

Several Valuable Hook-Ups

September 30

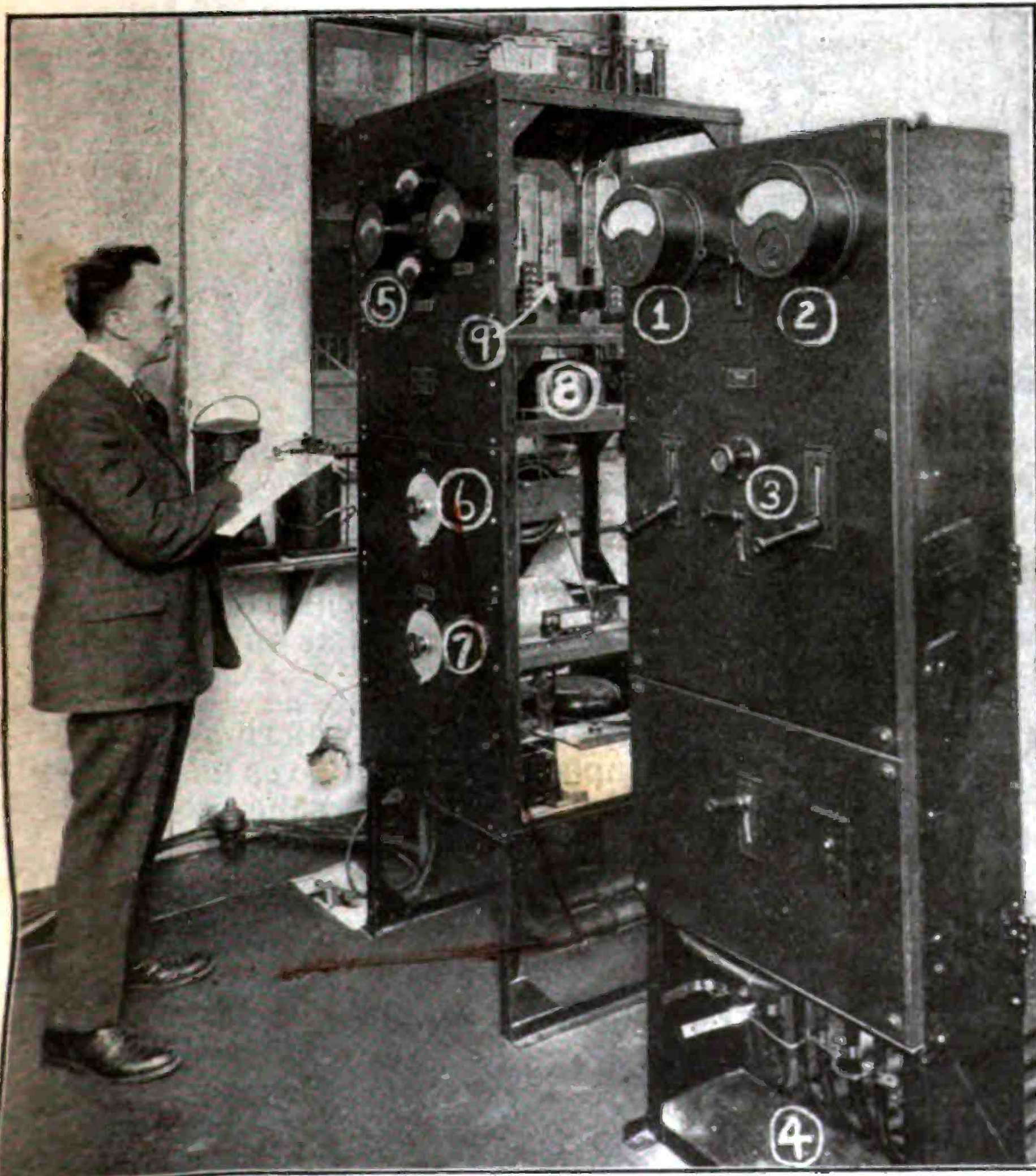
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52 Numbers

RADIO WORLD

ILLUSTRATED
PUBLISHED EVERY SEVEN DAYS

WBAY, New York, Will Broadcast Personal Messages See Page 16



(Photo by Morris Rosenfeld, New York)

The radio transmitter forming the heart of WBAY, the broadcasting station of the American Telephone and Telegraph Company, is shown in the accompanying photograph. It is located on the upper floor of the company's building, on Walker Street, New York City.

The tubes are mounted in the upper part of the framework of the transmitter (See 9). This location is used because it provides adequate ventilation. The current for heating the filaments is supplied from a constant potential generator. Means must be provided, in the radio operating room, so the radioman in charge can see at once just what power is being used.

1 and 2 indicate the two meters which are the telltales of the direct current flowing. These meters register the amount of current used.

3 indicates the rheostat and the protective devices which cut, in or out, the units of the set.

In order to operate these instruments the necessary electric feed wires must be brought to the panel by conduit pipes. These pipes are indicated by 4. Not only must the electric-power wires be run in a conduit pipe, but the conduit pipe must be grounded, as shown in the photograph. The ground clamp is fastened to the panel by screws. It runs to each pipe where it is grounded. This prevents the high-frequency current that is being generated in the air surrounding the instruments to become affiliated with the low-frequency currents, preventing the generators from being ruined.

The next step is to force the necessary current to the vacuum tubes. Here is the most critical and important stage of the transmitter. This is where the operator must know what the vacuum tubes are doing. The only method employed is the use of meters. These electric meters are somewhat like the meters indicated by 1 and 2.

