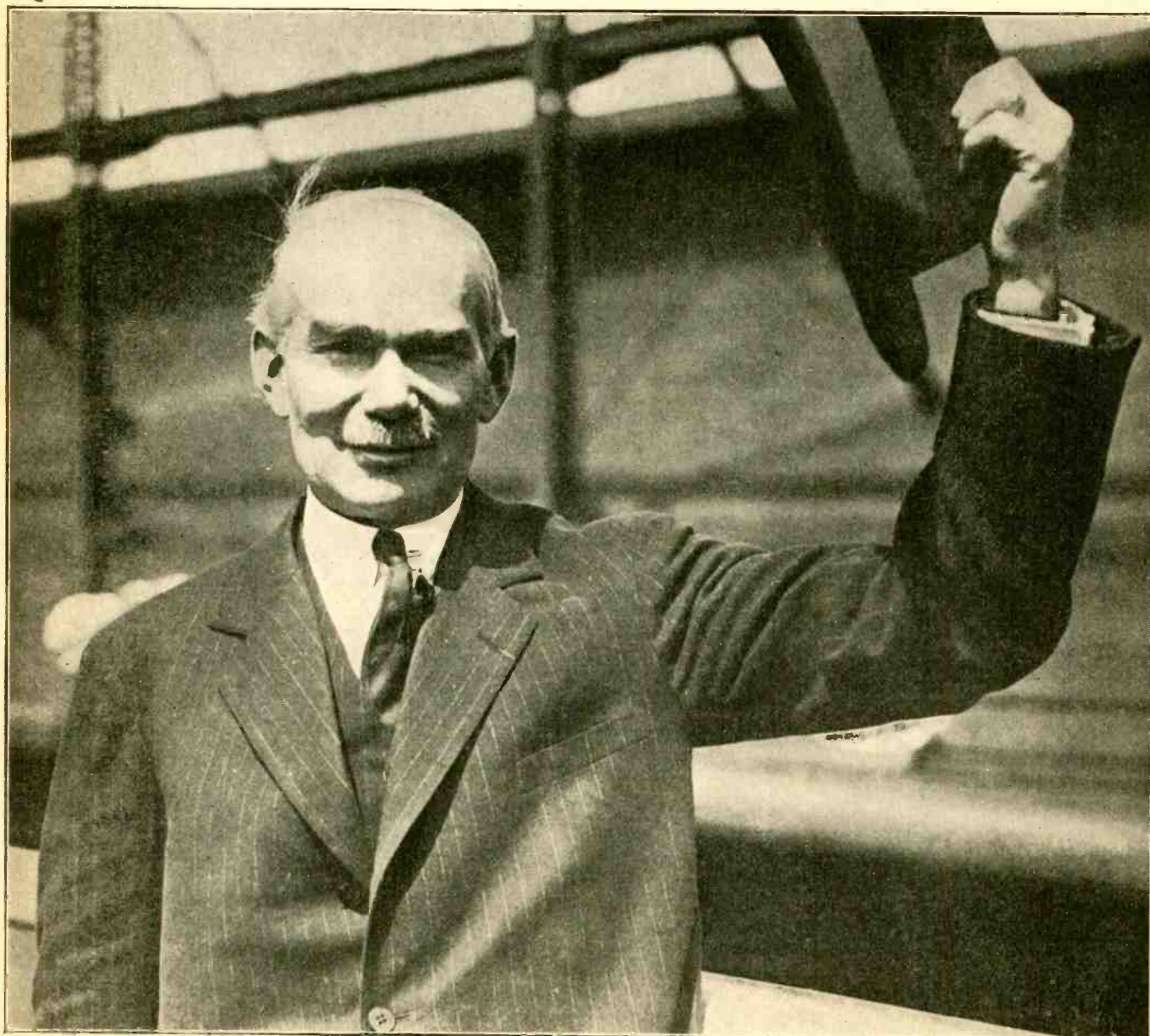
Dr. H. Riley Spitler, of Eaton, Ohio, in sending his check for \$6.00 for a year's subscription to Radio World, wrote us as follows:

"I bought a copy of Radio World at a newsstand and found it to be about the best ever. In fact, it is without a peer in the field of radio publications."

Mr. J. C. Hornstein, general manager, Howell Cine Equipment Company, Inc., 729 Seventh Avenue, New York City, has written us as follows:

"We wish to state we have received over five hundred inquiries within the last few days, from the half-page advertisement which we put in your Radio World, issue of April 15, 1922."

These words are more eloquent to us than anything our contributors or editors could write.



(Photograph from Wide World Photos)

Arrived from Europe Friday, sailed again Tuesday! Lee De Forest, wizard of wireless, bidding good-bye to America as he departed for Germany to perfect his radio and talking motion-picture inventions.

The Advantages of Radio Frequency

By Harold S. Potter

RADIO-FREQUENCY amplification seems to be the great hobby of most amateurs to-day. Let us consider the advantage of radio-frequency over audio-frequency amplification. First of all, radio-frequency amplifiers, if well built, are quiet in operation. There are no tube noises to speak of. In an audio-frequency amplifier, the first tube is a soft detector tube, given to hissing when near the critical point. This hissing is then greatly amplified if a two- or three-step amplifier is used, and will seriously hinder the reception of weak signals. This trouble does not enter into radio-frequency amplifiers, since the detector is the last tube, and its local noises are not amplified.

A radio-frequency amplifier cannot be used to amplify loud signals, as only a slight amplification would be obtained; but signals so weak as not to be audible on a detector alone may be greatly amplified. This property of a radio-frequency amplifier is very useful in receiving weak signals of about the same wave-length as strong ones. Static, also, is but slightly amplified. A greater number of steps of radio frequency can be used than is possible with the audio-frequency type of amplification. There is less "howling."

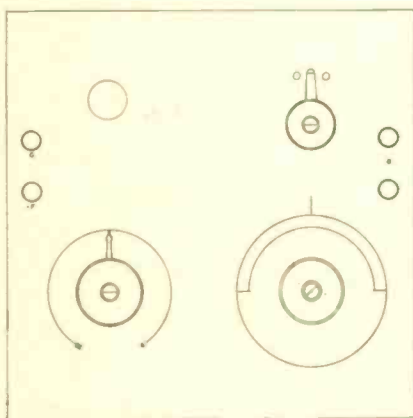


Figure 1. The front panel which serves to show just what the completed set looks like when completed. Drawn by Harold S. Potter.

There are several types of radio-frequency amplifiers in use to-day, such as the resistance-coupled type, the transformer-coupled type, in which iron-core or air-core transformers may be used, and the tuned-plate circuit type.

The first-mentioned type, the resistance-coupled, is efficient only on wave lengths of over one thousand meters, while the second type uses

special transformers which cannot be readily constructed by the amateur; so we have only the tuned-plate type left for short-wave work. This variety of radio-frequency amplifier is the best where but one or two steps are to be used; but is impractical for a greater number of steps, due to the fact that each step must be carefully tuned to resonance with the incoming signals. The great advantages of this type is due to the fact that great regeneration is obtainable and very selective tuning may be accomplished.

Step for step, a tuned radio-frequency amplifier should cost less than an audio-frequency amplifier. Each

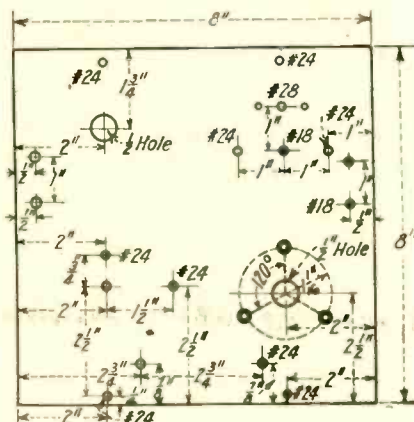


Figure 2. This diagram will be of value to the amateur in showing how the panel should be drilled. Suggested by Harold S. Potter. Drawn by S. Newman.

requires a tube, socket, rheostat, and a .0005 mfd. Murdock condenser, will cost less than a good audio-frequency transformer.

Either A-P amplifier-tubes, or Meyers tubes, will give good results in a radio-frequency outfit; but radio-trons should not be used, since they possess a very high capacity between their elements.

Having mentioned a few of the important points in regard to radio-frequency amplifiers, we are now ready to take up the construction of an instrument. The set I am about to describe is of the tuned-plate type, and has a range of approximately 150-800 meters, which is quite sufficient for use with the ordinary short wave regenerative sets on the market to-day. The drawing, Figure 1, of the front panel, will serve to show what the completed set looks like, while the other drawings, Figures 2, 3, 4, 5, and 6, show the details of construction.

1. Panel

The panel is of 3/16 of an inch black bakelite, 8x8 inches. The drawing of the panel layout, Figure 2, shows how the panel should be drilled.

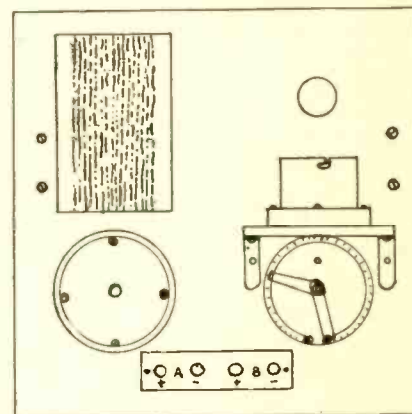


Figure 3. The rear view of the sub-panel, known as the connecting panel. Drawn by Harold S. Potter.

The size drill to use is shown beside the hole. A large hole, 1/2 inch to 1 inch in diameter is drilled for an audion window.

The sizes and arrangement of holes for mounting the condenser are shown in the diagram. A 1/2-inch hole is drilled for the center shaft, in order to provide sufficient clearance. Great care should be observed in laying out and drilling the holes for mounting.

Referring to Figure 3, a small sub-panel, or connection panel, will be noticed on the back of the main panel near the bottom. This panel is of 1/8 inch or 3/16 inch black bakelite, 3/4 x 3 inches. Four small binding-posts are mounted upon it, to take the A and B battery connections.

In the end views, Figures 5 and 6, it will be noticed that the panel is supported by a base board of 3/8-inch hardwood, 8x5 1/2 inches by 2 3/4-inch round-head brass screws fasten the panel firmly to this base, which is entirely independent of the bottom of the cabinet, and slides into the cabinet. In this way, the amplifier may be used without the cabinet to support the panel.

2. Condenser

The variable tuning-condenser is a Murdock, No. 3680, is of the panel-mounting type, has 23 plates, and a capacity of .0005 mfd., maximum. It is mounted at the lower right-hand corner of the panel. The Murdock condensers are 3 3/8 inches in diameter at the longest part—the top plate. The height of this type is 1 5/8 inches.

If the builder so desires, a different

make of condenser may be used; but this will require a different arrangement of the mounting holes. The Murdock condensers will give complete satisfaction if used, and are especially desirable because of their small size and light weight.

3. Inductance

Great care should be exercised in the winding of the inductance if good results are expected. Although I have conservatively rated the range of this

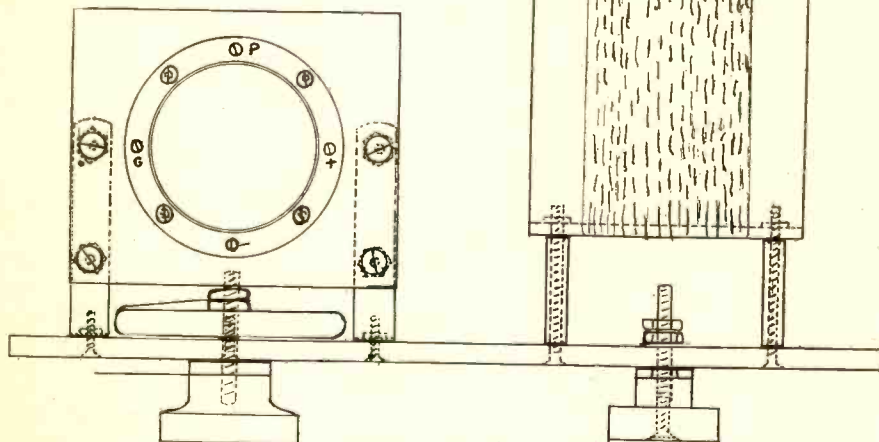


Figure 4. This drawing gives the builder the proper idea of mounting. It shows the top view. Drawn by Harold S. Potter.

amplifier as 180-800 meters, it will be noticed, from the following data, that the range is somewhat broader, thus allowing for possible errors.

The data for the construction of this inductance was taken from the pamphlet, "Inductance Tables," by M. B. Sleeper. The coil is 1.45 inches long, and is wound on a 2.5-inch length of fibre tubing, 3 1/2 inches in diameter, leaving about a 1/2-inch margin at each end to allow for mounting. No. 24 single silk-covered wire is used. The data for tapping the coil is as follows:

	Distance in inches from start	Turns	L-in Omo.	X with .0001 Cond.	X with .0005 Cond.
1st Tap	.5	21	70,560	158	354
2nd Tap	.85	36	165,800	243	542
End	1.45	63	370,400	362	811

The taps are removed at the points noted in the above data, and connected to the contact points of the three point switch on the panel, directly in front of the inductance. It will be noted that the ranges of the various sections overlap, and it is well to bear in mind that, in tuning to a given wave length, the best results are obtained by using a high value of inductance, and a low value of capacity.

For example, in tuning to a 300 meter station, better results are obtained by placing the switch block on point 2, and putting a small capacity in the circuit, than by placing the switch blade on point 1 and using a comparatively high capacity.

At this point, I will say a word concerning the mounting of the induct-

ance. Figure 3 shows its location, while Figures 4 and 5 show the details of mounting. At a distance of 1/4 of an inch from each end, and on the same side of the tube, two holes are drilled through the tube. These holes will then be two inches apart,

and will match the holes drilled in the panel for the purpose of mounting this inductance. Two 1 1/2 inch No. 6-32 flat-head brass machine-screws, with nuts to fit, are used to support the inductance. Two 1-inch lengths of brass tubing with an inside diameter of 5/32 of an inch are used, as shown in the Figures before mentioned, to give a space of one inch between the panel and the inductance.

4. Rheostat

The rheostat may be of any make, but the drawings show a Rembler, the type I used in my model. It is, of course, the small-size Rembler. This rheostat is about 2 and 3/16 of an inch in diameter, has a No. 8-32 threaded-brass shaft, and a 1 3/8 inch knob, with a 1 1/4-inch pointer. The resistance is 6 ohms, quite sufficient for use with any of the modern tubes.

The rheostat is mounted at the lower left corner of the panel, directly under the tube base.

5. Tube Base

The tube base may be of any kind designed for the modern four-prong tubes. Care, however, should be taken to select one which has the four-contact springs at right angles, thus cutting down the capacity effect between the springs. I used a De Forest base with good results.

The tube base is mounted on a shelf made of 1/8-inch bakelite, hard rubber or hardwood, 2 1/2 x 3 inches, which is, in turn, secured to the panel by two

brass bakelite having two-inch legs. This shelf is mounted above the rheostat, and 3 1/2 inches from the bottom of the panel. It will be noticed, also, that a space of 1/2 an inch is left between the front of the shelf and the panel. This is to allow for the tap of the rheostat, which projects up slightly, between the brackets.

6. Connection Panel

The connection panel, previously mentioned, is mounted behind the main panel as shown in Figures 3, 5, 6, while the drawing of the panel shows the holes are drilled.

No. 6-32 flat-head brass machine screws are used to support the sub-panel, and a couple of old battery-nuts are used to space it about a 1/4 of an inch from the panel.

Four binding posts, of almost any type, are mounted on this panel. These binding posts are used for connecting the A and B batteries, thus eliminating a great bunch of unsightly wires on the front of the panel.

7. Panel Fittings

Having discussed the essential parts of the amplifier, we now come to the panel fittings which might be termed the trimmings. In my model, I used an Amrad knob and 3-inch, 180-degree metal dial. These knobs and dials are made for a 1/4-inch shaft, and a set screw is provided in the knob.

The rheostat uses the regular Rembler knob, which comes with it.

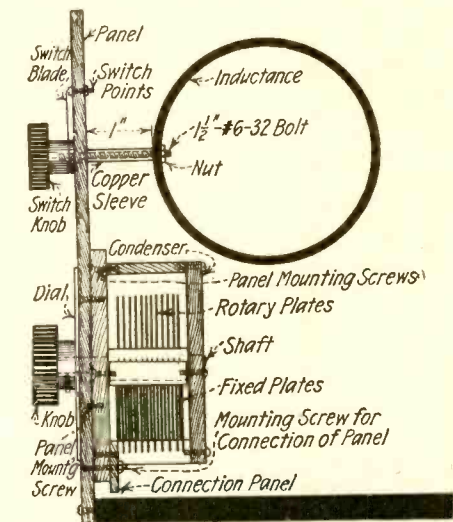


Figure 5. Detail of various parts of the panel showing side right hand view. Suggested by Harold S. Potter. Drawn by S. Newman.

The top switch is of the common type now on the market. It has a 1-inch nickel-plated blade, and a bakelite knob 1 inch in diameter. Small nickel-plated switch points are used.

The four binding-posts mounted on the panel are of the molded-composition type about 3/8 inch in diameter.

The builder should remember that
(Continued on next page)

(Continued from preceding page) articles such as knobs, dials, and binding posts need not be of exactly the specified type; but may be selected to harmonize with other apparatus on the table; as, for example, the composition-binding posts could just as well be replaced by brass or nickel-plated ones, or a bakelite dial used instead of the metal one. Such changes would necessitate no change in the design or in the panel layout.

8. Cabinet

The completed set is protected by a cabinet of $\frac{1}{4}$ -inch quartered oak, with inside dimensions of $8 \times 8 \times 5\frac{3}{4}$ inches. Four $\frac{1}{4}$ -inch holes are drilled in the

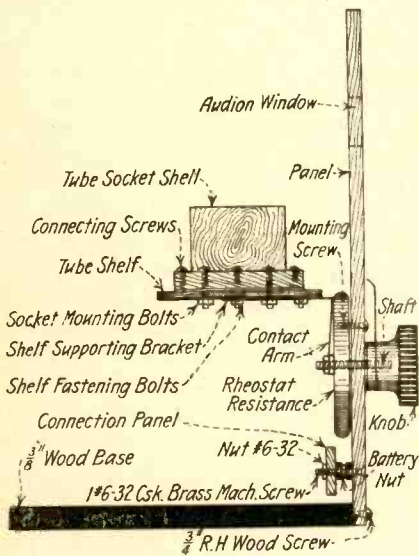


Figure 6. This clearly describes each little part of the sub-panel which carries the tube socket and rheostat. Suggested by Harold S. Potter. Drawn by S. Newman.

back of the cabinet, and the wires from the batteries are passed through them in order to reach and connect with the connection panel.

A strip of $\frac{1}{2}$ -inch oak, 1 inch wide, is fastened to the underside of the top, $\frac{3}{16}$ of an inch from, and parallel with, the front edge. After the panel—secured to its base—has been set in place, two $\frac{3}{4}$ -inch round-head brass wood-screws are passed through the holes near the upper edge of the panel and screwed into the above mentioned strip, holding the panel firmly in place.

By this method of mounting, the panel and base may be easily and quickly removed from the cabinet and used without it.

The cabinet may be finished up in any finish desired. I used one coat of dark oak stain, one coat of varnish, and then rubbed it down with crude oil and powdered pumice.