5 indicates the necessary meters which permit the operator to know how the vacuum tubes are working.

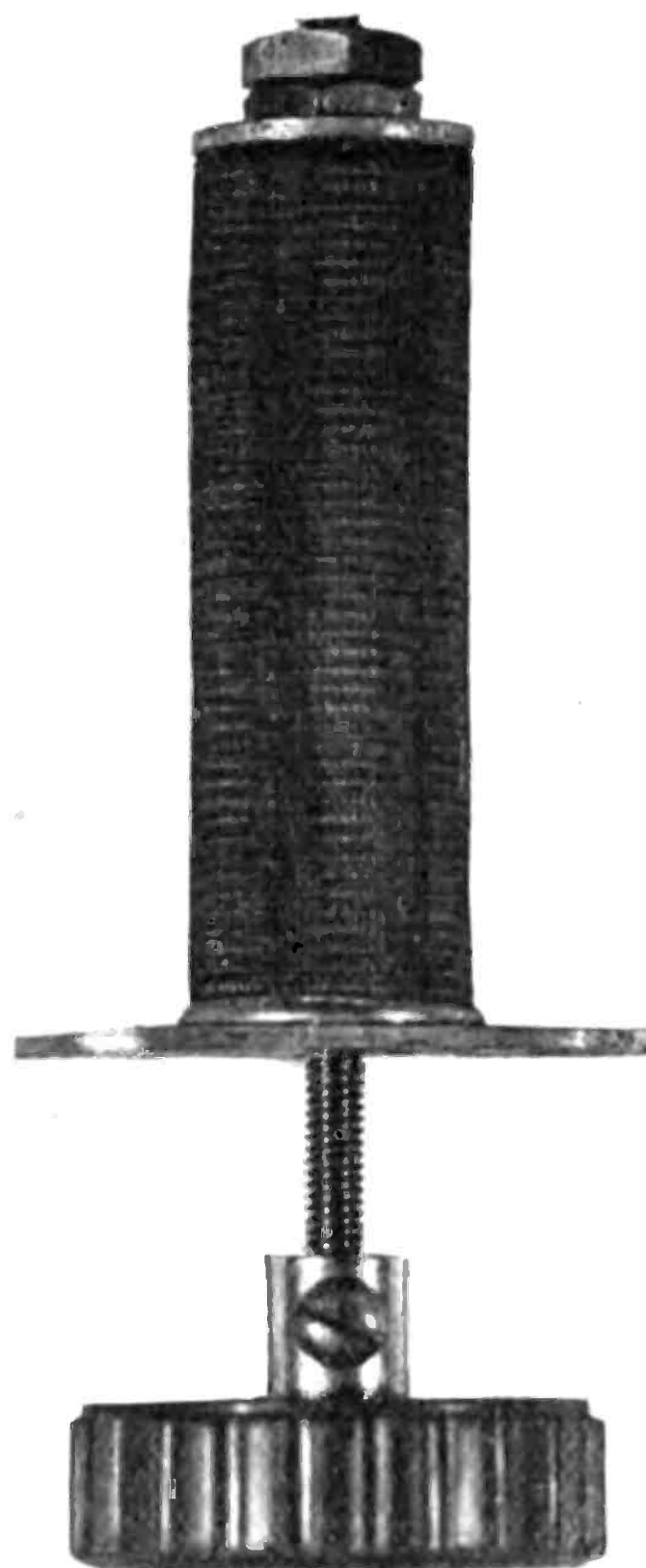
The frequency of the transmitted energy (wave length) is controlled by the value of the inductance in the oscillatory circuit, which includes the antenna. This inductance is adjusted by means of a variometer, indicated by 6. A variable condenser, connected across the plate-coil, controls the plate current through the oscillator tubes. This condenser consists of a variable unit in parallel with two fixed units which may be switched in or out of the circuit. The variable unit is controlled by a knob on front of set 7.

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**MICROSTAT COMPANY
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RADIO WORLD

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A Weekly Journal, Published Every Wednesday and Dated Saturday, by Hennessy Radio Publications Corporation from Publication Office, 1493 Broadway, New York, N. Y. Telephone: Bryant 4796

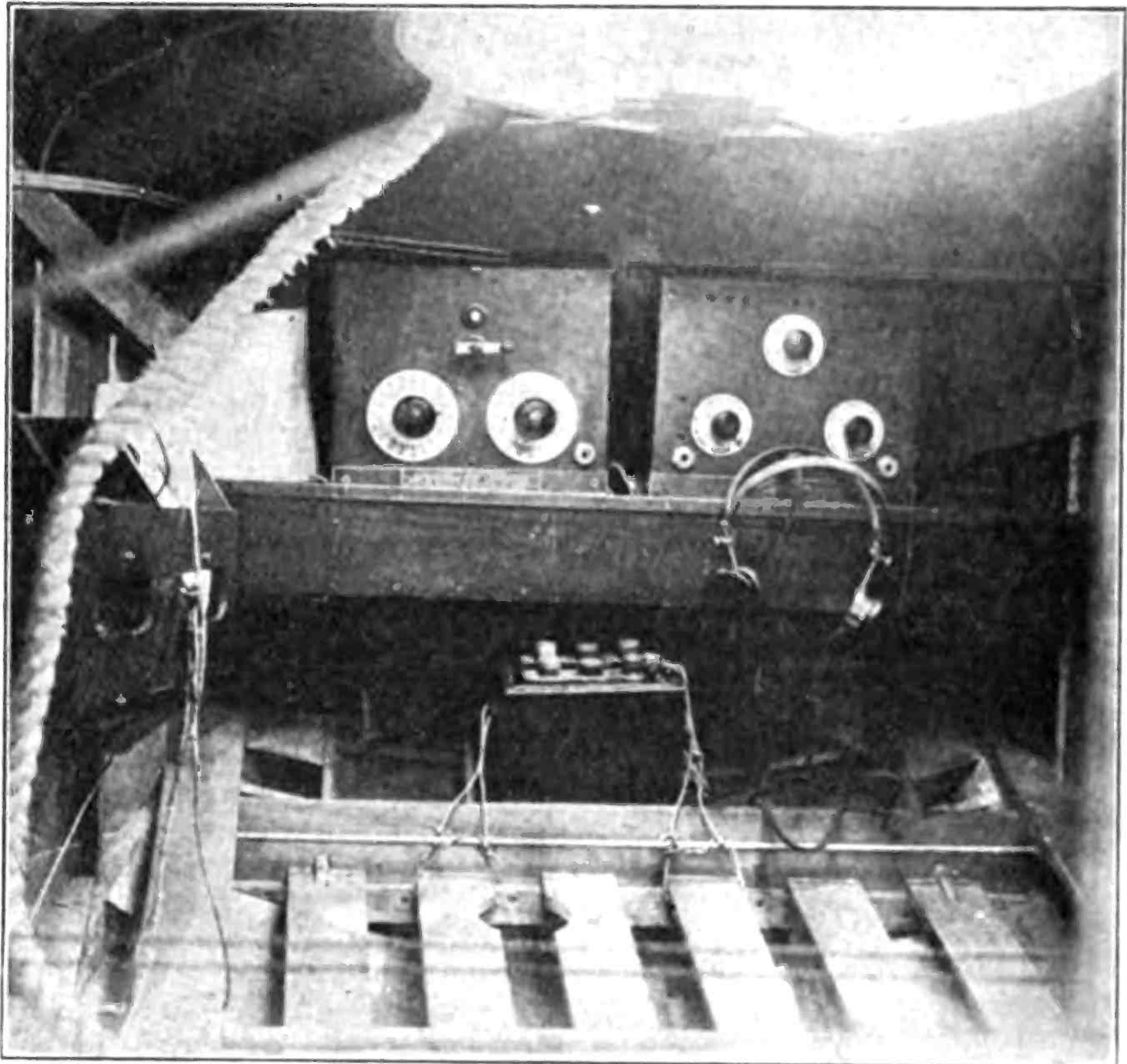
Vol. II, No. 1

September 30, 1922

15c. per copy, \$6.00 a year

In the Heart of a Navy Seaplane

THERE is nothing complicated about radio reception. It proved its merits when the "Sampaio Correia," the Brazilian seaplane left New York City on its flight to Brazil. The accompanying photograph gives a splendid view of the radio installation aboard this "ship," and it shows what can be done in a similar way on any heavier-than-air vessel. The receiving-set consists of a tuner and amplifier unit. A fixed antenna is strung between extremities of wings and tail structures. This makes it possible for the pilot to pick up any messages forwarded which will enable him to make such changes in his course as he desires. Weather reports, storm warnings that are broadcasted hourly are of vital importance to the aviator and it is only by radio that he can get them. Seaplanes are also equipped with radio-compass outfits.



(C. Radio Corporation of America.)

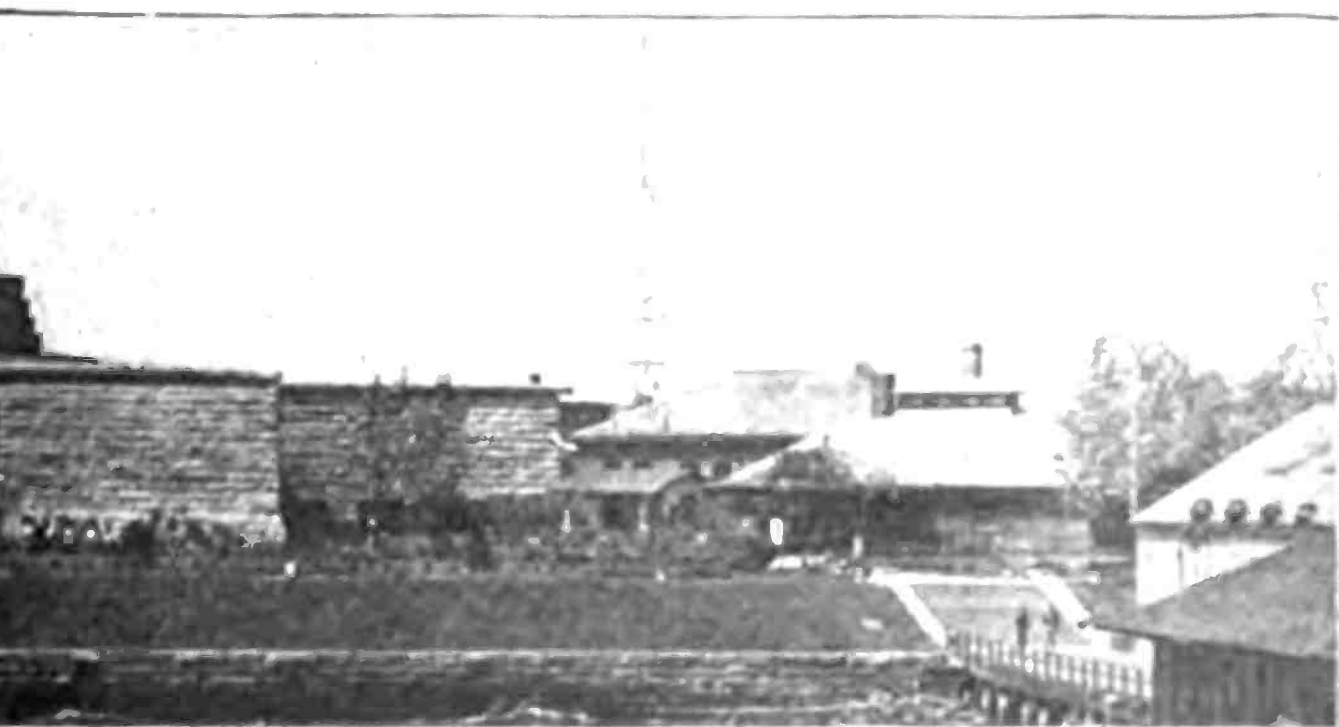
Interior of the pit of an airplane showing how the radio apparatus is placed. The set is composed of a tuner and amplifier connected to a fixed antenna strung between wings and tail.