9. Hook-Up

No. 14 B and S-gauge bare copper wire should be used in making con-

nections, if good results are to be obtained. In working with currents of radio-frequency, it is absolutely necessary to have all wires as short as possible, and parallel wires as far apart as possible. Wires should cross at right angles, or nearly right angles. All connections should be soldered, using some non-corrosive soldering paste.

Figure 7 shows how the amplifier is hooked up. The first drawing shows in detail the connections of the differ-

ent instruments on the amplifier panel, the second shows its connection to a detector, using the same A and B batteries.

In this case a B battery of about 45 volts is used, a tap being taken off at 22 volts for the detector.

When the same A and B batteries are used, as shown, the lower output-post need not be connected, as the dotted lines show. Better results are obtained by using a different A and B battery for the amplifier and detector.

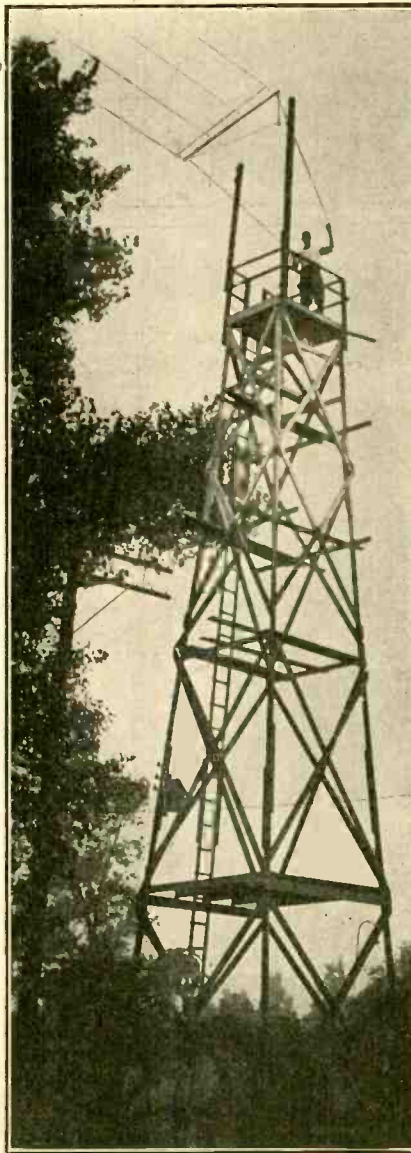
In this case the lower output-post should be connected to the common filament post of the detector.

Conclusion

It should be remembered that the plate-circuit of the amplifier must be tuned to resonance with the station to be received, or no signals will be heard.

Probably the best way to secure results with this type of instrument is to celebrate the amplifier against a standard wavemeter, making a record of the switch and condenser-settings for different wave-lengths. Then, to tune for a certain station of known wave-length, set the condenser and switch in the proper position, and tune the station in on the tuner in the usual way. If the tuner is already calibrated, the process of tuning above described may be reversed and the amplifier may be calibrated from the tuner.

If a station of unknown wave-length is sufficiently loud to be heard on the detector alone, it may be tuned in on the detector and then the amplifier connected. A double pole, double throw switch may be arranged to connect the tuner to either the detector alone, or to the amplifier and detector.



(c. Underwood & Underwood)

John Iringle, fourteen years old, a pupil at the Tilden High School, Chicago, has one of the best-equipped radio stations in the second city of the United States. He has constructed most of his radio equipment even down to the storage batteries. Long before the present radio craze swept the country, he was giving his friends very selective operatic concerts. The photograph shows the 60-foot radio tower, with his four-wire aerials, which are erected with aid of his radio chums.

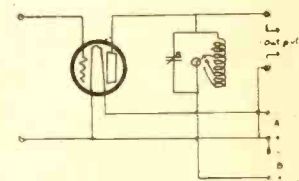


Figure 7. Circuit with amplifier hook-up.

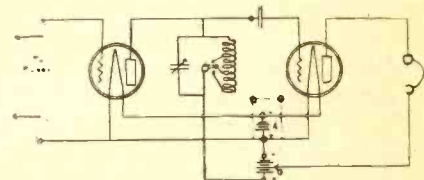
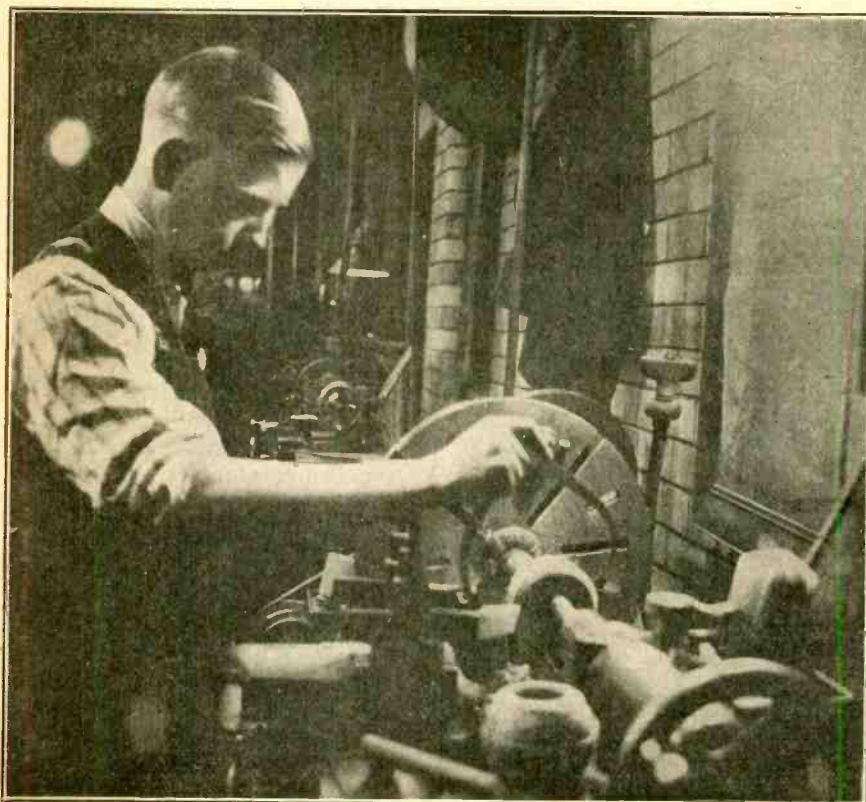


Figure 8. Circuit using amplifier with necessary connections to detector circuit. Drawn by Harold S. Potter.

As this type of amplifier gives very selective tuning on the plate coil, a somewhat less selective tuner may be used than would otherwise be practical, and satisfactory results may be obtained on single-coil tuning outfits.

Chicago High School Teaches Radio

By George F. Paul



Facing off end of rotor for required diameter

AT the Lane Technical High School, Chicago, boys are kept busy, as a part of their regular school work, in making various parts of radio sets. Regular instruction in the operation of wireless sets and in the sending of messages also has become part of the school's course.

The boys like this work. It is intensely interesting. They take to it as the proverbial duck takes to water. There is a keen rivalry among the leaders to see which will be able to first turn out a certain part or to attain a certain speed in the handling of messages. The training is practical; this is indicated by the fact that the star quarterback on the football team has served as wireless operator on one of the big lake steamers.

In the classroom instruction, boards with keys and phones attached are used. Six boys can receive training while using one board. They learn the Morse International Code. They are given training both in sending and receiving messages. Boys are grouped according to the speed they show. This means that, in one group, may be found boys who can copy from five to 10 words a minute; in a second group will be those who can copy from ten to fifteen words a minute

in a third group will be other boys who work at greater speed. In the classroom, the boys are taught the theory of wireless, and many informal discussions are held to make clear the fundamental principles.

The boys in the radio classes are assigned to duty in the cage which is installed on the ground floor of the school building. This station, GDB is in operation throughout the school day and while the boys are on duty. There is a regular operator and one assistant every period of the day. The regular operator is a boy who has obtained his license as an amateur. This

Winding a rotor and fitting in stators in the radio class of the Lane High School, Chicago, Illinois. The first public school to create a course in the popular marvel.



instruction is under the personal direction of Miss Helen Bergner, who enjoys the distinction of being the only licensed woman operator in the city of Chicago. She is probably the only woman teacher of radio in any large high school in the United States.

One of the most interesting features of the work at Lane is that the different shops are co-operating in making parts for wireless outfits. The school principal, William J. Bogan, has received many orders for these parts, and in turning them out it has been found necessary and also advantageous to divide the work into class projects. This gives boys in different years some training in this new subject and arouses their lasting and growing interest in wireless.

Thus in the woodshop some of the younger boys are kept busy making cabinets to hold the receiving sets; also cabinets for the amplifiers. In the pattern shop, another group of boys are working on the form for the variometers and the variocouplers. Special machines have been made for turning out some of the parts so as to insure greater accuracy.

In the electric shop, the boys are winding and wiring variometers and also assembling the sets as the parts become available. They are also doing some of the engraving on the sets.

The radio club at Lane gives the boys a chance to pick up a lot of valuable hints on wireless installation and operation. The president of the club is George Frost.

Recently, at one of their meetings, the boys had a competitive "spell-down" to determine the best-informed members of the club. Each contestant asked his opponent a set number of radio questions. The contest proved that the boys are keenly interested.

Using Radio to Fight Forest Fires

By Harry Gould

DUE to the carelessness of man, many thousands of dollars worth of valuable timber is wasted every year by forest fires. To overcome this frightful waste, Congress created the United States Forest Service, not only to protect the forest, but to prosecute all persons who are the direct cause of these gigantic losses.

Every means of communication to locate the fires was utilized—telephoning, heliographing, wigwagging and other methods of signaling; but, three years ago, radio was given a chance.

A combination of radio and airplanes was planned by the officers of the Forest Service and the United States Army Air Service. Airplanes were put in service to fly over forests and locate any fires that were seen. In order to facilitate the work, receiving stations were installed at the forest headquarters.

The planes were equipped with $\frac{1}{8}$ -kilowatt, 500-cycle spark transmitters, consisting of generator and exciter—driven by a small propeller—a transformer, a mica condenser and inductance, all mounted on the running-gear of the plane. The only equipment inside the plane was a key and a radiation ammeter.

The antenna is a single-strand wire with a lead weight (known as a "fish") attached to one end. The "fish" keeps the antenna from becoming tangled with the control wires and gives a vertical component to the antenna in order to overcome a purely directional effect of radiation. When the "ship" is ready to make a landing, the antenna is wound up on a reel located in the rear of the observer's seat.

All fire messages are sent by code in order to save time. A few minutes may mean much in checking a conflagration. The official code is as follows:

Code.

Fire call: FFF.
 New or old fire: N-New. O-Old.
 Location: T-Township. R-Range. S-Section and subdivision.
 S-Size: G-Single snag. M-Camp fire. R-Square rods. A-Acres. T-Timber. B-Brush. O-Open. X-Burn or cut over.
 S-Slope: L-Level. G-Gentle. S-Steep.
 W-Wind (Velocity and direction): N-North. S-South. E-East. W-West.

New Frequency Amplifier Brings Faintest Waves In Strong

By George W. May, R.E.

RADIO-FREQUENCY amplifiers are now attracting considerable attention. This is due undoubtedly to the arrival in the market of a radio-frequency intervalve - transformer which incorporates many new and important features.

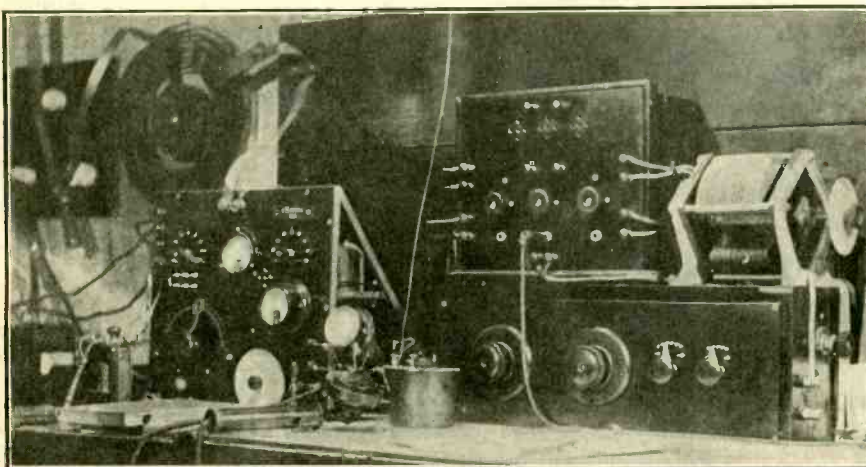
Heretofore, radio-frequency amplifiers operating on short-wave lengths have not been very satisfactory, and transformer-coupled radio-frequency circuits, even if satisfactory on short waves, could not be extended to cover medium or long-wave ranges without the addition of separate transformers. Where an operator desired to cover a band of wave lengths from 150 to 5,000 meters, it was necessary, therefore, to employ three or four different transformers. In a cascade amplifier employing three stages, twelve transformers were required to function over the band of wave lengths indicated.

The radio-frequency amplifier now being marketed, is designed to function satisfactorily over a range of from 200 to 5,000 meters. The windings of both the primary and secondary coils are provided with a tap so that each winding has three terminals for connecting the transformer for different wave-length ranges. Where operation is desired on from 200 to 5,000 meters, a small metal-strip is used to connect two of the terminals of each winding, thus short-circuiting the long-wave portions. Where operation is desired over a range up to 5,000 meters, this strip is disconnected and the full windings are used.

The very broad-wave length of this new transformer is only possible because a laminated iron-core is used. These laminations are extremely thin, and each piece of metal in the core is thoroughly insulated from its neighbor by a process of japanning. On short waves, the frequency of the incoming signals is so great that penetration of the core is negligible. As the frequency decreases with the longer waves, penetration of the core is greater, having the effect of increasing the inductance value of the windings. This action permits the transformer to function properly over a band of wave lengths that were previously unattainable.

Undoubtedly this improvement in the wave-length range of radio-frequency circuits will make them more popular. Reports are already being circulated of extremely long-distances being covered regularly by amateur receiving-stations.

Home-Made Long Distance Receiver



(c. Kadel & Herbert News Service, N. Y.)

The receiving set of the radio station shown in the accompanying photograph, constitutes a regenerative circuit with a detector and two-step amplifier. It proved a success when demonstrated by its builder, B. B. Duvall, of Baltimore. Mr. Duvall claims that he heard the United States Navy Station at Avalon, Catalina Island, California, approximately three thousand miles away, broadcasting a concert. To the left of the receiving equipment is the transmitter, which, with the aid of the other transmitter on the table, a voice may be broadcast through the radio transmitter to thousands of listeners. The transmitter on the left may be used for either voice modulation, straight continuous wave, or interrupted continuous wave.

Broadcasting on Bedloe's Island

ONE of the best-equipped broadcasters in the United States is the radio station on Bedloe's Island in New York Harbor, where stands the Statue of Liberty. It is operated by the United States Army, Lieutenant H. S. Paddock in charge. This station is familiar to hundreds of radioists by its call letters, WVP. It was opened about eight weeks ago for general broadcasting on a wave length of 1,450 meters—one that is particularly free and clear and that permits of very little "jamming."

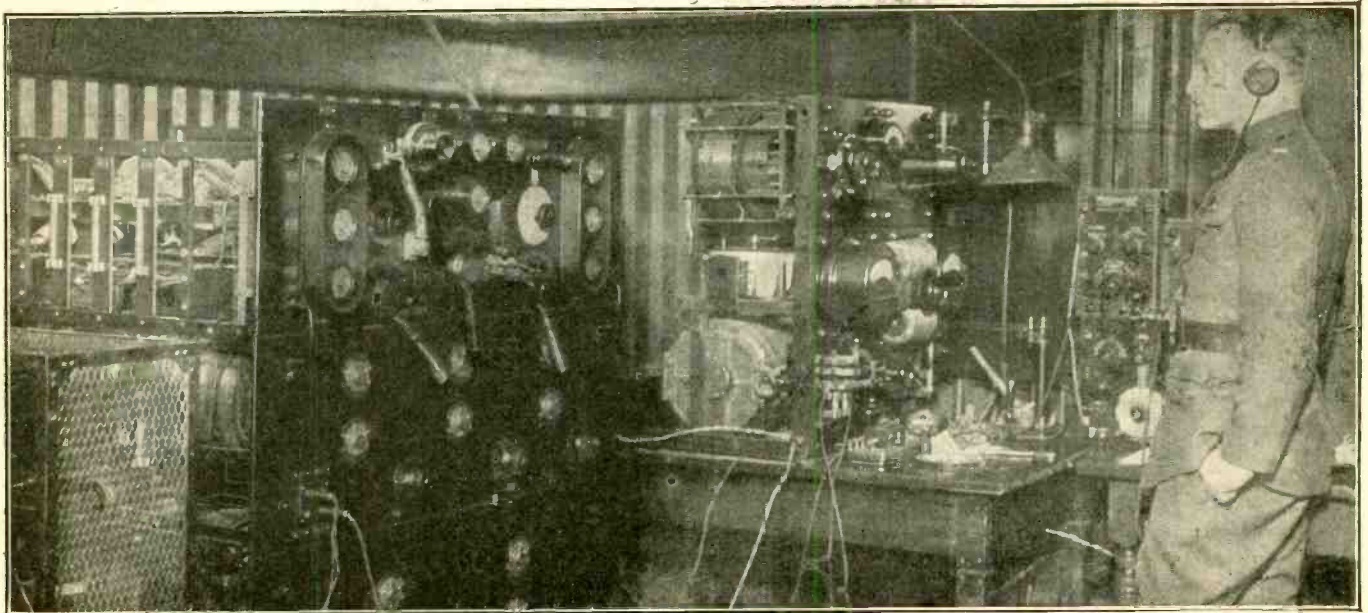
The photographs give one a splendid idea of the important characteristics of an up-to-date station. At the left of the photograph at the bottom of the page, is the large transmitter which sends music and the human voice on their long journey. Note particularly the mouthpiece on the panel with its many switches and meters which indicate the various wave lengths and the degree to which the matter being transmitted is modulated.

The station on Bedloe's Island has every possible modern device and is one of the best in the government service.

In the photograph to the right, Lieutenant H. S. Paddock, Post Signal Officer, U. S. A., is explaining to Miss Margaret Walz, Philadelphia's first policewoman, the mysteries of the "soup plate." In polite radioese, a "soup plate" is a transmitter used in broadcasting. The photograph across the bottom of the page shows the interior of the United States Army broadcasting station—WVP—at Bedloe's Island, New York Harbor, Lieutenant Paddock is the officer in charge.



(Photographs copyrighted by Keystone View Co., N. Y.)



Radio World's Hall of Fame



HAROLD J. POWER

Declared by many to be the pioneer of broadcasting. His realization of the universal importance of radio broadcasting led to the establishment of the world's first station in 1921—the big station operated by the American Radio and Research Corporation at Medford Hillside, Mass. Mr. Power experimented for a year, when a boy, first in his mother's kitchen and later in a shack he called a laboratory, before he received from the Boston Navy Yard his initial message over the crude instruments he had constructed.

Harold J. Power

Established a Daily Broadcasting Station in 1921, after Years of Struggle

By *George H. Flint*

HAROLD J. POWER, of Medford Hillside, Massachusetts, was one of the first men to realize the universal importance of radio. And this realization led to the establishment of the world's first broadcasting station in 1921. He probably deserves the title of "Pioneer Broadcaster."