Here is WVP, Bedloe Island's Big Radio Station

To the right in the photograph you will see the antenna of WVP on Bedloe's Island, N. Y.

THE radiophone service of the future is possible to everyone who is provided with a suitable receiving-set. All that is necessary is some kind of aerial, which, for this purpose, may be a single wire, elevated 30 feet or more above the ground and running more than 100 feet. This

will enable the operator to have a receiving-set that will permit him to listen to the broadcasts on 360 meters. With a somewhat longer aerial, it may be possible that we shall employ a longer wave-receiver and utilize the longer waves used in radio. For this purpose we could listen to WVP, the Signal Corps station of the United States Army located at Fort Wood, Bedloe's Island, N. Y. There is nothing more fascinating than listening to a radiophone concert and service. One turns the tuning handle of the receiving set and, finally, when the tubes are lit, one is able to hear the broadcasting. It is well to remember that the radiophone is subject to the noise dreaded by all radiomen: atmospheric disturbances, or static—and, often, QRM. This is not so bad when listening on 1450 meters for WVP. The accompanying photograph shows the towers and aerial of the Fort Wood station.



Increasing the Wave Length of a Receiving Set

By George W. May, R. E.

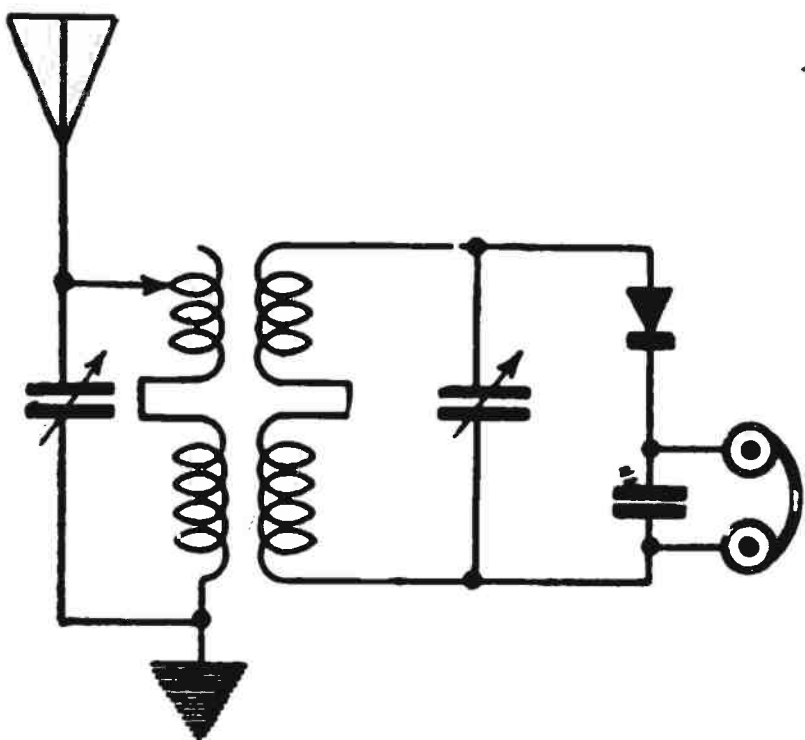


Figure 1—Inductance coil in series with single-circuit receiver, the details of which are fully described in the accompanying article. Drawn by S. Newman

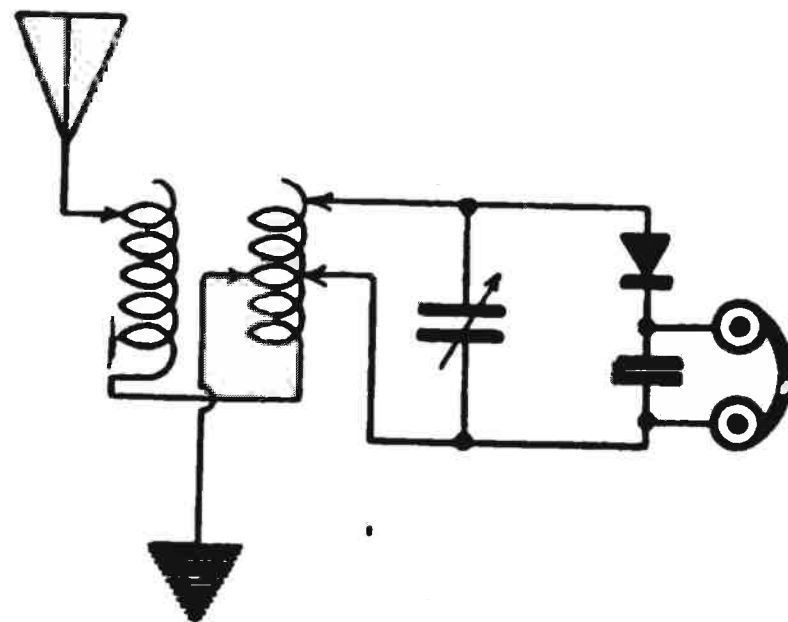


Figure 2—Inductance in series with primary and secondary of an inductive type receiver. Both elements must be loaded to obtain resonance.

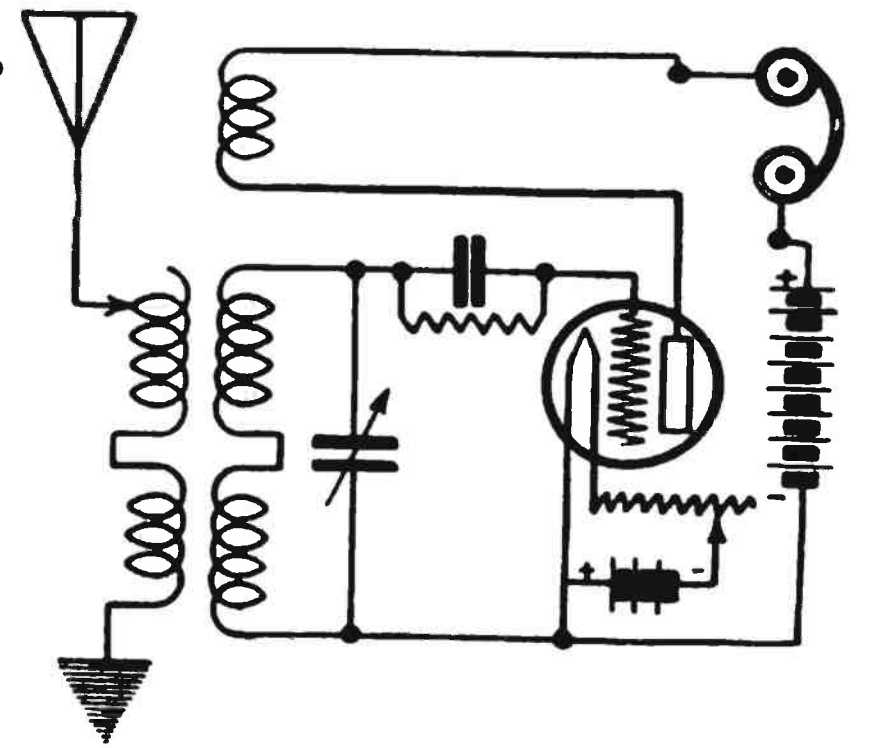


Figure 3—Vacuum tube receiver of the inductive type. Primary and secondary have inductance for increase in wave length as well as the tickler coil for regeneration.

WHAT must I do to my set in order to hear the longer wave-lengths? This question is asked by many fans who wish to listen in on stations with a wave length in excess of 600 meters. Although simple as it seems, the principle of loading up must be properly followed out, provided long wave-reception is desired.

On these long waves—such as 1450 meters, which is above the average wave-length of receivers generally used—some means of increasing inductance must be made. The average receiving-set is capable, ordinarily, of operating only over a comparatively narrow band of wave lengths. This should not be considered a great fault, because sets may be made to operate more efficiently over a narrow band of wave-lengths than over a wide band of wave-lengths. Occasionally one wishes to hear stations operating on the higher wave-lengths—higher than those afforded by the tuning-coil gear on one's

set. In all cases, the range of wave-lengths of the receiving set is increased to higher waves by means of the loading coil, or inductance. This means that more inductance must be added to the inductance already in the set. This instrument may take a number of forms such as tuning coils or honey-comb coils.

It is known that there are two circuits, namely: single- and double-circuit receivers. If vacuum tubes are employed, there also may be regeneration in both cases. In the single-circuit short-wave receiving sets—usually made up of a tuning coil and variable condenser in series with the aerial and the ground—have the crystal detector and telephones in shunt to the coil. Now, if longer waves are desired, simply add another coil in series with the aerial and ground. Remember, this coil is in series with the coil in the set.

There must be a sufficient number

of turns depending upon the maximum inductance of the other coil in the set. Remove the condenser in series and place it in shunt to both coils. The detector remains the same, whether crystal or vacuum tube.

When a two-circuit receiver is used, another coil must be connected in series with the secondary in order to balance the two circuits. If a loose-coupler is in use, a moderate amount of loading may be used in the primary circuit without any in the secondary as secondaries of this type instruments are usually wound with more wire to compensate for the slight loading.

If the circuit in use employs a vacuum tube as a means of regeneration, or in conjunction with a tickler coil, the question of loading up for the longer waves is a little more difficult as in the double-circuit receiving-set we must load up the three coils, namely: primary, secondary, and tickler coil.

Gave Him the "Double Throw"

By Jack Turner

Radio Editor, "The Age-Herald," Birmingham, Ala.