Mr. Power first became interested in radio during a certain half hour in a grammar school, back in 1904, while he was struggling through his writing lesson, endeavoring to add genuine Spencerian touches to his chirography. He was then in his eighteenth year. Across the top of the copy book was a sample specimen of handwriting for the pupils to copy. The sentence read: "Marconi, the inventor of the wireless telegraph." It became riveted on young Power's mind. The name "Marconi," and the word "wireless" danced before him as if imbued by magic. Electricity had attracted Harold Power since he was a boy. He was familiar then with the use of batteries and simple apparatus. He thought that if he could send a wireless message across the back yard of his home he would accomplish something really wonderful.

Finally, he determined to accomplish this feat. He tried to find out how to make a wireless set. At that time—eighteen years ago—no books had been published in the United States on the subject. The only material available were a few short articles that had appeared in the scientific magazines.

The first outfit of Harold Power consisted of simple metal-filing coherer with a relay and the telegraph sounder. He put up the set in his mother's kitchen. He reconstructed an old soap box into a table. Then he attached a little post to his mother's clothespole in the yard, with the wires running down from it.

One year later, he received his first message. However, he had determined that he would have struggled for that message if it had taken fifty years. Many times he was discouraged, but his mother spurred him on to succeed.

Mr. Power received his first message from the Boston Navy Yard, situated about five miles from his mother's home. That was the hap-

piest day of his life, he says. He managed to catch about one-fourth of the message—about three or four lines. His instruments did not work consistently.

The message came through early one morning. Harold Power rushed to his grandmother's room and made her jump out of her to hear the marvelous sound. He was so thrilled that he rushed into the homes of several of his neighbors and aroused them. Their only comment was to call him a fool.

Gradually the young man improved his equipment, as new improvements were made. In 1909, when the American battleships returned from their historic trip around the world, his equipment was fairly well perfected and his little station was one of the first to pick up the information of the incoming ships a thousand miles out at sea. The operator at the Boston Navy Yard was surprised when he learned that the message had been received. It was difficult to convince him that a wireless message had come over a thousand miles.

In the spring of 1909, Harold Power was listening in one morning and heard the steamship "Harvard" calling to the Boston Navy Yard. The Navy Yard station was not operating, or the operator was not on watch, for the ship received no response. She had many important messages and was anchored down the harbor in a heavy fog. Power called the "Harvard" and offered to deliver the message to the local office in Everett and despatch them. The outcome of this was that the company owning the equipment on the "Harvard" offered him a position the following summer as commercial operator on the steamer "Yale," plying between Boston and New York. He was then sixteen years old.

Through the effort of the Reverend G. G. Hamilton, he entered Tuft's College on a Scholarship. Before he could finish his course, the donor of scholarship died and the young man's plans had to be abandoned. His dreams of a scholarship went-a-glimmering, but as he had spent two years preparing for college, with characteristic pluck, he decided to go anyway. Not only would it be necessary for him to pay his college expenses, but he also had to help out at home. The

best way to earn a nest-egg in a short time, he reasoned, would be to teach. And he decided the only subject he could teach was wireless.

When he went to the physics teacher in the local high school and told him he would like to start a class of wireless telephony at the evening school, the teacher was interested and brought it before the committee. The members only laughed and said it was presumptuous of this boy to think he could teach working boys, who lacked even a high school education, to operate a radio set. They turned him down, but he went back. "Give me a room in the high school building and establish a class as a regular course in evening school," he urged. "I agree to teach for one year without salary unless one of my students qualifies for a position as a commercial radio operator."

The Evening School committee probably agreed, because they thought they would never have to pay him that salary. Discussing this, Mr. Power says:

"Never will I forget the first night the class met. There were about thirty students enrolled, every one of them old enough to have been my father. I was very timid. When I got up before that class of men to start instruction in radio telegraphy, I lost my voice. My knees didn't bother me, but my voice just went completely. Yet I knew I had to make good. I had to have that position, so I forced myself to continue. I worked hard that year, because I found out I knew very little about radio myself. It was the most valuable experience of my life, because it taught me to study."

Needless to say, that school committee had to pay him a salary. Two students qualified as operators after the first term.

The next fall he entered Tufts College with \$30 and a lot of courage. Three days later he had barely \$5 left, and had not purchased all the books. He saved car fare by walking to Everett, six miles away. His term bill came due. It was \$75 plus a lot of extras. He decided that he would pay that bill. On the same day he received a notice from the Evening School committee that he had been appointed a regular teacher on the school staff at \$2 an evening for three three evenings, which was \$6 a week.

Broadcasting at WJZ

How They Sing and Talk into the Transmitter at Newark

By Golda M. Goldman

MR. AND MRS. Listener-in allow me to present the man-behind-the-voice, Announcer A. C. N., of the Newark Westinghouse Station, WJZ. In real life, he is Mr. Thomas Cowan—a pleasant young man of medium height, with curly blond hair. After the police sergeant at the door of the Westinghouse factory had passed me on to another policeman on the stairs, I was greeted by the original announcer himself. The agreeable voice sounded strangely familiar, so I felt at home at once.

The reception room is not at all romantic; it is, in fact, merely the general office of the Westinghouse Company, and, at night, notwithstanding the lights and the ever-present police, it has a queerly deserted look. As Mr. Cowan and I were getting acquainted, the performers for the evening arrived—Mr. Charles B. Isaacson and a group of artists who were to give the evening's entertainment. The group included Signor Renato Zanelli, baritone of the Metropolitan Opera; John Meldrum, a blind pianist; Miss Margarite White, soprano, and Miss Alice Clausen, pianist.

Before being taken into the studio, we were shown the most interesting exhibit in the office—a large map of the United States, thickly dotted with red and green pins. These pins represent the places from which letters have been received from listeners-in who have been entertained by the WJZ concerts. Recently the great antennas on the roof were raised to a greater height. The red pins represent letters received before this was done; the green are those received later. As the improvement was in clearness rather than in carrying power; there are no green beyond the red. To my amazement, I saw pins in San Diego, California; Seattle, Washington; Cuba; Panama, and north almost to faraway Labrador. Near the chart, Mr. Cowan pointed out a letter.

"That," he said, "is from a naval officer whose ship was only two hundred miles off the coast of France when he wrote it."

We entered the studio, where the entertainments are broadcasted. I thrilled in anticipation, expecting to see a place of sumptuous proportions and exquisite furnishings. What I did see was a long, very narrow room,

with bare white-washed walls, and a quantity of old office furniture. In one corner stood a grand piano. Along the wall was a pianola; opposite were two victrolas. Above the piano, striking an incongruous note, was an oil painting of a Spanish lady in a black mantilla.

"That," Mr. Cowan told me later, "is my own. I brought it from my own home when I wanted to transform the place into a proper setting for the opera 'Thais' one night, when Mme. Namara, of the Chicago Opera Company, sang here."

Near the grand piano Miss Florence Smith Vincent was talking slowly and distinctly into a black box which stood at just the proper height, upheld by a nickel tripod. Such an innocent-looking object is the famous microphone—the means of transmitting sound to millions of people at once. As nearly as I can describe it, it looks like an ordinary receiver multiplied, perhaps, a dozen times. I had looked for a large and elaborate mechanism for transmission—I found a little black box!

When Miss Vincent finished her animal stories, Mr. Isaacson's concert began. The radio instrument is so very sensitive to every sound that no one can speak in the room while the switch is open, so we all maintained an unearthly silence, and scarcely dared breathe. First, Mr. Meldrum played a Beethoven composition and I thought that, perhaps, this blind pianist who played so feelingly, would be in closer touch to the unseen multitudes who were listening than any of those who were to follow him. Mr. Zanelli then sang the *Largo al factotum* from "The Barber of Seville," and followed it with a spirited Spanish-dance number.

I Am Radio

By George Schubel

INSTANT messenger of sympathy and love

Servant of parted friend,
Consoler of the lonely,
Bond of the scattered,
Enlarger of the common life.

Carrier of news and knowledge,
Broadcaster of Happiness and Truth,
Instrument of trade and industry,
Promoter of better understanding,
And of peace and good will among men.

Then Mr. Isaacson read his "Face to Face with Beethoven." In the midst of this, one of the special police beckoned me out of the room, and invited me to go up and see the radio office on the roof. Up we climbed to a little office ablaze with light, where I found Mr. O. G. N.

"Oh, I said, "I'm so glad to meet you. I have heard you speak over the phone so many times, We can hardly tell your voice from that of your brother.

"My brother?" said Mr. O. G. N., looking puzzled.

"Well I suppose it's your brother, as the last initial is the same and your voices are almost identical. He calls himself 'Announcer O. H. N.'"

"I see," said O. G. N., laughing. "I guess most people make the same mistake. The first letter, A or O, means announcer or operator; the final means Newark, and the middle initial stands for the speaker's last name. I'm 'Announcer O. G. N.,' which, translated, means 'Operator Guy, of Newark.' An operator is a man who not only announces, but understands this mechanism up here as well. When you are called announcer, you just introduce the entertainers."

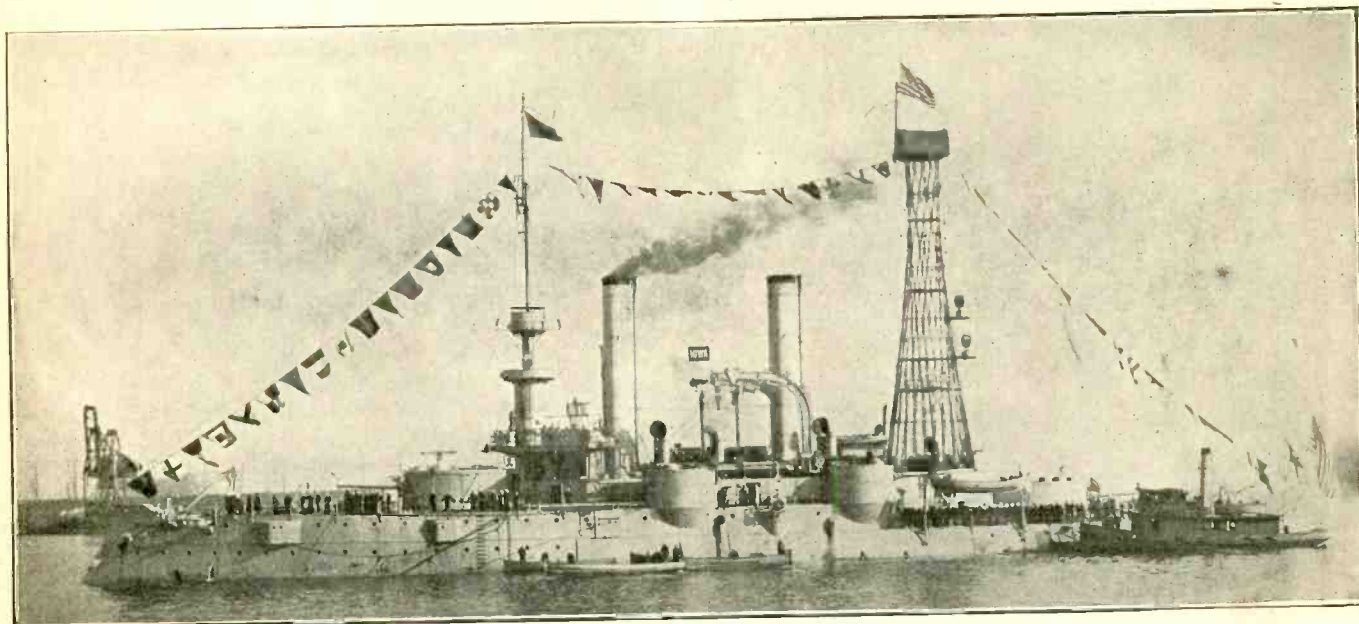
He then let me listen over his receiving set, which can easily be regulated in loudness. "I can make that so loud," he said, "that it would burn out the phones."

He touched a switch. Suddenly an object on the table which looked like a round electric-heater with an asbestos back, began to sing! This is called a phonotron. It can be regulated so that its sound will fill a large hall. The effect is quite like that of a victrola, except that it is, of course, very much clearer, as that mechanical sound is entirely absent. One of these in every home would have the advantage of always providing the latest music. And its versatility! One could tune it down soft and low to croon the baby to sleep, or put the little folks in a circle on the floor while the Man-in-the-Moon tells them their bed-time story; or let it out and start the folks dancing! No end to its possibilities.

"And here," said Mr. Guy, "is the famous and so-called mysterious, black box."

He handed me a box about the size

Radio-Equipped "Iowa" to Be Sunk



(c. International)

Radio will play a very important part when the famous battleship "Iowa," once pride of the American Navy, will face the mighty guns of the Great Atlantic Fleet only to be sunk. The "Iowa" is completely fitted with radio control that makes it possible for her to be controlled from another vessel without having a man aboard. If one remembers, last fall, this vessel was under constant radio control from the Naval radio experimental ship, "Ohio," while airplanes hovered overhead in order to test various types of bombs. Some 600 changes were made by radio and the "Iowa" responded to every move that the commander of the Ohio made. Next month when the "Iowa" steams past the Delaware Capes for the last time, she will be sent in a hunt-and-chase-game by radio only to be found by the Atlantic Fleet and sunk by the fire of the huge dreadnoughts.

(Continued from preceding page)

of a large cigar box with one receiver. No wires were attached for either ground or aerial. He told me to take it out on the roof.

Of all the uncanny experiences! Out on the roof, above the lights of the town, with the two great antennas of the wireless station stretching upward, one hundred and twenty-five feet, like giant masts, I held this little unattached box in my hand, put the receiver to my ear, and heard Miss White, who was several floors below me, finish the "Slumber Song." It gave me the most indescribably strange sensation. Can you fancy the day when we will all carry something of the sort around with us?

I finally tore myself away from the roof, and returned to the studio. Miss Clausen was at the piano, accompanying Miss White. I had not previously noticed a little receiving set which was in the room. I put on the phones, and heard "The Dance," by Rossini, come back into the room which they had barely left. They had been up in the air and returned again!

Then the Isaacson concert was over. The genial Mr. Isaacson, the spontaneous, bubbling Zanelli, and the other entertainers departed in a laughing crowd. Mr. Cowan settled down to telling me the history of the broadcasting movement.

This work began, last October, with the broadcasting of the World's Series, at the Polo Grounds, New York, in the daytime, and victrola concerts at night. From that it has assumed the present elaborate proportions. Mr. Cowan, who used to be in charge of the welfare work and entertainments for the Westinghouse Company, is responsible for the concert work in Newark. He bears the proud title of "the original WJZ."

"We've just started," said Announcer A. C. N. "This will be the greatest thing in the world in a few years. We'll give you complete operas and plays!" He became enthusiastic. "We'll have a really fine studio, large and well furnished." He went on to give me a glimpse into the way in which he intends to bring the finest things in the artistic world, not into the theatre, but into our homes. It is a wonderful vision and, as he handles it, a fine ideal.

When I could think of no further excuse for lingering in that fascinating atmosphere, I started for home. When I reached my own library, thrilled to the finger-tips by my close-up of radio, I was still in time to hear over my own set the conclusion of Major Vivian Gilbert's lecture on "The Romance of the last Crusade with Allenby in Palestine."

Sailor's Regard for Radio

Every seafaring man believes that radio belongs to the sailor, claims Lieutenant Commander D. C. Patterson, district communication superintendent of the United States Navy.

"He has good cause for this belief, too," says Lieut. Patterson. "It's practically the only means of communication he has.

"Our greatest service is rendered to the mariner. He receives not only news, both general and personal, but weather forecasts, chronometer time and reports of danger in his path at sea. Letters come in daily from all the seven seas telling how the naval radio has helped guide some ship.

"Before the recent radio convention in Washington was called, the director of naval communication requested my views. I told him we suffered absolutely no interference from the amateurs or broadcasting stations."

Heard 5,000 Miles

A twelve-tube receiving set with a one-meter loop antenna, in Paris, France, has been used in recent radio experiments. Experts have found that, with this instrument, they could detect low power transmission up to 5,000 miles away, under ordinary conditions. Besides detecting and amplifying, the tubes have succeeded in filtering out a great deal of static and other worries.

How to Construct, Protect, and Operate a Storage Battery

By George W. May, R. E.

THE storage battery—these cells of electrical energy are of vast importance. All wireless or receiving outfits, now on the market, equipped with a vacuum tube, require two batteries, technically known in the trade as the A battery and the B battery. The A battery is a storage battery of relatively low voltage and high amperage, while the B is just the opposite.

First of all, we shall endeavor to outline the construction of a storage battery, the plates of which are constructed chiefly of lead. The plates are generally cast and the pores are filled with oxides whose component parts are varied, thus producing what is known as a positive and the other a negative plate.

The plates are made in various sizes, depending upon the capacity called for; capacity, in turn, being figured as to the size of the plates, area of plates, and number or group of plates assembled. When a cell is ready for assembly, an even number of plates are connected to a strap preferably burnt on, and of an uneven number, attached in the same manner to another strap. There is always one more negative than positive, this being necessary to keep all surfaces active at all times.

Now that we have the plates assembled, we will endeavor to interleave them; but when this is to take place, we must provide some means for preventing the plates from touching each other. This is accomplished by placing some insulator between each plate, the purpose of which is to prevent the plates from being short-circuited which, in time, would probably kill the battery.

Experiments with rubber, mica, and glass were made, but experts found out that a very good wood separator was far better than any of the above mentioned separators. It has been noticed under experimentation that when batteries were assembled with different insulators and placed on test, the one containing the wood insulator showed up far better than insulators previously mentioned.

In one examination of hard-rubber insulators, we found that, with a jarring of the battery, small pieces would break off, or, in fact, break up and have a tendency to fall downward be-

tween the plates. It is evident that with these hard-rubber bits falling down, portions of loose active material would be carried out of the pockets or grids; and, probably, by the time they worked their way to the bottom of the cell would loosen and rip other portions of the cell. This does not so happen with wood as the acid soaks the wood to such a degree that, being of a wet nature, bits that do drop are so small they rarely carry any active material with them. Should a poor quality wood be obtained and used in the construction of the battery, the user will find that, for filament lighting howling noises will be experienced. Most radio folks blame this on the receiver—preferably the tubes—whereas the cause is the battery which has possibly passed its stage of perfect operation.

The mere fact that your filaments are burning to a great brilliancy, and signals are received, does not indicate that you have a good battery. A question that is very often asked by the newcomer in the game of radio is, "Will an automobile storage-battery do for radio work?" Evidently the answer is "Yes;—but there are several other features of the case that may make a difference."

There are storage batteries especially designed for radio apparatus that have characteristics which differ from the storage battery manufactured for automobiles, telephones, and other special work. An automobile battery is made up with very thin plates and separators in order to enable the battery to give a very high rate of discharge for a short time. This of course is necessary when the battery is used for starting the automobile. In the automobile the battery is constantly being recharged and will hardly ever be left fully discharged as a radio battery is. Thin plates and separators are satisfactory for such service, but when the battery is allowed to stand discharged, time after time, the requirements call for heavy plates and separators.