I SAW Ray D. Owe downtown the other night, and with him was Anne Tenna. I had told Ray that I would like to "meter," so he introduced me and I asked her if she wouldn't like to have a "feed, back" around the corner, and she said that it would just "tickler" to death.

When we went in, she took off her hat and I saw that she had her hair done up in "short" "continuous waves," and wore a "switch" or two. She said she just "came in" town. I asked her what "station," and she replied, "The 'Terminal'."

I said to her, "You are the 'cat's whisker'—you have eyes like 'crystal'—I 'solder' like you." When I told her that I was going to kill a mosquito that kept buzzing around my head, she said, "kilowatt?"

Anne ordered so much that I thought she would "choke," and when the

We have not as yet found out even an infinitesimal part of the many things radio will do for mankind.—Prof. J. A. Fleming

waiter brought a cake that was full of "currents," I broke my "plate."

There were many people there "antenna" them were dancing. I asked Anne for a dance and she didn't offer any "resistance," but we didn't have much "selectivity" as I could only do the "one step." She told me that I danced like an "amateur." Once I hit the "ground" when I did a "loop." But she couldn't dance much "ether." After dancing with me once, she would re"fuse" if I asked her for an encore.

While I was talking to her, she told me that I was a "loud speaker" and that I "broadcast" everything I said. When the waiter "brought in" the check, I told him to "charge" it.

I asked her, "'Wire' you in such a hurry?" She answered: "I must go 'ohm' because I don't want to get 'insulate.'"

The Importance of the Variometer to a Receiving Set

By Donald Van Wyck

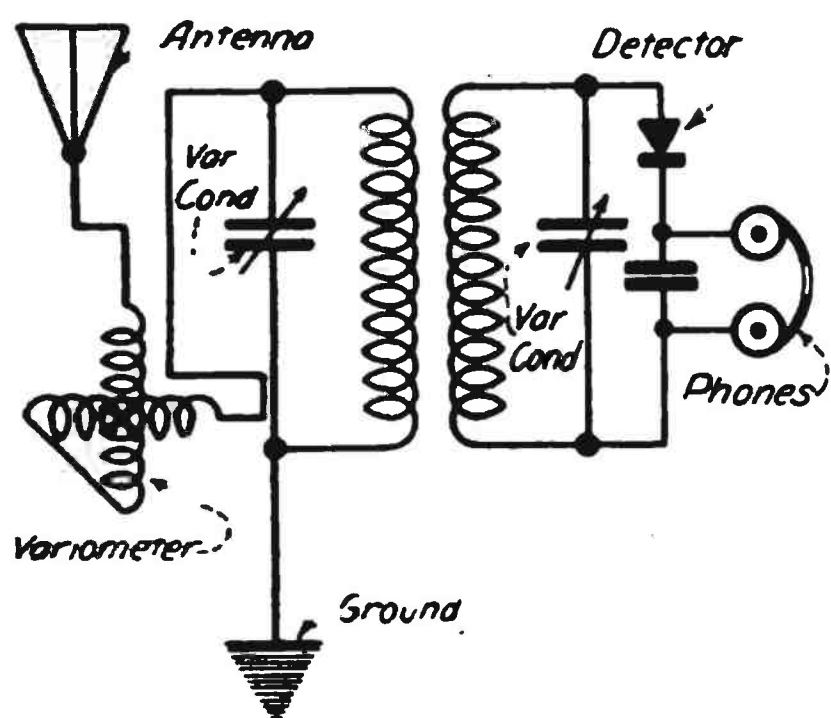


Figure 1. The use of the variometer as a variable inductance in the inductive-coupled receiving-set. Drawn by S. Newman.

A SIMPLE means of tuning-in a radio set is afforded by the variometer. This piece of apparatus, widely known, is one of the instruments that tend to make up a certain type of regenerative set. In its simplest form it is quite easy to make and parts for its construction may be easily purchased and assembled.

A variometer is particularly adapted for the construction of radiotelephone receiving sets. They effectively cover a wave-length range from 150 meters to about 600 meters. A variometer is built up of two spherical coils. One which revolves, is termed the rotor; the other, which remains stationary, the stator. The rotor, or secondary coil, turns about its axis inside the stationary coil, or stator, which acts as the primary. The variometer, as its name signifies, is a variable type of inductance, but it is different from tapped coils, or coils with sliders, in this respect: there is no variation in the length of wire. In the inductance of a variometer, the variation is accomplished by the rotor revolving inside the stator, or primary. This proves that the elimination of multiple point, or tapped switches, permits variation without any break in the circuit whatsoever. With this important feature, the variometer is adapted for the vacuum-tube work, since switches or taps are likely to leave a break in the circuit when the set is being tuned.

A variometer with a rotor shaped like a ball, is known as the ball type; another type consists of two cylindrical tubes, one rotating within the other. This type variometer does not have a minimum or as high a maximum inductance as the ball type. The best variometers have a minimum clearance between the rotor and the stator, and both coils have the same inductance. It may be then said that a variometer is a tuning coil in which the primary coil is fixed and the secondary coil

movable and revolving at right angles to the primary. One end of the primary is connected to one end of the secondary. It has no sliding contacts or other means of varying the inductance of the primary and secondary coils, but tuning is accomplished solely by varying the coupling between them. This is what happens in the variometer when the tuning adjustments are made by turning the variometer dial.

When a current flows through the coil—in this case the stator—a mag-

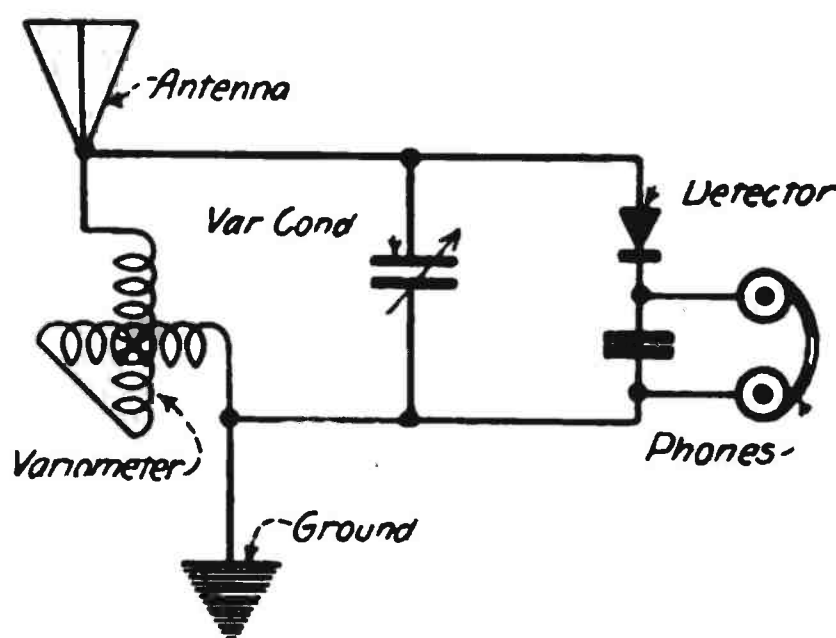


Figure 2. The use of the variometer as a direct-coupled tuning transformer, well adapted for short-wave reception. Drawn by S. Newman.

netic field is set up about the field surrounding the wires. When the current in the coil is varied, there will be a corresponding variation in the magnetic field. If another coil, the rotor, is placed in proximity, the changing magnetic field will induce, or set up, a voltage in the secondary coil. Connected to the second coil—or, as it is known the secondary—is a detecting

Argentine Fans to Build American Sets

ARGENTINE radio fans soon will be building receiving sets along the lines of the specifications issued by the United States Bureau of Standards. Believing in the development of radio, especially in the efforts of the United States Bureau of Standards to simplify and standardize home-made or assembled sets, the Argentine Embassy has just completed the translation of the Bureau of Standards illustrated reports on building simple and two-circuit radio receiving sets at home. These pamphlets, which were popular in this country, are expected to be equally as popular in the Argentine now that it is in Spanish.

Radio Catches Everything

IN a radio broadcasting studio the absence of a visible audience often makes a singer forget that several thousand people may be listening to him. Such was the case with a soloist at one of the local stations recently. At the end of a fine tenor solo, listeners heard the singer say, "How do you shut this — thing off, anyhow?"

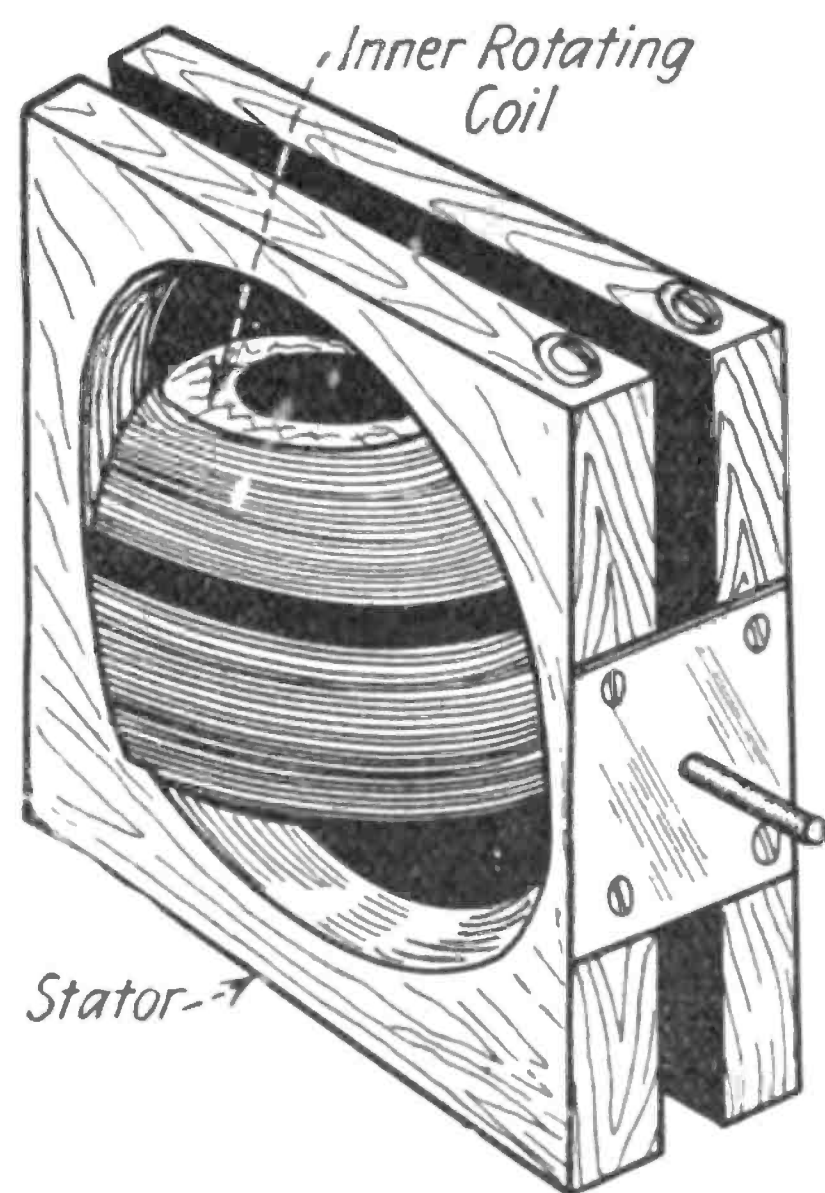


Figure 3. View of variometer giving a larger range of inductance variation than some of the other types of variometer. This is known as the ball type. Drawn by S. Newman.

device such as a telephone receiver, which records the change of current. The induction of current from the primary to the secondary is termed mutual induction.