In radio work, the discharge rate is very slow and the heavy thick plate gives a steady voltage, which is much to be gained in radio work. The thin plate battery may fluctuate considerably with the consequent change of signal strength. Each type of battery

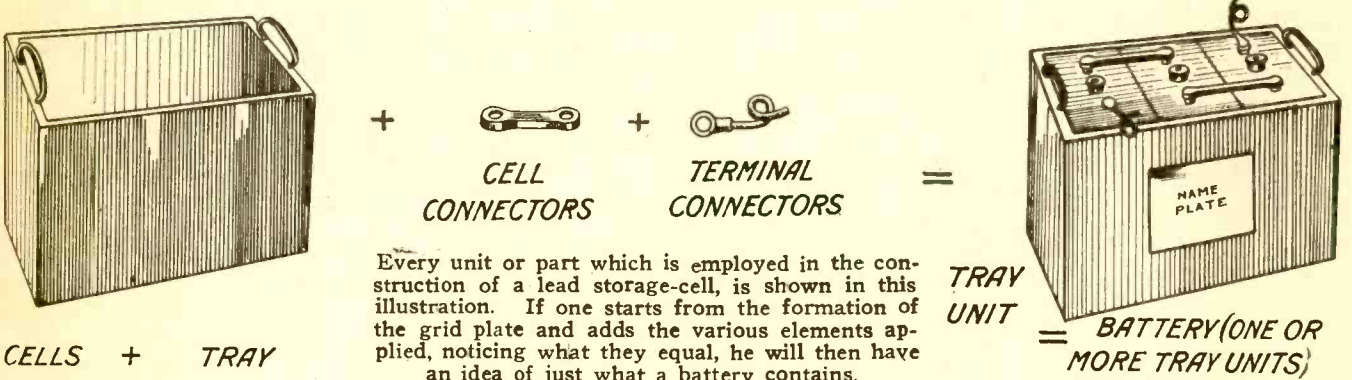
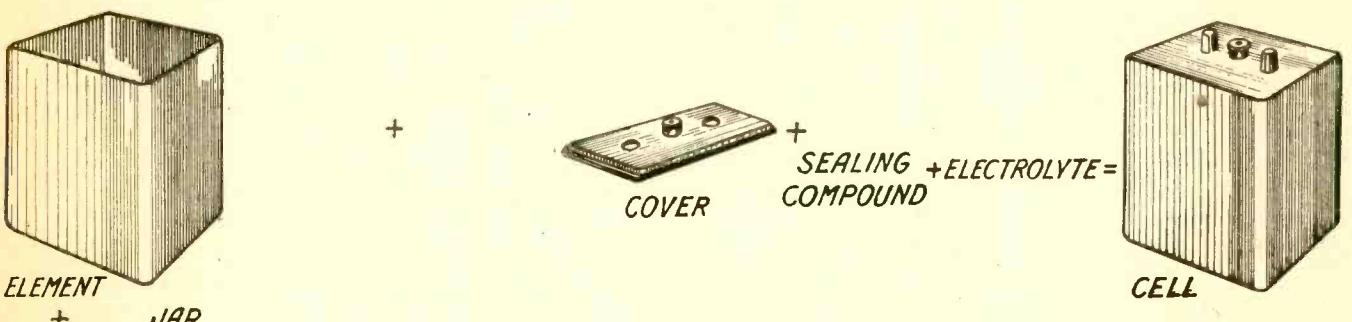
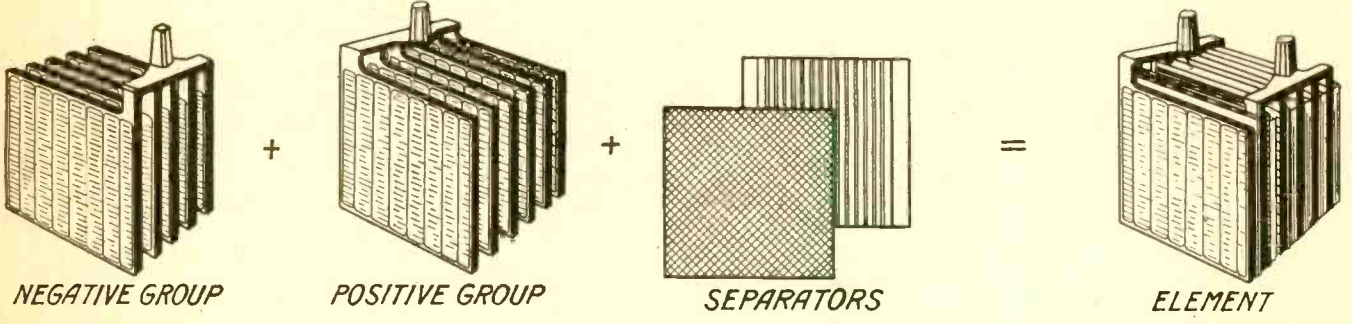
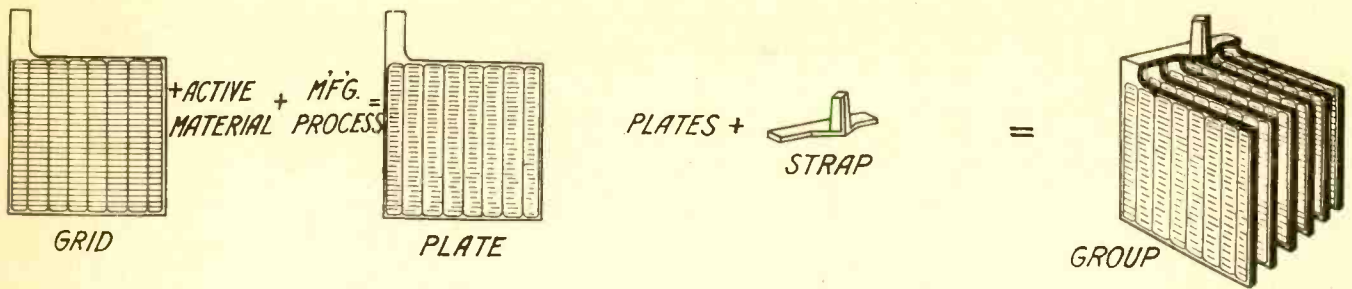
is built for a certain type of work, and while the automobile battery may be used for radio work it would not prove economical or efficient.

Many of the so-called radio stores that have sprung up recently, are selling storage batteries to beginners. Many of these storekeepers have no extensive knowledge of electricity and will place a battery, for a test, with the prospective customer. With a heavy piece of wire, they will cross or short the terminals and, of course, a hot spark is secured. This test means nothing, and is the worst punishment a battery can have.

Another idea; many batteries are sold at bargain-counter prices for radio work. I call your attention to this so as to be sure and consider before purchasing a higher-priced article at a low figure. It is a sure sign that there is some reason for such a sale. Be careful of rebuilt wartime batteries, as they are merely batteries whose positive plates and insulators have been replaced and the old negative plates used. There is no question that these batteries will operate perfectly in automobiles; but for radio work, where a steady voltage is required, the result will not be obtained, causing an annoyance in the functioning of your receiver. It is better to pay more and get a new article.

Storage batteries are rated in volts and ampere-hours. The radio battery should never exceed six volts as the vacuum tubes are built for this voltage. If an eight-volt battery is used, the tubes will either burn out immediately or will be very short-lived. The ampere-hour rating means that the battery will deliver one ampere for as many hours as stated. Thus a forty-ampere hour battery will deliver one ampere for forty hours. Naturally the higher the ampere-hour rating the longer the battery will go without recharging.

But there is another important factor to be taken into consideration. The higher the rating of the battery the more it will weigh and if the battery has to be taken out to be charged, the user will find that it may take two men and an auto to get the battery to the charging station. A small-size battery of, say, forty-ampere-hour capacity may be used, and in this case it may be good to have two batteries,



Every unit or part which is employed in the construction of a lead storage-cell, is shown in this illustration. If one starts from the formation of the grid plate and adds the various elements applied, noticing what they equal, he will then have an idea of just what a battery contains.

so that when one is being charged the other may be used. These batteries weigh only about thirty pounds and may be transported easily by hand.

The most efficient way to use the storage battery is to have a good rectifier at home and charge your own battery as it gets low. The rectifiers may be purchased for a reasonable sum and the amateur who owns one is, indeed, lucky. With the charger, it simply means that a large capacity battery may be installed because it won't have to be moved; and, about every third or fourth night, the battery may be left on charge all night. Thus it will be seen that there will never be a shut down of the radio set owing to the discharged condition of the battery. This is, by far, the best way to use a battery as it will be kept charged up and in good condition.

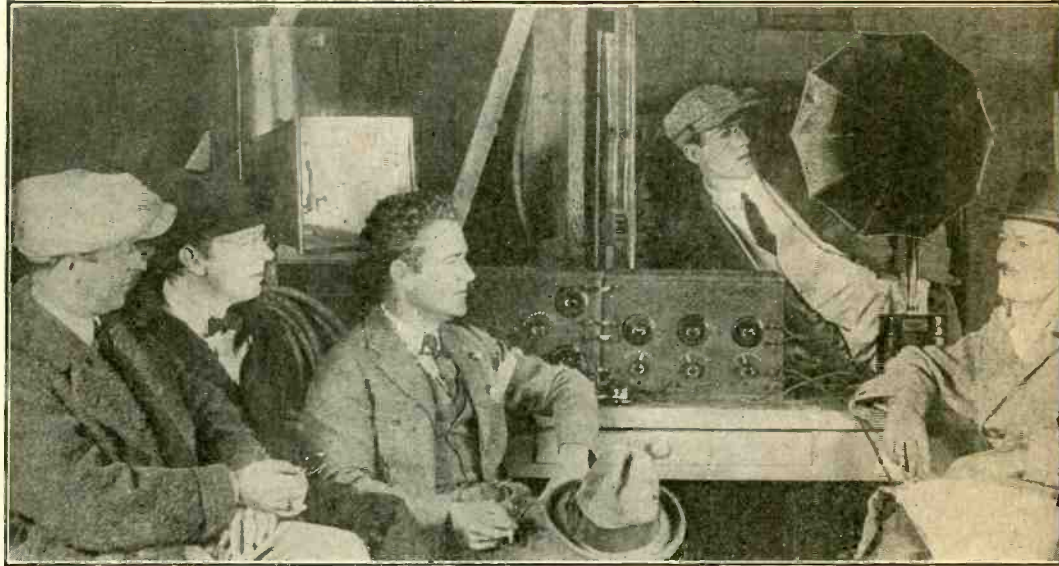
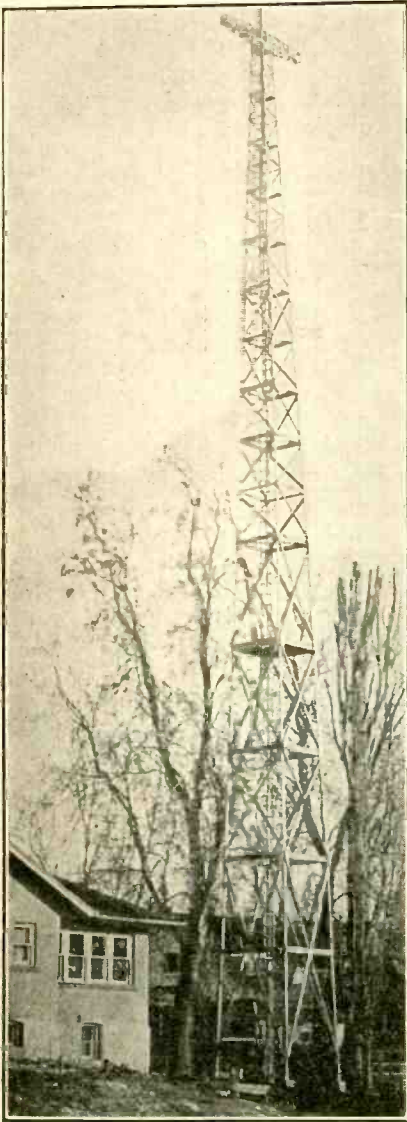
The only sure test for the storage battery is the hydrometer test. This instrument may be purchased for a very reasonable sum and it consists of a glass tube with a rubber bulb at one end. Inside the glass tube, is a small float. The end of the tube is placed in the liquid inside the battery and the bulb pressed. This will exclude the air, and when the bulb is released, cause the liquid to flow up inside the tube. The inside float will then rise with the liquid. The man who is doing the testing then looks at the little float to see what the reading is. On close inspection, it will be seen that the float is divided into small divisions ranging from 1,100 to 1300. If the battery is fully charged, the hydrometer will read 1280; if it is discharged, it will read 1225. The battery should not be allowed to stand when the

reading shows 1,200. Sometimes the battery will show an overcharge. This condition is about as bad as the discharged condition, and readings should be taken frequently to see that the battery is in good condition.

A storage battery is a rather delicate affair, even if it does weigh a lot, and care must be taken to see that it does not deteriorate quickly. With good care, a battery for radio work should last for several years. The liquid inside the battery is composed of sulphuric acid and distilled water. This counteracts the acid and makes it harmless. Occasionally the liquid in the battery will get low. In this case, never add acid but simply add enough pure distilled water to cover the plates.

The four disadvantages of a lead type battery are mechanical weakness, buckling, sulphation, and short life.

How Radio Is Being Used in Various

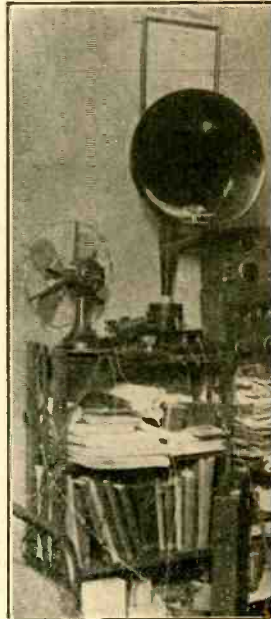


(Left) One hundred feet is the height of this tower, built by J. M. Cope and L. Cornwell, sixteen year-old, Salt Lake City boys. They have caught messages from as far west as Oakland, Cal., and as far east as Schnectady, N. Y.

(c. Keystone View Co.)

(Below) Daniel J. O'Brien chief of the San Francisco Police Department, has become such a rabid radio fan that he is hoping to equip the men of his force with radio outfits in order to keep in touch with them. This is being done in Chicago.

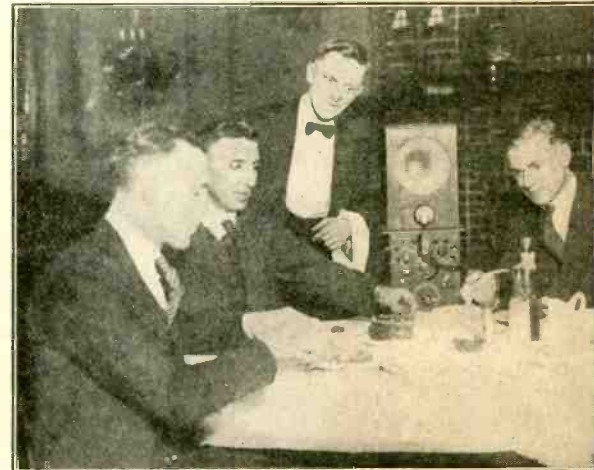
(c. International)



By means of the radio-
phone in a Philadelphia
broadcasting station,
Col. Franklin D'Olier,
former head of the
American Legion ad-
dressed thousands on
Americanization. He
was clearly heard, it is
claimed, as far West as
Salt Lake. He spoke
in Washington, D. C.

(c. Keystone View Co.)

Mr. James W. Cook is
has a radio in his apart-
much noise! However,
tage. An inspection of



is Ways for Usefulness and Pleasure



(Left) Reading from left to right—Frank Urson, Mat Moore, Marshall Neilan, George Dromgold, Raymond Griffith and Beatrice Joy in a moving-picture studio spending an idle hour listening in.
(c. Underwood & Underwood)



(Right) No human voice ever went so far as that of Secretary Wallace, of the Department of Agriculture, when he radioed his Arbor Day speech. Experts claim that his voice was heard at one time by more people than any other person's voice since the world began.
(c. Underwood & Underwood)



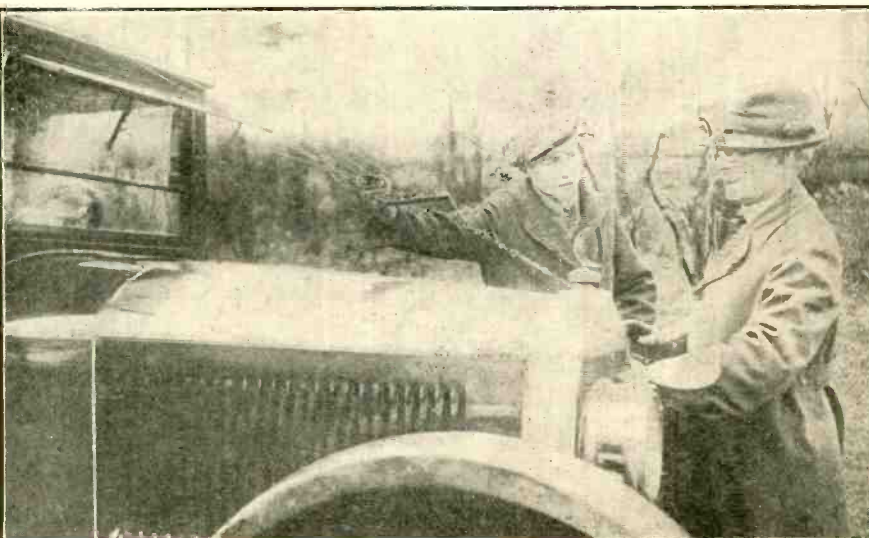
one of the enthusiastic radio fans of Washington. He ment—out! the other tenants claim that it makes too there should be an easy way to quell such a disadvantage the photograph shows that Mr. Cook has a pretty complete outfit.
(c. Underwood & Underwood)



The radio receiving-set on the Pioneer Limited, the fast train on the Chicago, Milwaukee & St. Paul. Passengers in the club car photographed listening in while a concert is coming over the ether. The Pioneer is one of the fastest trains in the United States.
(c. Underwood & Underwood)



(Left) A corner in the Turn Verin dining room, Brooklyn, N. Y., where radio has been installed for the benefit of the club members. This is the first club to use radio in this way. A loud speaker is connected up with the receiving set.
(c. Underwood & Underwood)



(Right) a Chicago physician has rigged up his motor-car for radio reception. His aerial is strung from the radiator shell over the top of his coupe to the tire rack in the rear. The doctor can receive messages when he stops and makes a grounding.
(c. International)

The Radio Primer

A. B. C. of Radio for the Beginner Who Must Have all Primary Facts Put Plainly and Accurately, and all Terms Fully Explained

The Beginner's Catechism

By Edward Linwood

AFTER the waves have passed through tuning coils and variable condenser, what do they next affect?

In simple set, the detector.

What is a detector?

A detector is a device which is placed in a wireless-telephone receiving-circuit to intercept the waves as they rush through and so alter them that they can be heard through a pair of telephone receivers.

Why is this necessary?

Because the waves as they pass through the air are too rapid for our ear to catch and for our brain to report. Radio waves, when they leave the broadcasting station, travel nearly 830,000 a second. Our ears were never made for radio reception; therefore, detectors are fashioned for waves moving at the rate of 10,000 a second, or less. Our ears are made to pick up speech, and speech is seldom carried by sound waves at a speed greater than 8,000 a second. There is a big difference between 12,000—the limit of the human ear—the 830,000 of the radio waves. If it were not for the detector, we would never be able to listen to broadcasting, even though the waves were passing around and through us continually.

What is there about a detector that gives it this wonderful power?

To answer this question it will be necessary to divide the detectors into two classes, the vacuum-tube detector and the crystal detector.

The crystal detector is the simpler and the older of the two. It was with a crystal detector that many of the early distance-records were made. It consists of a certain piece of crystalline metal suspended in a cup in such a way that a fine spring-wire can be swung around onto it at any point. It is the contact between the fine wire and the crystal that provides the detector action.

What crystals are used?

Among others, carborundum, silicon, galena, molybdenum, radiocite, chalcopyrite, bornite, and zincite. The first five are used alone with the fine wire. The other three are used in pairs—one crystal bearing on the other.

Why can these crystals change the speed of the radio waves?

Because of a peculiar property which they have of letting only part of an electric current pass through them. As you have read in "The Primer," in preceding numbers of

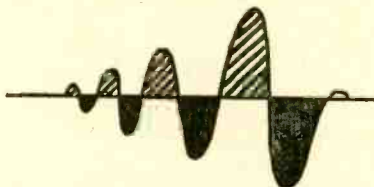
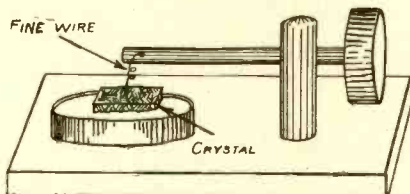


Figure 1. Diagram of radio wave as it passes around through tuning coil and condenser. Solid-black part represents positive wave; cross sectioned part, the negative wave.



Figure 2. After passing through detector, wave of Figure 1 has been reduced to this form. The negative wave has been strained out by the crystal.



Simple crystal-detector. The fine wire bears on a sensitive spot on the crystal.

RADIO WORLD, all radio waves, when they pass through the air, are in the form of a wave, one-half of which is traveling in a positive direction while the other half is traveling in a negative direction. This is illustrated in Figure 1. Now a crystal of one of the substances mentioned above has a fondness for the positive kind of elec-

The Radio Primer has been published regularly in RADIO WORLD since issue No. 1, and will be a regular department in order to instruct and aid the many thousands of amateurs who are joining the ranks of radio enthusiasts every week.

tricity, but won't have anything whatsoever to do with the negative kind. The crystal opens wide its door to the waves that are positive, but the door is slammed in the face of the other waves. This exclusiveness of the crystal is a fortunate thing for us. If the radio waves are trotting around our receiving circuit at a tremendous speed and we insert a detector in their path just one-half of all the waves

Wouldn't the frequency of the waves, that is, the number of times they occur a second, be still too much for the ear?

That is quite right, but the story is only half told. Suppose we started with a spark, or a transmitter, which sent out 800,000 waves a second. By eliminating half of them, we have cut down the number we must account for, to 400,000. This is still forty times faster than the ear can appreciate. So we come to an instrument called the telephone. And in order to make the entire action clear, the phone will be described before we have completed the detector.

However, as the two devices really work together they should be described in the same way.

What is a head phone?

A radio head-phone consists of a twin pair of pieces of soft iron about half-an-inch high, a quarter-of-an-inch broad and, perhaps, a sixteenth-of-an-inch thick, around which are wound hundreds and hundreds of turns of very fine silk or enamel-covered copper wire.

The end of the wire from one of the little coils is then connected to the beginning of the second coil.

What is an electromagnet?

An electromagnet is a piece of soft iron around which a large number of turns are wound; the wires from the latter being connected to a supply of electricity. The term, "electromagnet," is used to distinguish this type from so-called "permanent magnets." Electromagnets do not produce magnetism until the current passes through the turns of wire, while permanent magnets, as their name implies, retain their magnetism imbedded in the steel or iron out of which they are made.

But my phones have magnetism even when they are disconnected. Why is that?

That is done intentionally. The iron centers of the magnets are a combina-

The Radio Primer (Continued)

Tuning and What Is Meant By It

AS described in this installment of this article, published in RADIO WORLD, No. 5, the receiving antenna must be altered in some way so that its wave length is equivalent to that of the station sending the message. This is the reason for *tuning*.

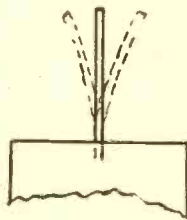
There are, in reality, three ways of doing this: By changing the length of the receiving antenna system; by adding inductance; by adding capacity. Most amateurs, of course, are not equipped to change the length of their aerials to accommodate various wavelengths, hence one or both of the other methods must be used.

The tuning coil in any of its forms, such as the one- or two-slide tuner, the loose coupler, the variocouples and the variometer is a device for adding inductance to the antenna. The variable condenser stands alone as the device for adding capacity to the receiving station.

If an aerial does not contain sufficient inductance for a given wavelength inductance can be added in the simplest manner by inserting a coil of wire consisting of several turns of wire wound around an insulating tube. The phone and detector will be placed in series with this coil. By series, we mean that the wire from the aerial is connected first to one end of the coil and that the other end of the coil is connected to the detector. From the other binding post of the detector the wire leads to the phones and from the phones to the ground.

But this arrangement, while simple, is very inefficient because of the extraordinary resistance which has been in-

serted in the aerial circuit by the detector and phones. A high resistance in a radio circuit carrying the high-frequency currents of a radio message means that the electric impulses will



A spring set in vibration will move from side to side until the friction of the air brings it to a stop. If the spring is vibrated in a liquid it will come to a stop sooner. The decrease is similar to "damping."

be killed down too rapidly. The situation can be easily pictured in this way: Suppose that a steel spring is held in a vise, as shown in the illustration. The unsupported end is snapped back and released. The spring will swing from one side to the other too fast for the eye to follow, and, gradually, due to the resistance and friction of the air, it will slow down and come to rest. Now, if the same spring is made to vibrate in a liquid, such as water, it will move from one side to the other, but due to the heavier resistance of the water, it will come to rest much sooner than in air. When a resistance in the form of a detector or phones is inserted in a high-frequency circuit, the effect is the same as when the spring was vibrated in water. The energy is lost in heat, and the impulse comes to a rest sooner than it should for good reception. A wave, under these conditions, is said to be *damped*.

Realizing the faults of this simple circuit, it is evident that the inductance must be added to the same amount but

in such a way that the phones and detector can be added to the circuit without increasing to such a great extent the wasteful resistance. In practice, this mode of tuning is accomplished by means of a double coil or transformer, called in radio parlance, a "loose coupler."

With a loose coupler, the proper amount of inductance is added to the circuit by increasing or decreasing the number of primary turns used. The primary coil is the outside coil. When this has been done the antenna circuit is said to be *tuned*. But the antenna circuit contains no detector or phones or means for picking up the sounds. This is achieved by inserting the outer coil, a second coil of wire called the *secondary*. There is no connection between the two coils. But when an electric current flows around through the turns of the outer coil each turn is surrounded by areas of magnetism. If the secondary is then brought relatively near the first coil, the magnetism will cause little currents to start in the secondary and instantly there is a full current in the inside coil corresponding to that of the outside coil. If the current in the outside or primary is varying at the rate of 100,000 a second, then the current in the inside coil is imitating it at the same rate.

The primary has already been tuned to the incoming radio-wave. To make the station complete, the secondary circuit must now be tuned to accommodate the same wave, then both primary and secondary will vibrate in unison. When this has been accomplished the set is said to be tuned.

In tuning the secondary, we are again confronted with the necessity of supplying inductance and capacity in the desired amounts. The secondary coil, of course, supplies the inductance. It also supplies some of the capacity, because there is a miniature condenser between each two turns of wire. Between each wire connecting the various parts of the receiving set and the ground, there is another condenser. But these condensers are fixed. Their capacity is a certain amount and is not easily changed. So to provide a sensitive change in capacity, a variable condenser is inserted in the circuit.

If the condenser and coil are considered at length, they will be more easily understood especially as regards their relation to fine tuning.

A continuation of this article on tuning, will be published in next week's issue of RADIO WORLD.

(Continued from preceding page)

tion of permanent and electromagnets for a reason which will be described and explained later.

What are the other parts of a phone?

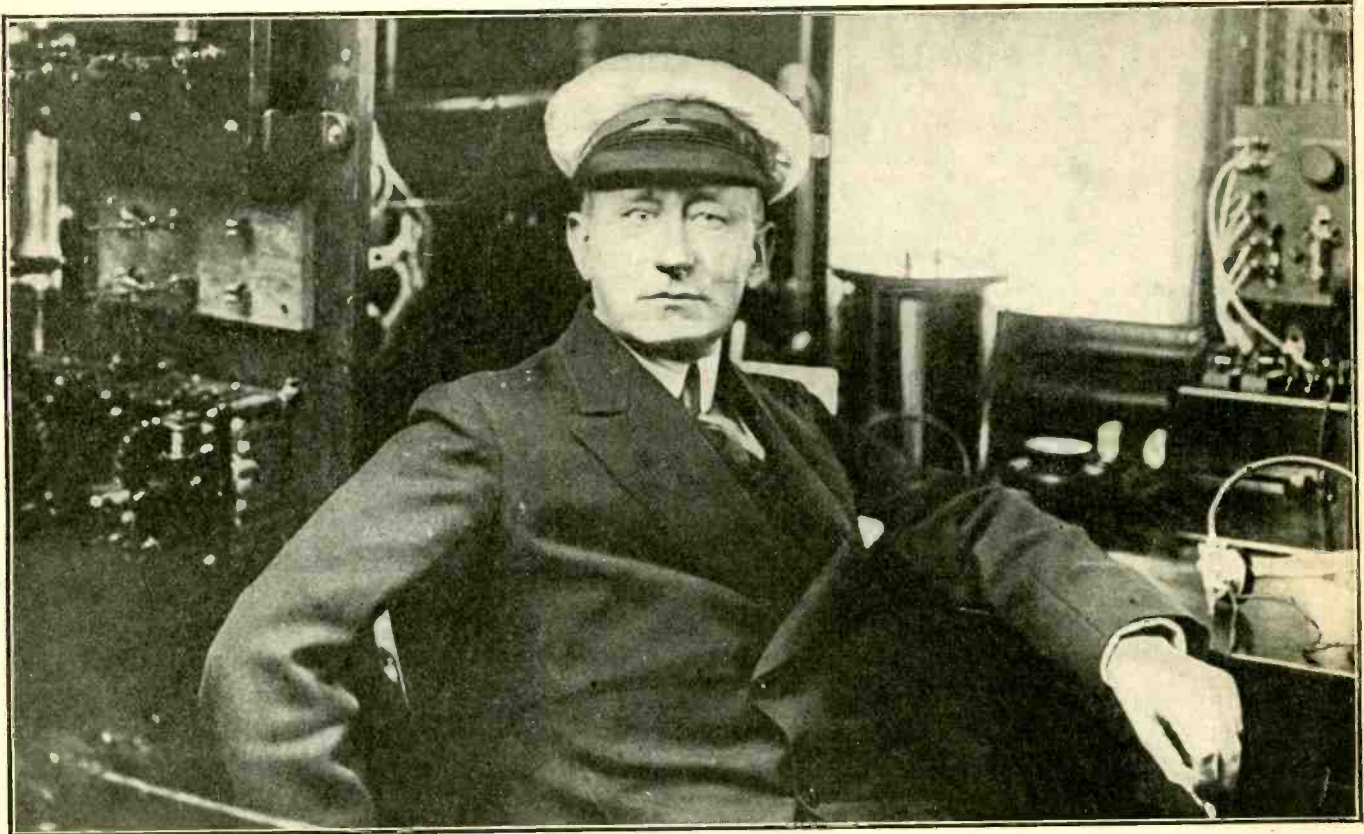
The principal remaining part is the diaphragm. This is the thin black disc which fits down tightly over the phone case. It may be of iron or of mica with a small iron piece fastened to the mica directly over the magnets.

What is the disc for?

The disc is the cause of the sounds heard in the phones. Up to the time that the disc comes into the picture, the action has been electrically, but the disc takes the electric pulsations and changes them first into mechanical

movements and then into sound waves. You know how it is when an electric fan is turned on. The blades start to rotate slowly, gradually increasing speed. At the start, the fans make a low humming noise, but the tone becomes higher pitched the faster the blades revolve. The sound is caused by the blades striking the air and producing waves which affect our ears. The disc in the phone does the same thing. As the electric waves come in through the electromagnets, the diaphragm is first drawn down by the magnetism and then released, drawn down and then released, and so on. Every time it moves it slaps the air, and the sound waves thus produced are picked up by our ear and translated into sounds.

Marconi in His Radio Studio



(c. Kacel & Herbert News Service)

Guglielmo Marconi, the inventor of wireless telegraphy, is again an active worker in the field of wireless and is making further experiments in his laboratory aboard his yacht. The wireless and radio equipment on this vessel is said to be worth many thousands of dollars and is one of the most complete in the world.

Broadcast Bill's Radiolays

(Copyright, 1922, Westinghouse Electric & Manufacturing Co.)

SEEN' we're ter be acquainted, I might as well be frank—my real name ain't no Broadcast Bill—it's Peck—my fust name's Hank—the folks at Brussels Sprouts has been a-christenin' me, I guess, 'cause of a little habit they knows me to possess. I'll start at the beginnin' and say when I was small, I couldn't git enough of news, not any way at all; I'd listen through the keyholes an' I'd harken at the doors, till news an' gab an' gossip was just oozin' at my pores. Out here in Brussels Sprouts there ain't much stirrin' all year 'round; it's so dern quiet folks kin hear things growin' in the ground; there ain't been nothin' doin' now fer—wall, now, let me see—sence Deacon Stiles drank peddlers' hooch an' cracked his sanctity. You see what it was up against—no matter how I tried, my bump of information never could git satisfied, which caused me awful sufferin' fer, you know, the thing that brings the greatest happiness ter man—is hearin' lots o' things. It was a moment in my life I never

shall forget—the day that feller worked on me about that radio set; he had my eardrums itchin' and my



"I kin hear the universe!"

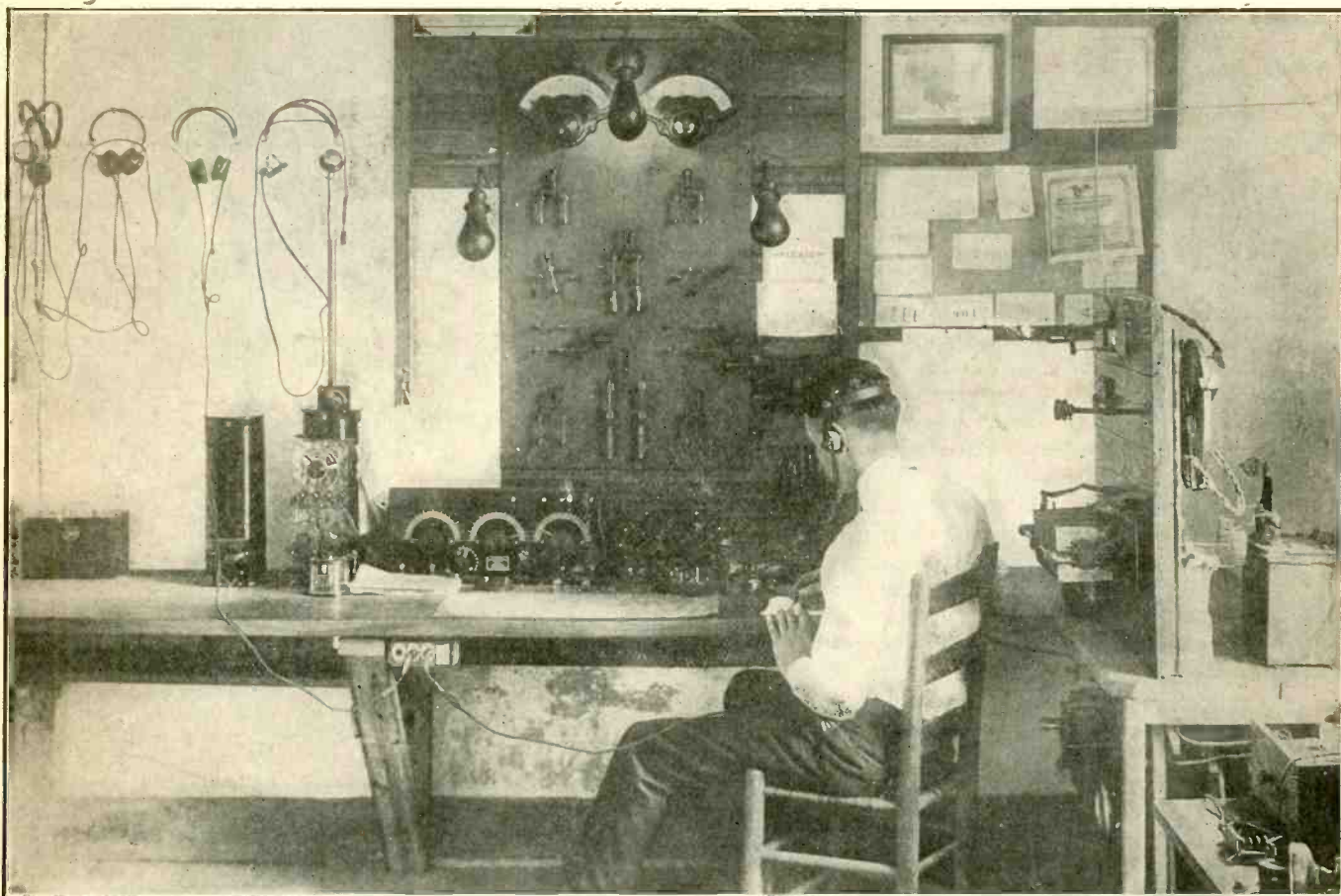
soul a-cravin' so, that I gol-dern near fergot myself—yep, hit him with a hoe! Ef he'd had a set 'long with

him er anywheres about, yep, even if he'd swallered it—I'd turned him inside out! But one wasn't long ar-rivin', an' there come into my life more'n a feller ever heard—exceptin' from his wife; an' from that quarter, I remark, there's been a plenty said about me loafin' 'round with this here harness on my head; but there ain't no home-made sermons ner rollin' pins er worse, that'll stop me listen' in when I kin hear the universe! I dunno the way they work it an' I ain't a-askin' how—I only know I git the news—there goes the dern thing now!

Clearing the Pacific Air

AFTER considerable difficulty in reaching a wave length which does not interfere with the transmitting of the British and Japanese radio stations on the Pacific, the Naval Communication service has determined upon a wave length of 13,700 for east bound messages from the Naval Station at Cavite (NPO). A two-weeks test between Cavite and San Francisco (NPG) showed that with this length the signals from the Japanese station sending from Iwaki did not interfere as was previously the case.

Radio Room of 5XA, Auburn, Ala.



(c. Underwood & Underwood)

The broadcasting and receiving station of the Polytechnic Institute, Auburn, Alabama, is considered one of the most important wireless stations in the southeastern part of the United States. Alabama has been backward in developing amateur radio work, and, as a result, few stations are working. The Auburn station has no elaborate layout of apparatus or anything that makes a big flashy show; but what the operators have done proves it to be wonderfully efficient. The call of the station is 5XA. This station has been heard in thirty-five States and in Canada. This photograph shows the operating room of 5XA. Note the two spark-transmitters located in the rear of the homemade switchboard, also the receiving equipment laid out on the table, with a number of phones for additional listeners.

Results from Vacuum Tubes

THE vacuum tube is still a puzzling piece of apparatus to a great many who have just become interested in radio, when in reality it is a comparatively simple affair. In the first place there are several different types of tubes on the market, chief of which are the tubes put out as radiotrons. These tubes are also known sometimes as Cunningham tubes. Among the various types of these tubes are the U. V.-200 type. This is a detector tube only and the U. V.-201 is an amplifier. The difference lies in the fact that the first tube has a small amount of rare gas left in it, while the amplifier tube is exhausted to a very high degree.

The tube known as the U. V.-202 is a 5-watt transmitting tube, and the U. V.-203 is a 50-watt transmitter. The largest type is known as U. V.-204 and is rated as 250 watts. This type of tube is also known as a P tube

and is the one that is universally used by the broadcasting stations. A station such as WJZ uses five of these large tubes, the retail price of which is \$110 each. This may make some of the amateurs, who are averse to paying \$5 for a detector tube, feel that, after all, they are lucky that they do not have to use P tubes.

Another type of vacuum tube is the A-P. These are made in only a very few sizes, principal types being the electron relay, which is a detector; and the A-P amplifier tube, which is another of the tubes that are exhausted to a high degree. Both of these tubes are very good and consume a little less current than the radiotrons.

Easy to Operate Radio

If you are interested in radio and want to receive broadcast concerts and lectures, says the Boston "Traveler,"

don't let lack of technical knowledge deter you. The most marked recent development of radio has been in making available receiving sets which anybody can operate by following a few simple directions. Operating a complete receiving set, which can be installed in any home, is no more difficult than operating a talking machine.

Neither should you hesitate to get a receiving set for fear of lightning. All commercial receiving sets, to-day, comply with fire underwriter regulations and include simple devices which make it impossible for lightning to enter your home through radio aerials.

Fear of electric shock, as expressed in communications to "The Traveler," is based on lack of information. The electric current necessary to make possible the reception of sound waves sent through the air is very faint. It could not possibly injure, even if it were not properly insulated, as it must be in any workable radio set. You have much more cause to guard against shock when tuning up your automobile.

Radio Merchandising

Radio Advertising

Present Market Conditions Indicate that the Weekly Publication Is the Best Proposition

THERE are several well-edited monthly publications devoted exclusively to radio, and there are hundreds of daily newspapers devoting a column or two, sometimes whole sections, to radio. As the old Kentucky Colonel said about whiskey, all advertising is good but some is better, i. e. more economical and effective.

A daily newspaper is, after all, just a newspaper printed on cheap paper, bought for two or three pennies principally for its news, such as baseball, sporting, political, etc. It is quickly and only casually scanned, then thrown away. We are ashamed to be seen reading yesterday's paper; in fact, feel a diffidence in reading a morning paper on the way home at night. So a radio advertisement has a pretty short life in any daily newspaper and, of course, it's out of the question to use in the dailies a good 120-screen half-tone cut, often so necessary to properly illustrate a radio instrument or accessory.

Radio advertisers now have an

ideal advertising medium in **RADIO WORLD**, which has none of the defects of either the monthly or the daily, for **RADIO WORLD** is a **WEEKLY**, the only national weekly devoted exclusively to all angles of radio.

RADIO WORLD is printed on excellent paper, so the finest cuts and illustrations can be used, is so well edited that it not only interests, but instructs, and is carefully read and observed. (We have yet to see a copy that has been thrown away). And the most important feature is its quick-action results. Advertising copy reaching **RADIO WORLD** office even as late as Wednesday P. M., starts the advertiser's telephone ringing with orders the following Wednesday A. M., and brings a whopping mail of orders Thursday.

Quick action is needed to-day in business more than ever before. The weeklies have come into their own—such as "The Saturday Evening Post," "Literary Digest," "Collier's," and for radio—**RADIO WORLD**, the one Radio Weekly.

Department Stores Expect Big Radio Sales

THE Radio Conference, called by the National Retail Dry Goods Association, was held last week in the Hotel Pennsylvania, New York City.

Those in attendance represented 500 department stores, located chiefly in the eastern part of the United States, doing a yearly volume of business in department-store lines amounting to one half billion dollars.

The conference was in session several hours, discussing the systematic merchandising of all radio equipment. Before adjournment, a committee of five representing geographical divisions of the United States, was appointed to continue investigation and report. The committee is composed of F. W. Tully, R. H. White Co., Boston, Chairman for the New England division; C. S. Hammond, Frederick Loeser, Brooklyn, for the North Atlantic Seaboard; Joseph Fisher, of Kirby, Block & Fisher, resident buyers, New York City, for the South; Joseph V. Ryan, of the J. L. Hudson Company, Detroit, for the Middle West; and Alfred Fantl, resident buyer, New York City, for the West.

The discussion in the course of the conference covered very thoroughly all possi-

bilities of radio development, more especially under its merchandising aspects. The members present felt that the new, popular science presents wonderful business opportunities, although all were fully informed as to the difficulties of supply and demand prevailing at present.

There was general recognition of the fact that the business of supplying radio equipment must undergo radical changes; that the existing enormous demand may slacken, and again, that the entrance of new producing concerns may create a surplus of supply.

It was the sense of the meeting that the department store is definitely needed for the full development of radio because only those business enterprises which are well established, large in their operation and complete in their resources are qualified to handle it on the scale of greatness and thoroughness which it requires. Every opinion expressed emphasized the consideration that the sale of all radio material must be essentially a service-giving business. It was pointed out that, where some receiving sets may be of standard qualified to satisfy every demand on the part of the public, others may not

give the satisfaction which stores of the standard of those participating in the conference must always provide, whatever the merchandise. It was agreed that any store handling radio merchandise must be prepared to know all about that merchandise and to stand behind it once it has been sold.

After adjournment, Lew Hahn, managing director of the National Retail Dry Goods Association, remarked that radio is a merchandising undertaking and that the association does not merchandise. It may be necessary, he added, to organize, outside of the association, a separate corporation which can take charge of the general merchandising aspects in the interests of the public as well as of merchants.

Public Must Not Be Bamboozled

Editor, **RADIO WORLD**: I have been very much impressed with the first two issues of your publication; so much so that I enclose my check for one year's subscription, which please mail to my residence, 72 Beverly Road, Kew Gardens, Long Island, N. Y.

My interest in radio is first, as an amateur; and, second, on account of being interested in lyradion, which has already been introduced and well received, and which we expect to have definitely on the market within a few weeks.

Since you are likely to hear more of lyradion later, you may be interested to know something of the policy behind it. It will be for the radio public to judge as to the merit of our product; but our policy will be to produce an instrument of the highest quality, workmanship, and efficiency, to unequivocally maintain the quality of the product, and to back it up with service. This is an ambitious program. Behind it is a group of men who are entitled to confidence.

I have still another point of interest in your paper—the vigorous manner in which you start in to fight for absolute truth and perfect square dealing in the new radio industry. This speaks volumes for the character of your paper and your availability for leadership in the radio publishing-field. You have acted wisely. Nothing would damn radio more or interfere with the impetus it has achieved than for the public, which is new to the subject, to be bamboozled by the claims of unscrupulous advertisers and stock vendors. I am with you in all that makes for the constructive development of the industry. I am also with you in all properly directed effort to curtail the efforts of those who may not deserve the confidence of your readers.

It so happens that I can offer real assistance, for I am identified with the work of the National Vigilance Committee of the Associated Clubs and in position to promise you the cordial support and active cooperation of that militant agency for truth in advertising. By later mail I will send you an official letter from the committee on this subject.—H. D. Robbins, H. D. ROBBINS & CO., Investment Securities, 61 Broadway, New York.

Radio Merchandising (Continued)

Communicate With Them

Editor, RADIO WORLD: Can you furnish us with a list of reliable manufacturers of long-distance radio-receiving sets? We contemplate the installation of a radio department and are anxious to get in touch with sources of supply.—H. C. Petersen Company, Inc., 20 Oneida St., Utica, N. Y.

Editor, RADIO WORLD: We want to know what kind of outfit would be best to merchandise here in Bay City, Michigan. As the nearest forwarding station is located in Detroit, we are told that the \$15 or \$18 outfits are too small to be of any service to any one here; that a more expensive outfit is needed.

Please inform us as to your best judgment on the cheapest and best radio outfit on the market.—A. Kowaleske, 105 Fourth St., Bay City, Mich.

Editor, RADIO WORLD:—I am a dealer in phonographs, musical instruments, etc., and I am trying to analyze the radio market, with a view to stocking up on appliances and equipment complete for all manufacturers.

Therefore, I am eager to obtain a list of all manufacturers who specialize in the production of radio essentials or accessories. Can you furnish me with such a list? If you cannot will you please advise me where I can procure the same?—H. Leviten, 551 East 138th Street, New York City.

Trade Notes

THE Rialto Radio Corporation, Times Square, New York, have their demonstration room fitted up as a living room furnished with wicker furniture, oil paintings, lamps and a Persian rug. Here the prospective purchaser can hear the concerts come in over any kind of a receiver from a portable set to a large cabinet style.

* * *

The Rex Radio Sales Corporation have opened offices at 1452 Broadway, New York City, where they will act as distributors and selling agents for everything in radio from a binding post to a machine. They are organizing a large sales staff and are preparing an extensive advertising campaign to distribute and promote the sale of the products they will handle. The officers are Harry L. Urdang, president; Abraham Lipton, treasurer.

* * *

The Universal Radio Service Association, with offices at 300 Madison Avenue, New York City, are just putting on the market their "URSA" receiving set. This company will also distribute to the trade everything in radio parts and equipment and offer an expert radio service.

Frederick Winkler Moves

One of the oldest firms in the radio business is the Frederick Winkler, Jr., Company. For fifteen years it has been manufacturing standard parts and sets at 304 Columbus Avenue, New York, but due to the sudden expansion of the business, has been obliged to take larger quarters at 59 Park Place, New York City. There it has a modern plant occupying 1,800 square feet and a large force of employees.

Will All New Firms Join This List?

RADIO WORLD wants to keep its Radio Merchandising Department up to the minute in order that it will be of value to all engaged in every phase of the radio trade—a trade that is increasing daily, that will engage millions in capital create huge payrolls for skilled workers of both sexes, and draw considerable money from the fast-growing army of radio fans; for the day is certain to dawn when, so far as the American home is concerned, radio will be as popular as the phonograph, if not more so.

We begin in this number the publication of a list of dealers and jobbers in radio supplies in the United States. The list is classified by geographical sections, beginning with New England States. Watch for the name of your firm in your particular territory. If it is not recorded here, send it in for publication. It may mean business to you. Also send along any trade notes of interest—anything that may be of value to the radio trade.

Simply address your letter: "Editor RADIO WORLD, 1493 Broadway, New York.

North Atlantic States

(Continued)

Royal-Eastern Elec. Supply Co., 114 W. 27th St., N. Y. City. (Jobbers).

S. & N. Radio Supply Co., Inc., 2106 Broadway, N. Y. City.

Sorsinc, Inc., 80 Washington St., N. Y. City.

Sterling Radio Equipment Co., 2723 Copper Ave., Brooklyn, N. Y.

Sunbeam Electrical Supply Co., 71 3rd Ave., N. Y. City.

Times Appliance Co., 145 W. 45th St., N. Y. City.

United States Electrical Co., 10 Ditmas Ave., Brooklyn, N. Y.

Dreyfuss Sales Corp., 179 Greenwich St., N. Y. City.

Frederick Winkler, Jr., 304 Columbus Ave., N. Y. City.

United Electric Stores Co., Braddock, Pa.

Elec. Equipment Co., 147 N. Center St., Corry, Pa.

Lehigh Radio Co., Center & Fairview Sts., Bethlehem, Pa.

Keystone Radio Co., Greenville, Pa.
Lancaster Electric Supply Co., Lancaster, Pa.

Star Cabinet Shop, Lansdale, Pa.
Bear-Cat Battery Service, Lemoyne, Pa.
K. & L. Electric Co., 427 Olive St., McKeesport, Pa.

Leon D. Quick, Milesburg, Pa.
Pennsylvania Mfg. Co., New Castle, Pa.
Valley Elec. Co., New Kensington, Pa.
E. P. Noll & Co., Philadelphia.
Penn. Marconi Wireless School, Philadelphia.

Philadelphia School of Wireless Telegraphy, 1533 Pine St., Philadelphia.

Quaker Light Supply Co., 728 Arch St., Philadelphia.

Sayre-Level Radio Co., Philadelphia.
Simplex Radio Co., 1013 Ridge Ave., Philadelphia.

Frank H. Stewart Elec. Co., Philadelphia.

Doubleday-Hill Electric Co., Pittsburgh.

The King Radio Co., 113 Sheridan Ave., Pittsburgh.

Ludwig-Hommel & Co., 530 Fernando St., Pittsburgh.

New Radio Firms and Corporations

Metropolitan Radio Corp., Manhattan, \$20,000; J. Sanacory, E. Yers. (Attorney, D. Kassel, 256 Broadway.)

Susquehanna Radio Co. of Williamsport, Pa., Wilmington, radio apparatus, \$250,000; (Corporation Service Co.)

Radio Glass Corp., Manhattan, general glazing, \$10,000; B. Hermaan, L. Cohen, C. Sinclair. (Attorneys, Meier & Vanderveer, 290 Broadway, New York.)

Haynes Radio Co., Manhattan, \$25,000; A. J. and T. C. Haynes, C. E. Sprague. (Attorney, B. V. Butterfield, 60 Wall St., New York.)

Aerex Radiophone Corp., Manhattan, \$12,000; F. C. Edson, W. P. Foss, Jr., C. H. Messmore. (Attorney, H. J. Baily, 32 Liberty St., New York.)

Empire Radio Corp., Manhattan, capital increased \$1,000 to \$10,000.

Man-Day Radio Corp., Manhattan, make apparatus, \$5,000; S. J. Grossman, V. Stein, H. V. Leonard. (Attorneys, Bowman & Shea, 416 Broadway, New York.)

National Radio Sales Corp., Jersey City, N. J., radio apparatus, \$150,000. (Registrar & Transfer Co.)

Independent Radio Corp of America, radio instruments, \$500,000; Abraham Schneider, May Wechsler, Brooklyn; Peter Glasstetter, New York. (Corporation Service Company.)

Torris Radio Apparatus and Vacuum Tube Co., radiophones, \$500,000; Samuel Torrisi, Joseph Torrisi, Charles Salkind, Philadelphia. (Corporation Service Co.)

Radio Outfitting Corp., Manhattan, \$5,000; G. E. Ward, H. T. Booth, F. A. Hahnel, (Attorney, J. A. Walsh, 51 Chambers St., New York.)

Radio Instrument Co., Wilmington, Del., transmission, \$900,000. (Corporation Trust Co. of America.)

Clarkson Radio Equipment, Wilmington, \$2,000,000. (Colonial Charter Co.)

Standard Radio Corp., Del., \$500,000; has designated E. L. Flanigan, 15 Broad St., as representative.

Radio Engineering Company, electrical sound machinery, \$50,000; Walter S. Harris, Jeanette B. Harris, March Frazer, Minneapolis. (Corporation Service Co.)

Cosmopolitan Electric Co., Manhattan, contracting in electrical work, \$5,000; L. and R. Bayer, M. F. Rotberg. (Attorney, E. E. Fuchs, 51 Chambers St., New York.)

Addition W. Brown Electric Co., Brooklyn, N. Y., has changed name to A. W. Brown Electric Co.

King Radio Corp., Manhattan, \$20,000; neys, York & York, 7 Dey St., New York.)

Easter Radio Corp., Wilmington, Del., apparatus, \$1,000,000. (Corporation Service Company.)

Radio and the Woman

The Latest Gossip About the Feminine Enthusiasts of the New Marvel of Civilization---News of Women's Organizations and Up-to-the-Moment Items



(c. P. & A. Photos)

The only woman member of Congress, Representative Alice Robertson, of Oklahoma, is hoping to broadcast her appeal for re-election, to her constituents, despite the ruling of Secretary of the Navy Denby that political speeches shall not be broadcasted out of Washington over the only available station—that of the Navy Department. The photograph shows how the receiving set is installed in the office of Representative Robertson.

IT has been set down as a scientific fact that when telephones were first installed on the New York Exchange, boys were employed as operators, but, later on, were supplanted by girls because they were found to be better adapted to the work. This same feature may present itself in the radio field.

* * *

The announcement that department stores plan to carry better grades of radio goods holds out alluring prospects of future bargain-hunting tours.

* * *

"One great advantage of the ear-piece," voices a friend afflicted with headaches, "is that when one doesn't happen to feel in the mood for listening in, it's an easy enough matter to hang up the instrument until the desire to hear again comes on."

* * *

For the enlightenment of those who believe that woman's interest in radio has only been recently awakened, the following excerpt from a book entitled "The Wireless Man," published by The Century Company

somewhere in the vicinity, of a particular steamer. No one knows just where the young lady lives—it may be Connecticut, New York, or New Jersey—but they look upon her as an old friend. She sends regularly from her home to a brother who is a wireless operator on a big trans-Atlantic steamer. For two or three days after the steamer leaves New York, and again, for many hours, when she is nearing port, there is the liveliest kind of an interchange of messages between the two."

* * *

Of what great matter will it be to young lovers if the summer evening meeting-place be seats on a Coney Island boat or deck chairs on some millionaire's yacht, so long as music and romance are enhanced by the most democratic of all sciences—wireless?

* * *

A pictorially disillusioned woman friend wonders if, in the forthcoming production, "Robinson Crusoe," any of the several high-power stations now within easy range of the island on which Crusoe passed so many adventurous years of his life, will appear in a long-shot.

* * *

The statement that red-haired boys make the most alert wireless operators, ought to stimulate any slumbering capabilities possessed by our Titian-haired beauties.

* * *

It is an amusing as well as an interesting coincidence, that I have seen within the past week, at least a baker's dozen receiving sets in the home of as many friends. On none of them lay a pipe, cigarette case, or other masculine possession; or was

over eight years ago, is quoted here: "The receiving stations about New York for several years have been reading messages sent out by a girl



(c. Kadel & Herbert News Service, N. Y.)

Harry R. Martin, of New York, has perfected a system whereby hotel guests can listen in. He is photographed instructing the telephone operators how to switch on whenever a guest asks for the radio service.

there lacking some feminine touch which bespoke a woman's interest in the instrument.

* * *

A school girl declares that in case she requires a new party-bracelet, she will wear her "honeycomb coil." If she does so, I'll wager that some-up-to-the-minute jeweler will copy the design. It's certainly attractive enough.

* * *

One who claims that she is not versed in wireless, but who intends purchasing a receiving set this summer, writes to ask if the "fan" aerial has anything to do with cooling the temperature of the immediate neighborhood in which it is erected!

* * *

"Radio has its faults as well as its virtues, like everything else," sighed one stay-at-home wife whose husband is so engrossed in their radio-telephone that he fails to take her to the theater at night. "But I shouldn't complain about that," she adds, "when I come to realize what great pals he and my brother have grown to be since they've found wireless a congenial stamping ground."

* * *

The problem of loading up the receiving set to receive longer wavelengths, is one that does not trouble a certain girl whose fiance is an employee of the Tarrytown Radio Research Laboratory.

* * *

At least one woman's scientific mind is evolving the problem of "making motion pictures talk." I agree with her when she remarks: "Just because phonographs failed in this respect, I see no reason why radio should not come up to requirements."

* * *

A friend utters the fervent wish that the needs of the average servant in the American home might be broadcasted. She claims that many a capable domestic, who understands spoken English, but who is unable to read advertisements inserted in various "want" columns, could be reached and obtained through this means.

* * *

It should be of interest to women to note that Miss Alice Robertson, Congressional representative from Oklahoma, was among the nation's lawmakers who gave strong support to a bill extending the use of radio.

* * *

A young private-secretary who believes that what's worth doing at all is worth doing well, is learning the Continental Code. I inquired why:

"For the same reason that a typist studies the 'touch' system," she answered. "I'm a radio fan and expect to remain one. Knowledge of a code makes broadcasting a lot more fun!"



(c. Underwood & Underwood)

Alma Gluck, famous as a grand opera star, talking into the radio sending set in the office of the "Atlanta Journal," Atlanta, Georgia, to the government station at Fort McPherson, Georgia.

An amateur receiving-set atop a discarded kitchen-cabinet, bookcase, the drawers of which had been removed and the whole mahogany stained and varnished—served as an attractive assets to a girl's den which I entered recently.

* * *

High above the sound of voices that acclaim this great new science which is being developed for us come the notes of another voice that must be heard: the voice of those dear deaf people whose eyes grow wistful when they read of radio. Wizards of Wireless may your magic not fail to reach to them!

* * *

A prospective June bride expresses the wish that her wedding ceremony may be performed where it could be broadcasted to faraway parents, who, though denied the privilege of attending, might at least, listen in on the service.

* * *

A certain clever young actress is rehearsing a radio monologue which she expects to present in vaudeville.

* * *

"That wireless shall be instrumental in bringing about universal peace,"

is the unuttered prayer in many a devoted mother's mind as she bends over her young sons.

* * *

A manager in a New York department store voices the opinion that in order to answer the inquiries and meet the demands of the great number of progressive girls who wish to build their own receiving sets, women instructors will be placed in radio departments.

* * *

In fact, the department stores are going to be among the biggest promoters of radio. They will constitute a chain of broadcasting stations across the continent with every station fully equipped to take up sendings.

* * *

Let me tell you of a dear old lady who lives where "it rains a great deal," asks if—when she's selecting a receiving-set—I would advise that she buy an "umbrella aerial." She tells me in a postscript that she knows there is such a thing because her grandson often refers to it and she judges it to be an aerial particularly suited to wet climates!

—Rose R. G.

RADIO WORLD

PUBLISHED EVERY WEDNESDAY (DATED SATURDAY OF SAME WEEK)
FROM PUBLICATION OFFICE, 1493 BROADWAY, NEW YORK, N. Y.

BY RADIO WORLD COMPANY

ROLAND BURKE HENNESSY, Editor and Proprietor 1493 Broadway, New York

FRED S. OLARK, Manager 1493 Broadway, New York

ROBERT MACKAY

ASSOCIATE EDITORS:

FRED. CHAS. EHLERT

CENTRAL-WESTERN ADVERTISING REPRESENTATIVES:

W. B. ZIFF CO., 608 S. Dearborn St., Chicago

SUBSCRIPTION RATES

Fifteen cents a copy. \$6.00 a year. \$3.00 for six months. \$1.50 for three months.

Add \$1.00 a year extra for postage to Canada and foreign countries.

Receipt by new subscribers of the first copy of RADIO WORLD mailed to them after sending in their order, is automatic acknowledgment of their subscription order and payment therefor.

ADVERTISING INFORMATION

MECHANICAL REQUIREMENTS:

Size of page: 12 inches deep—9 inches wide.
Size of type page: 10 1/4 inches deep—7 1/4 inches wide.
Three columns, 147 lines each—441 lines to the page.

CUTS:

All plates should be mounted. We can use screens up to and including 133. We prefer 120 screen half tone. We cannot use matrices.

ADVERTISING RATES:

One page: One time—\$150.00.
Half, Quarter, Third and Two-thirds pages at proportional rates.
One inch, one time—\$5.00. Per agate line, \$0.40.
On four consecutive issues, 10% discount.
On thirteen consecutive issues, 15% discount.
Terms: 30 days Net. 2% 10 days.

CLASSIFIED ADVERTISEMENTS:

Five cents per word. Minimum, 10 words. Discount of 10% on 4 consecutive issues—15% on thirteen consecutive issues. Cash with order.

Cover and preferred-position rates made known on application

Entered as second-class matter, March 28, 1922, at the Post Office at New York, New York, under the act of March 3, 1879.

IMPORTANT NOTICE:

While every possible care is taken to state correctly matters of fact and opinion in technical and general writings covering the radio field, and every line printed is gone over with a scrupulous regard for the facts, the publisher hereby disclaims any responsibility for statements regarding questions of patents, priority of claims, the proper working out of technical problems, or other matters that may be printed in good faith and on information furnished by those supposed to be trustworthy. This statement is made in good faith and to save time and controversy over matters over which the publisher cannot possibly have control.

HEAD PHONES

EISEMANN, \$8, 2200 Ohms

VARIABLE CONDENSERS

PURE ALUMINUM PLATES

23 Plate, \$3.45 43 Plate, \$4.00

Mail Orders Filled—Immediate Delivery

W. G. BYRNES 15 Whitehall St.,
New York City

ATTENTION AMATEURS!

Special Offer for this week
Aeriola Sr. with 2 batteries and Complete Antenna Equipment \$71.75
Loading Inductance (tapped) 2.45
Dials90

Butters-Horlick Radio Co.
258 Washington St., Boston, Mass.

HAYNES TESTED EQUIPMENT

This is an exclusive radio shop. We sell nothing else. For honest values and satisfactory results call on us.

The HAYNES RADIO Shop

629 Lexington Ave., New York
At 54th Street Plaza 6301

RADIO PANELS

Cut exactly to size and shipped within 12 hours. 1/4 inch thick, \$.01 1/2 c. per square inch; 5/16 inch, .02c. Made of the highest grade black fibre. This material possesses high dielectric strength, is inexpensive, unbreakable, easy to work and takes a nice finish. Special offer 6x6 1/4, 50c. We pay postage.

RADIO INSTRUMENT & PANEL CO.
Box 75, Cicero, Illinois

RADIO WORLD
Is on the Newsstands
Every Wednesday
15 cents a copy

43-plate Variable Condensers (.001 M.F.)	\$6.00
25-plate Variable Condensers (.0005 M.F.)	4.50
11-plate Variable Condensers (.00025 M.F.)	4.00
3-plate Variable Condenser (used as a Vernier)	3.00

Above prices include knob, pointer, and dial. Hard Rubber Panels for above. Immediate shipments from stock. Discounts to Bona Fide Dealers
F. Jos. LAMB COMPANY
1070 Franklin Street Detroit, Mich.

Radio Dealers and Jobbers Attention!

Variometers vario-couplers
Rotors and Stators
Wound and unwound

Exceptional Value to Quick
Buyer

IMMEDIATE DELIVERY
Address: 608 Renshaw Bldg.
Pittsburgh, Pa.

WANTED: CORRESPONDENTS EVERYWHERE

RADIO WORLD wants correspondents in the various cities located in radio zones throughout the United States.

Address Correspondence Editor,
RADIO WORLD, 1493 Broadway,
N. Y. C.

CABINETS — CASES

Send us your design or let us know what you require and we will make you a Cabinet or Case for your Radio outfit, in any wood or any finish at a very reasonable price. Just what you want.

E. R. COLLINS & SON
Woodworking Department
Belvidere, N. J.

Expert Radio Wiring and Installations

Complete Line of Receiving Sets and Radio Apparatus

K. R. SCHULLSTROM
30 E. 59th St., Bet. 5th and Madison Ave.
Phone Plaza 9425-9426

why is a honeycomb
coil set better?

read the RADIO RED BOOK
25¢ 406 W 31st St. 25¢

Receiver Magnets Remagnetized While You Wait

If your ear pieces are weak you can not hear the concerts distinctly. Let us remagnetize them for you. Single phones 35c.; double, 50c. Any type radio equipment repaired. Complete sets and parts built to order.

P. RICHARDS
204 W. 76th St., Near Broadway
Phone Schuyler 0140

DEALERS

Send for free samples of our Window Display Signs and Cartoons featuring RADIO EQUIPMENT.

Attractive, snappy result getters.

Merchants Signs Service Co.,
48 Zabriskie St., Jersey City, N. J.

do you know how
to test a crystal?

read the RADIO RED BOOK
25¢ 406 W 31st St. 25¢

RADIO SUPPLIES RADIO SUPPLIES
We Carry a Full Line of
RADIO GOODS

Head Sets, Vacuum Tubes, Vario Couplers, Variometers, Transformers, Tuning Coils, Dials, Knobs, Bakelite Panels.
Phones in stock.

Radio Sets Made to Order. Aerials put up.
SUNBEAM ELECTRIC COMPANY
71 3rd Ave., Bet. 11th & 12th St., New York
Phone Stuyvesant 2890 Estab. 12 Years

BOYS DO NOT FAIL

To obtain your copy of these instructions. Worth many times the small amount we ask. How to construct a variometer, how to construct a variocoupler and an amplifying transformer. Detailed instructions of either for fifteen cents or put four dimes in an envelope and get the three with diagrams of connections for your set. Save money by constructing your own. We have left no details to guess about. We enclose list of all parts how much of each to get and where to obtain same.

**Newco Radio & Electrical
Supply Co.**
Stratford, Conn.

Answers to Readers

I USE a variocoupler, variometers in plate, grid circuits, vacuum-tube detector, and Murdock 2,000-ohm phones. I have gone over my lead-in, etc., and find that everything is properly insulated; but everytime the telephone rings, I can pick up the receivers and listen to the ordinary telephone conversations. Please suggest a remedy for this trouble, as it interferes with radiotelephony.—H. P. Reynoldsville, Pa.

Carefully look at your antenna. Does it lie in parallel with any telephone line. See that no telephone feed-line runs in back or around your receiver. If a telephone line lies in close proximity to your antenna and ground circuit, it is probable that you are amplifying signals from this feed line.

RADIO WORLD further suggests that you look over your connections carefully for feed telephone-lines. If you locate any, try to run your feeds at right angles. Inform us as to results.

What is the average voltage of a storage battery for filament lighting? Will dry batteries answer this purpose? What is your expert advice on filament lighting?—K. L., New York City.

Batteries run in various sizes and, of course, have various voltages. The average voltage for filament lighting requires 6 volts. Use no more, or you will burn out all of your tubes. Dry batteries are of no use as their life is very short. They are an expensive proposition. By all means get a storage battery. If you have direct current, make yourself a charging outfit such as is described by E. L. Bragdon, in RADIO WORLD, No. 5, dated April 29.

Can I use No. 22 d.c.c. wire for a variometer described in a recent number of Radio World. Where does the fixed condenser go?—P. M., Brookline, Mass.

Yes, you can use the size wire you mention. Your fixed condenser should be shunted around the phone.

In the tickler feedback set, is the inductance a separate winding or not? Where does it go?—H. L. M., Perth Amboy, N. J.

The tickler coil you mention is one winding placed in series with the plate circuit and mounted inside the end of the main coil, beneath the two sections of the main winding which have twenty turns each.

Can I use a King amplitone-horn with my galena set?—K. C. D., Newark, N. J.

You cannot use any horn with a crystal set. Whenever signals are of such volume that you can hear the music—say, a foot away from the phones—then use the horn. Would suggest that you use more phones connected in the circuit.

Can a good regenerative-set be made using honeycomb coil? Will it work as well as a high-priced regenerative-receiver, using two variometers and a variocoupler? Is the De Forest circuit using two primaries and one secondary as good as either of these.—H. S. S., Nyack, N. Y.

The difference between the set using the honeycomb coils and the regenerative using the two variometers and variocoupler, lies in the fact that the former will give better results on longer waves, while most of the latter type of set will not work on wave lengths of over 600 to 800 meters.

Owing to the large numbers of questions received from readers it is impossible to answer all in this number. Your replies will appear in the next or future numbers of Radio World.

For sort waves, the variometers are hard to beat. These circuits are both regenerative, while the De Forest circuit you mention, is not regenerative. All three circuits are excellent in their respective fields, and it is difficult to compare their relative merits. Each is supreme in its class.

Can I hear Newark on my crystal set? I live in the lower part of Manhattan?—N. C., New York.

We cannot estimate the exact distance that any set will receive. Readers are requested not to ask this sort of question, because no man can answer it satisfactorily.

To whom shall I write regarding an amateur license?—A. B., Watertown, N. Y.
Address: Radio Service, Custom House, New York City, N. Y.

I have a regenerative set and can hear WJZ and WNO very clearly, but cannot seem to hear Pittsburgh. Will you tell me what to do in order to hear this station?—S. G. L., Curransville, Pa.

As you become more of an expert in the manipulating of your set, you will find out that you can tune him in. The set you have, perhaps, is a difficult set to tune. Possibly your aerial could be longer, but we believe that Pittsburgh cannot be received every night on account of the "fading." This peculiarity can not be explained.

Where is station 2XAI?—R. R., Binghamton, N. Y.

2XAI is the experimental license of WJZ. This call, as a rule, is used when the station is undergoing some experimental test.

I have a crystal set that works very well; but, once in a while, I hear howls and hums. What is the cause of this?—P. R. G., Jersey City, N. J.

You may be near some testing station; or, you probably have alternating current in your home near which some feed-line is running very close to your set; or, the aerial lies parallel with a feed line. Look over this very carefully; also, look for loose connections as this may cause some peculiar noises.

Can I use a regenerative receiver using a telephone line as aerial?—J. P. M., The Bronx, N. Y.

You may use this, but it is not advisable. Put up a single wire aerial about 100 feet long for the best results.

In RADIO WORLD of April 8, you published a diagram of a crystal detector-set. I have a similar set, I get spark signals only. Advise what to do?—P. M., New York City.

Evidently you are too far from a broadcasting station to receive concerts using a crystal detector. If you wish to hear the concerts you must use a vacuum tube instead of a crystal, and, later on, for louder reception you have the advantage of increasing a stage or two of amplification.

Will wires buried about a foot in the ground serve as a good lightning ground?—A. B. G., Bloomfield, N. J.

Yes. They will be all right if you bury enough of them and have them as long as possible.

SEND US YOUR ORDERS FOR

Variable Condenser, Variometers, Variocouplers, Loose Couplers, Tuning Coils, Amplifying Transformers, Sliders, Switches, Switch Points, Binding Posts, etc.

We are large manufacturers. Gorton machine engraving or manufacturing special parts to order.

F. JOS LAMB COMPANY
1970 Franklin St. Detroit, Mich.

FOR IMMEDIATE DELIVERY
No. 22 Enameled Magnet Wire. 85c. lb.
On full spools. (7 to 12 lb.)
F. JOS. LAMB COMPANY
1970 Franklin St. Detroit, Mich.

RADIO FINANCING

Cash advanced to Radio Manufacturers and Wholesalers on their outstanding accounts at lowest rates.

STANDARD TRADING CO.
COMMERCIAL FINANCING
491 Broadway, New York

Complete Line of Radio Parts and Finished Sets
Sets Built to Receive on Indoor Aerial

VICTOR LABORATORY
63 E. 9 St. N. Y. C. Near Broadway

All Radio Apparatus: Complete Sets or Parts

23-Plate Variable Condensers \$3.50
43-Plate Variable Condensers 4.25
Acme Amplifying Transformers 5.00
Federal Double Circuit Jacks 1.00
AA I Galena Guaranteed, \$4.00—Copperweld Wire, 100 feet, \$0.50.
immediate Delivery—Cash must accompany order. DEALERS: Write for Discounts
NEW YORK RADIOPHONE CO.
Dept. W, 32 Union Square, New York City

WOLVERINE AERIAL

ELIMINATE OUTSIDE AND INSIDE WIRES
Attach the Wolverine Aerial to any electric light socket in your home and receive good results from your receiving set. Fool proof and no danger. It comes ready to use; just screw into light socket and connect to aerial post of set. Save cost of wire and lightning switches. Will operate on blub or crystal sets. Guaranteed to give good results. Price \$3.50, postpaid. (\$4.00 west of Rockies.)
Dealers and Agents Wanted
WOLF RADIO COMPANY
208W Scherer Bldg., Detroit, Mich.

IMMEDIATE DELIVERY

Discounts to jobbers and dealers
AERIAL WIRE.

19 strand tinned silicon bronze
VARIABLE CONDENSERS

11-21-23-43 Plate
EISEMANN HEAD PHONES
Super-sensitive

Variometers Variocouplers
Binding Posts Contact Points
**"ECHOPHONE" LOUD
SPEAKER SETS**

General Auto Electric Co.
281 Halsey St.,
Newark New Jersey

Radio Sets and Supplies

Head Sets, Vacuum Tubes, Acme Transformers, Dials, Switch Points, "B" Batteries, Insulators, Etc.

N. Y. RADIOPHONE CO.

32 Union Square New York City

20% TO 33 1/3% OFF ON RADIO SUPPLIES

That's the club's motto

CLUB'S OBJECT

Saving of dollars and a united voice to be reckoned with in matters of interest to Radio Amateurs.

Membership fee, the small sum of 25 cents per month.

Membership blank mailed upon request.

CORUBIA ELECTRICAL PURCHASING CLUB

145-147 East 23rd St.,
Bet. Lexington & 3rd Ave., N. Y. C.

RADIO WILL MAKE YOU MONEY

Well known established concern manufacturing WIRELESS specialties offers investors an opportunity to participate in big profits to be made in the WIRELESS INDUSTRY EXPANDING BUSINESS. Not a promotion.

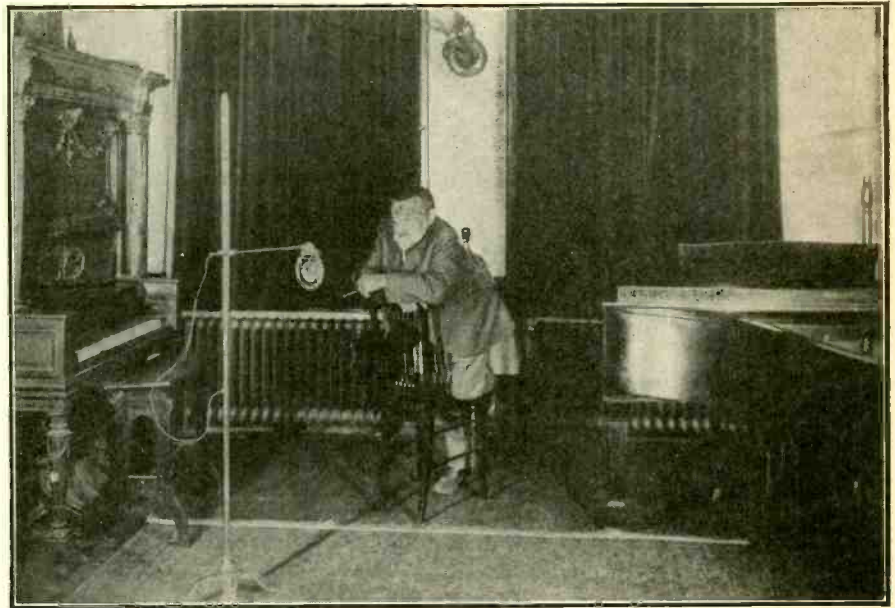
\$1.00 Per Share

Books Now Open for Subscriptions.

Factory, offices and demonstrating rooms, testimonials open for inspection. Strictest investigation invited. Call or write for information.

G. BOISSONNAULT CO.

26 Cortlandt St., New York.

Says Radio and Light Are the Same

(c. International)

Charles P. Steinmetz, chief consulting engineer of the General Electric Company, Schnectady, N. Y., who recently startled the world by announcing that he had made artificial lightning in his laboratories. Dr. Steinmetz is photographed speaking into the radiophone. He recently announced that radio waves and light are the same thing, the only difference being in the wave length.

New Radio Clubs

(Send RADIO WORLD items similar to the following. We want to keep a record of all clubs and their activities.—Editor, RADIO WORLD.)

HARRISBURG RADIO ASSOCIATION, Chartered by State of Pennsylvania, secretary-treasurer, L. G. Krause, 1912 Market St., Harrisburg, Pennsylvania. Receiving station located in Public Service Commissioners Building, Market Street. Outfit in use, Westinghouse. Membership

fee, or share of stock, \$10. Annual dues, \$5. No member can hold more than one share of stock, but must buy one share to become a member. Membership includes leading State officials. The club held a demonstration in Penn Harris Hotel, last week, in connection with A. T. & T., officials; talked to San Francisco and Havana. Continental wire and cables. Picked up ship "America" 400 miles out at sea.—MAXWELL H. HITE & SON, per Maxwell H. Hite.

TOTTENVILLE RADIO CLUB, organized April, 1921. 157 Bedell Avenue, Tottenville, Staten Island, N. Y. Robert A. Fuller, publicity director.

UNITED RADIO CLUB, Defiance, Ohio, C. O. Haley, secretary.

Actors Do Not "See" Radio

While recognizing radio as a scientific marvel, the members of the Actors' Equity don't think so much of it as a dispenser of entertainment unless it brings them financial return.

The council of the organization, at a recent meeting, went on record to that effect with the following resolution:

"Resolved, That the attention of our members be drawn to the fact the radiograph is a profitable commercial enterprise, which also in a way enters into competition with the theater and that, therefore, our members be advised to seek proper compensation for any services they may be invited to give to the radiograph companies."

Unusually Modern

"Are your new neighbors modern people?"

"Modern? Say, they sent in last night to borrow our radio set!"—*Buffalo Express*.

Radio Parts**We carry in Stock**

BINDING POSTS

DIALS

VARIABLE CONDENSERS

VARIO-COUPLERS

CRYSTAL DETECTORS

CRYSTAL SETS

SEND 25c. FOR LARGE CATALOGUE

Robin Radio Mf'g., Co.

47 WARREN ST., NEW YORK CITY

"Boss of Air" for Western States



(c. International)

Major J. F. Dillon, United States Radio Inspector for the States of California, Nevada, Utah and Arizona, holds a somewhat envious office. As "boss of the air" of those commonwealths, he is privileged to break in on any radio conversation or message. No secrets are kept from him.

"Stick to Aerials," Says Maj. Gen. Squier

When Major-General George O. Squier, Chief Signal Officer of the United States Army, announced that he had perfected "wired wireless" as applied to the radiophone, it looked pretty easy. Instead of attaching his receiving set to an aerial, he attached it to the electric light on his desk and received a perfect concert. Immediately radio fans throughout the country tried the stunt and many of them blew out their sets.

They had forgotten, or did not understand, that the broadcast must be transmitted along the lighting main if it is to be received from the lighting main.

"The set requires a special plug," General Squier has since explained, "but not special wiring. However, even the special plug will not give results unless the transmitting station is sending out broadcasts along the electric light mains. I did not receive a broadcast sent out on an overhead aerial. It was from a station which transmitted on the electric light mains.

"The advantages of the line radio method of broadcasting are many. The ether channels for radio broadcasting are limited, and even the few wave-channels which are available can be more profitably employed for such radio activities where space is the only or best method of communica-

tion. Also, since there is no radio interference caused by broadcasting on power lines, any number of wave channels may be employed and therefore multiplying the number of stations that can be operated on the same line."

RADIO WORLD is published every seven days. \$6 a year, \$3 for six months. \$1.50 for three months.—(Adv.)

RADIO CABINETS

Manufactured
in any Style, Size or Quantity
A. E. CHERNACK & CO., INC.
314 E. 75th ST., NEW YORK
Phone Rhineland 2747

Manufacturer's
Distributors of Everything

RADIO

REX RADIO SALES CORP.
1452 Broadway, New York

100% BETTER RESULTS
WITH

"AEROPLANE" WIRE

For Aerials

19 strand silicon bronze—each
strand tinned.

The Wire used by the U. S. Army
and Navy during the War.

HOOK UP BLUEPRINTS

These prints are clearly drawn and
each is accompanied with instruc-
tions in plain English so that any
layman may readily understand
them.

Dealers Write For Proposition.

HINTZE BROS. Inc.,

459 CENTRAL AVENUE
NEWARK, N. J.

RADIO PANELS

and Other Insulation for Wireless Work

BAKELITE-DILECTO

Grade XX Black was used by the United States Government
during the war for this purpose. It is the:

STANDARD OF THE WORLD

The Continental Fibre Company

Newark, Del.

New York, 233 Broadway

Pittsburgh, 301 Fifth Ave.

Los Angeles, 411 S. Main St.

Chicago, 332 S. Michigan Ave.

San Francisco, 75 Fremont St.

Toronto, Ont., Canada, 89 Wellington
St., West.

RADIO WORLD'S QUICK ACTION CLASSIFIED ADS

This department is intended for everybody who wants quick action on short announcements covering the buying, selling, exchanging or general merchandising in the radio field. Readers of RADIO WORLD will find that it pays to read these columns every week. Advertisers will get a ten-day service here—that is, copy received for this department will appear in RADIO WORLD on the news-stands ten days after copy reaching us.

The rate for this RADIO WORLD QUICK ACTION CLASSIFIED AD. DEPT. is 5c. per word (minimum of 10 words, including address), 10% discount for 4 consecutive insertions, 15% for 13 consecutive insertions (3 months). Changes will be made in standing classified ads., if copy is received at this office before 4 P. M. on any second Tuesday preceding date of publication. RADIO WORLD CO., 1493 Broadway, New York City. (Phone, Bryant 4796.)

WANTED—A few Western Electric VT-1's, VT-2's and head sets for use in our laboratory. Must be perfect. State quantity and lowest price. Reading Radio Shop, Box 6, Reading, Mass.

Short wave (crystal) receiving sets, not including phones, \$5.00. A. D. Nichols, Springfield, N. J.

Buy Direct; variometers, \$3.35 up, according to size, variable condensers, 23 plate, \$2.90, enclosed detector, \$1.35 dials, 3ins., 85c; 4inc., \$1.20, all other parts and complete sets at similar savings, mail order filled. G. C. Dee, P. O. Box 107, Brooklyn, N. Y.

We buy your Radio goods. Head sets wanted. Radio Shop, 1246 Gates Ave., Brooklyn, N. Y.

Crystal set that gets Radio Concerts. Build it right boys. Plans and full instructions for building at low cost, high grade fine adjustable Crystal Receiving Set, fifty cents postpaid. Dept. R. D. Shaw Mfg. Co., Galesburg, Kans.

FOR SALE—One De Forest Loose coupler mounted with primary switch and seven honey comb coils. Cheap. Gehhardt, 9532—114th St., Richmond Hill, L. I.

"News for the Radio Fans. Amateurs and beginners." A "Dixie Jr." crystal Detector set. Complete without phones \$2.00, cost less than renewal one bulb for local receiving. Tested and copy-righted 1922. R. H. Dixon, 185 Milford Ave., Newark, N. J.

Radiophone Wiring Diagram. Send 25 cents. J. E. Dunphy, 52 Bramhill St., Portland, Maine.

WANTED for spot cash. High grade Radio outfits, parts, attachments and materials of standard makes. No home made apparatus will interest us. Address F. J. Lamb, 1938 Franklin St., Detroit, Mich.

Wireless phone "B" Battery—direct from manufacturer. Large \$2.00, small \$1.00. Post paid 22½ volts. Wireless phone "B" Battery Co., 321 Canal St., New York.

Enclose self-addressed envelope and receive free illustrated bulletin of 22 up to date Blueprints of Receiving and Transmitting designs. We are the largest firm in the country specializing solely in Blueprints. Number 349 gives full construction and other data for building Crystal Receiver for only \$5.00. Ask for bulletin 44. Experimenters Information Service, 45 Pinehurst Ave., New York.

Are you interested in the stage? New York Star is an illustrated National weekly paper devoted to the American stage in all its branches. Articles by experts. Reviews of new Broadway plays. Gossip of legitimate vaudeville and motion picture players. Ten cents a copy, \$4.00 a year. Trial subscription, three months, \$1.00. New York Star Co., 1493 Broadway, N. Y. C.

AMERICAN MADE TOYS—Manufacturers wanted for large production and home-workers on smaller scale for Metal Toys and Novelties, Toy Soldiers, Cannons, Cowboys, Indians, Buffalo Bills, Wild Animals, Whistles, Bird-Whistles, Race-horses, Prize-fighters, Wag-tail Pups, Barking-dogs, and hundreds of other articles. Hundreds and thousands made complete per hour. No experience or other tools needed. Bronze casting forms complete outfit from \$5.00 up. We buy these goods all year, paying fixed prices. Contract orders placed with manufacturers. Exceptionally high prices paid for painted goods. An enormous business for this year offers industrious men an excellent opportunity to enter this field. Write us only if you mean real business. Catalog and information free. Metal Cast Products Co., 1696 Boston Road, New York.

10% discount and post paid on Radio Parts ordered by mail.

- \$1.00 Vacuum tube socket\$0.90
- 1.50 Caragon Rheostat 1.35
- 4.50 Amplifying transformer 4.00
- 3.30 Double slide tuner 3.00
- 5.00 Vacuum tube 4.50

Stamp for price list of more than 500 items. Money order must accompany your order. Edward T. Collins, 8502-101st St., Richmond Hill, L. I., N. Y.

WANTED for spot cash. High grade Radio outfits, parts, attachments and materials of standard makes. No home made apparatus will interest us. Address 1938 Franklin St., Detroit, Mich.

WANTED—Men—Boys over 17. Become Railway Mail Clerks. Commence \$133 month. Common education sufficient. List positions free. Write immediately. Franklin Institute, Dept. E 152, Rochester, N. Y.

Subscribe for Radio World by the year and be sure of not missing an issue. (Adv.)

Western Electric phones, tubes. Immediate delivery of Western Electric 2200 ohm phones. \$15.00 Western Electric VT-1 \$7.50, Federal 2200 ohm phones \$8.00. Radiotron 201-\$6.50. Send post office money order and goods will be shipped return mail. A. V. Gregory, 42 Broad St., Red Bank, N. J.

HAVE YOU A RADIO SET?—If not try my system in getting one. I sell at reduced prices, batteries, tools, sporting goods, merchandise of all kinds. Try me. Anderson, 340 Park Ave., N. Y.

CODE CHARTS—Containing alphabet, number, punctuation and Q abbreviations. Two sizes, 12 x 16 @ 25 cents and 24 x 30 @ 50 cents. If your dealer does not handle them, we will mail them

WE BUY second hand radio goods, any description. Columbus Shop, 874 Columbus Ave. (103d). Open evenings to 10 o'clock.

LEUMITE the ultra-sensitive detector crystal, postpaid 25c. LEUMAS LABORATORIES, 311B Fifth Ave., New York.

Government Positions. Men, women, 18, over. Wanted for Railway Mail, Postoffice, other Government positions. Examination soon. Salary \$1,400-\$1,500 year. Experience unnecessary. Particulars free. Write Columbia School of Civil Service, 383 Pope Bldg., Washington, D. C.

We buy old gold, silver, platinum, coins and stamps. Walters Co. 1540 North 58th St., Philadelphia, Pa.

52 Weeks for \$6.00
Subscribe for Radio World by the year and be sure of not missing an issue. (Adv.)

SUBSCRIPTION BLANK



RADIO WORLD CO.

1493 Broadway, New York City.

Please send me RADIO WORLD for months, for which please find enclosed \$

SUBSCRIPTION RATES:

- Single Copy\$.15
- Three Months 1.50
- Six Months 3.00
- One Year (including Special Nos.) 6.00
- Postage Paid.
- Add \$1.00 a Year for Foreign and Canadian Postage.

FOR IMMEDIATE DELIVERY

We offer the following items of our own manufacture:

Variable and Fixed Condensers.
Mounted Crystals. Crystal Detectors.

Distributors for—Grebe, De Forrest, Federal, Acme, Thordarson, Fada.

WHOLESALE ONLY — LARGE STOCKS
RADIO SHOP of NEWARK
(Telephone Market 9607)
41 SOUTH ORANGE AVE.
NEWARK, N. J.

Dealers: Forward Your Inquiries Promptly

Special Dealer Proposition

on

Federal Juniors and all Radio parts and apparatus. Very comprehensive stock on hand.

**SIGNAL SYSTEMS
SERVICE CO.**

1 E. 42nd St., New York City

**RIALTO RADIO
CORPORATION**

IS NOW OPEN
AT

1487 BROADWAY

with complete line of
**Radio Equipment and
Accessories**

Free Demonstrations

Dealers!

We Offer for
Immediate Delivery
in Quantity Orders

FEDERAL JR.

With Head Sets

DE FOREST EVERYMAN

With Head Sets

DE FOREST RADIOPHONE

With Head Sets and Tubes

Radio Stores Corp.

150 W. 34th Street,
NEW YORK CITY

BAKELITE Panels cut to order.
All thicknesses in stock.
Gorton Machine Engraving to order.
F. JOS. LAMB COMPANY
1970 Franklin St. Detroit, Mich.

**Washington
Conference**

WASHINGTON, D. C.—The second session of the Radio Conference, appointed by Herbert Hoover, Secretary of Commerce, to prepare a draft of an agreement of wave-length assignments for amateurs and commercial transmitting stations has received a set back from Congress. It is claimed that the radio law, as outlined by the experts assembled at the convention "doesn't mean anything." The members of Congress have been making a close study of the proposed measure as planned by the conference.

Senator Frank B. Kellogg, of Minnesota, and Representative Wallace White, Jr., of Maine, with the aid of some of their colleagues who are interested in radio, will redraft the bill. It is now undergoing complete overhauling, according to Representative White.

While the Congressmen approve the general principles of the recommendations of the radio conference, which extend the authority of the Secretary of Commerce to patrol the ether as the property of the public, they disapprove of the way the bill is written. Senator Kellogg and Representative White claim that it contains too much technical lingo and confusing phraseology. What Congress hopes to do is to write a law that any radio fan can easily understand.

1/4" Sliders—Brass, 20c.; Nickel, 25c.
1/4" Slider Rods—Brass, 15c.; Nickel, 20c.
Crystal Detectors, nickel plated on Mahogany base, \$1.00
Double Nickel Slider Tuning Coils, \$3.00
Contact Points, threaded with nuts—20c. dozen.
Compo. cap, Nickel base Binding Posts—7c. each
Plain Nickel Binding Posts—3 1/2c. each.
Liberal Discounts to Dealers
F. JOS. LAMB COMPANY
1970 Franklin St. Detroit, Mich.



**THE
HOME RADIO
HOW TO MAKE AND USE IT**

By A. Hyatt Verrill

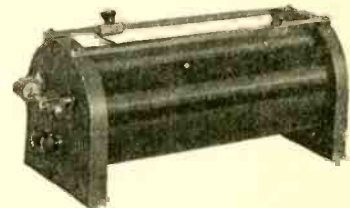
At last! A simple explanation of the making and use of a home radio outfit. Every step in construction is carefully directed and illustrated with numerous working diagrams. Get your copy to-day. Clothbound book.

Postpaid for 75 cents.
Broadcasting Guide, 25 cents.

Radio Educational Service
200 5th Ave., R. 416, New York City

**JOBBER—
DEALERS**

Write for discounts on our
**"RELIANCE"
TUNING COIL \$5.00
CRYSTAL SET**



Wound with No. 21 enameled wire on specially treated tubing, neat in appearance, efficient in receiving, has a range of 600 meters.

IMMEDIATE DELIVERY

We also manufacture:—

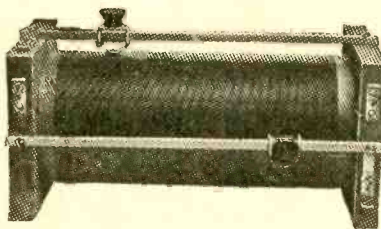
A small set at \$4.00

A 2 slides tuner at \$3.50

Unmounted coils in 3 sizes, 6x3, 8x3, 8x3 1/2" at \$1.00, \$1.25 and \$1.50 respectively.

RELIANCE MFG. CO.

354 Mulberry St.
NEWARK NEW JERSEY



"Essex" Tuning Coils—Double Slide—
Enameled wire—Good for loading coils.

LIST PRICE, \$3.00



"Essex" Polished Wood 3-inch Rotors

LIST PRICE, 50c

ATTRACTIVE DISCOUNTS TO DEALERS
3/16" Sliders, 3/16" Slide Rods, Mounted Crystals, .001 Fixed
Condensers, Crystals Detectors, Lightning Arresters.

ESSEX MANUFACTURING COMPANY

NEWARK

117 Mulberry Street

NEW JERSEY

No wireless receiving set is complete without the Magnavox Radio—"the reproducer with the movable coil."
Write for descriptive booklet and name of nearest dealer.

The MAGNAVOX COMPANY
Oakland, California
New York Office, 370 7th Ave.
Penn. Terminal Building

Radio brings it
MAGNAVOX
tells it

NOVO
"B" BATTERIES
FOR YOUR RADIO SET
All standard sizes 22½ to 105 volts.



For Sale by Leading Dealers

NOVO MFG. CO.
NEW YORK—424-438 W. 33rd St.
CHICAGO—531 So. Dearborn St.

LOOK

The "Junior" Crystal Detector



THESE
CRYSTAL DETECTORS

Are The Very Best For Constant Satisfactory Results.

Lowest of All in Price
Dealers and Jobbers Write For Proposition

WALTER H. SAMUEL
400 BELLVILLE AVE.
Bloomfield, New Jersey

ATTENTION AMATEURS

A complete line of high grade radio material backed with quick service has built up a remarkable radio trade.

The Quaker Light Supply Co.
728 ARCH STREET,
PHILADELPHIA, PA.



(Actual Size)

IN USING
THE "GREWOL"
RADIO DETECTOR

All Troubles Are Eliminated
This Detector Is Always Set and Ready

PRICE, \$2.00

No Free Samples

Dealers write for proposition.

RANDEL WIRELESS CO.
9 CENTRAL AVENUE, NEWARK, N. J.
Sole United States Distributors

TRADE **HMPCO** MARK
Reg. U. S. Patent Office



No. 20 Fixed Condenser
Price 70c Each

The most dependable and efficient phone condenser to be had at any price. Made of high dielectric specially processed varnished paper, 001 M. F. D. capacity and each condenser is tested at 110 volts before being released. Our special processes insure uniformity of product.

Largest fixed condenser (insulated type) manufacturers in the United States

ATTRACTIVE DISCOUNTS TO THE TRADE
Book Your Orders Now.

HEDDEN PLACE MACHINE CO.
41 HEDDEN PLACE

EAST ORANGE

NEW JERSEY

WISDOM.

Everything in Radio Is Available Here—We Are Manufacturers and Distributors of High Grade Parts and Complete Equipment.

"It is good business wisdom to place your full requirements with us"

Prompt Shipments Await Your Orders On:

"Nerco" 2200 Ohm Phones
Crystal Detectors
Variable Condensers
(23 and 43 Plates)
Fixed Condensers
Dials and Knobs
Variocouplers
Variometers

Binding Posts
Stops
Galena Cups
Arm Contact Switches
Switch contact points
Insulators
Magnet wire
Tuning coils—with two sliders

De Forest Sets Complete Including the M R 6's.
Federal Sets Complete With Phones.

ASK US about our little set complete with "Nerco" phones

Listed at **\$11.50** It's a Marvel

Wiener Wireless Specialty Co.

Telephone—Market 5668
21 ACADEMY STREET
NEWARK, NEW JERSEY