In two of the circuits illustrated, the use of the variometer in Figure 1 is shown as a variable antenna-inductance; while in Figure 2, the use of the variometer as a direct-coupled tuning transformer is shown. This circuit is particularly suited for the shorter wave-lengths, such as 200 to 500 meters. A large range of wave-length variation cannot be obtained from a variometer when used as the sole tuning-element unless it is made very large and wound with a large number of turns of wire. The circuit shown in Figure 2 has been used for long waves using a large variometer and a vacuum-tube detector. The manipulation of the variometer is very simple.

Figure 3 shows a variometer used in a regenerative vacuum-tube set. One variometer is placed in the grid and the other in the plate circuit. Any circuit that gives regeneration is called a feed-back circuit, from the fact that oscillating energy is fed back from the plate circuit to the grid circuits. There are several feed-back circuits. The two most commonly used in radio receivers are the "tickler circuit" and the tuned plate, regeneration being accomplished by employing the variometers.

In this case, the inherent capacitance between the grid and plate is relied on for coupling. The choice among different forms of feed-back circuit lies in convenience, design, and use.

Successful Stunts of an Amateur Radioist

By C. F. Rye

Adjusting Diaphragms on Receivers

HAVING different makes of receivers on hand, including some cheap ones, I tried to make some of the low-priced low-ohm receivers more sensitive. I was successful with all.

Looking them over, I noticed that they varied in length from the magnet to the diaphragm, and as the more expensive ones were of standard length and much closer, I tried to duplicate them by cutting down the outside edge of the rubber on which the diaphragm rests, thus permitting the diaphragm to come closer to the magnet. By so doing, I expected increased action due to a stronger magnetic field.

The cutting of the rubber was easily accomplished by laying fine sandpaper on a smooth table, and gently rubbing the body of the receiver over the paper.

If you happen to take off too much, you can place paper washers under the diaphragm to raise it from the magnet.

You had better use a straight-edge rule to see how far the magnet is from the diaphragm as it may be too close and be the direct cause of a tinny sound.

You may wonder why the receivers on a head set do not sound alike—one

will be louder than the other. Try them with a straight-edge rule and see if the diaphragm of one is not in a stronger magnetic field than the other.

If so, try to bring the weaker up to the stronger, either by shimming with paper, or removing the bearing portion of the body where the diaphragm rests on it.

I have made a big improvement in my receivers of cheaper make by the method I have here explained. Many of the receivers have metal bodies instead of rubber. The only difference is that the metal takes more rubbing, but the result is the same.

* * *

Using Mercury on Galena

AFTER looking over my crystal set to see if I could improve on any of the connections in order to help the weak current on its way, I remembered that in only a few places was the crystal sensitive.

The thought naturally came to me: How about the places where the crystal rests in the metal cup? Are they sensitive?

Well, to eliminate doubt, so far as possible, I used some cold solder and a drop of quicksilver, or mercury, as a bed in the cup in which to lay my crystal.

The mercury dissolved the solder

and made a thick mixture which gradually hardened and made a metal contact all the way through, improving the strength of signals.

I used mercury in a similar way on a piece that was mounted when I bought it, and this piece also was greatly improved.

My purpose in doing this was to overcome the evil which often occurs in mounting galena—overheated metal in which the galena is placed. Such overheating causes a thin coat, or film, to gather on the outside of the galena.

Later, I cleaned other parts in my hook-up where it was impractical to solder, and gave it a coating of quicksilver, or mercury. I can assure you this operation did no harm.

* * *

Disconnecting a Soldered Joint Cold

IN my desire to secure the very best results from my set and eliminate all noises, I had to solder my joints. This worked well until I wanted to change my connections, as illustrated in a magazine. Then I had to think, as some of the joints were in places where I could not heat them without damaging my set.

After trying to disconnect the joints I used mercury, or quicksilver; and all that was needed was to clean a place on the solder and apply a little mercury to the cleaned spot.

In a little while, the joint was free and ready for a good connection to any other place, as it had a mercury coat on it that helped to make a good connection—just as a wet hand makes an electric connection.

In this case, no solder whatsoever was needed; yet all the good qualities of a soldered joint was accomplished with excellent results.

* * *

Two Aerials Instead of a Ground

MANY amateurs have a poor chance to make a good ground. My best results have been secured without any ground—with less trouble even than digging a hole to bury copper wire.

My plan is this: I set up another aerial and ran my ground connection up to it. My signals—on a crystal set—were loud enough to be heard a hundred feet away with the aid of a horn.

I have a good ground to the water-main, but I prefer my second aerial.

My two-aerial plan may be accomplished by using one of the wires of a double-wire aerial.

Seen at London's First Radio Show

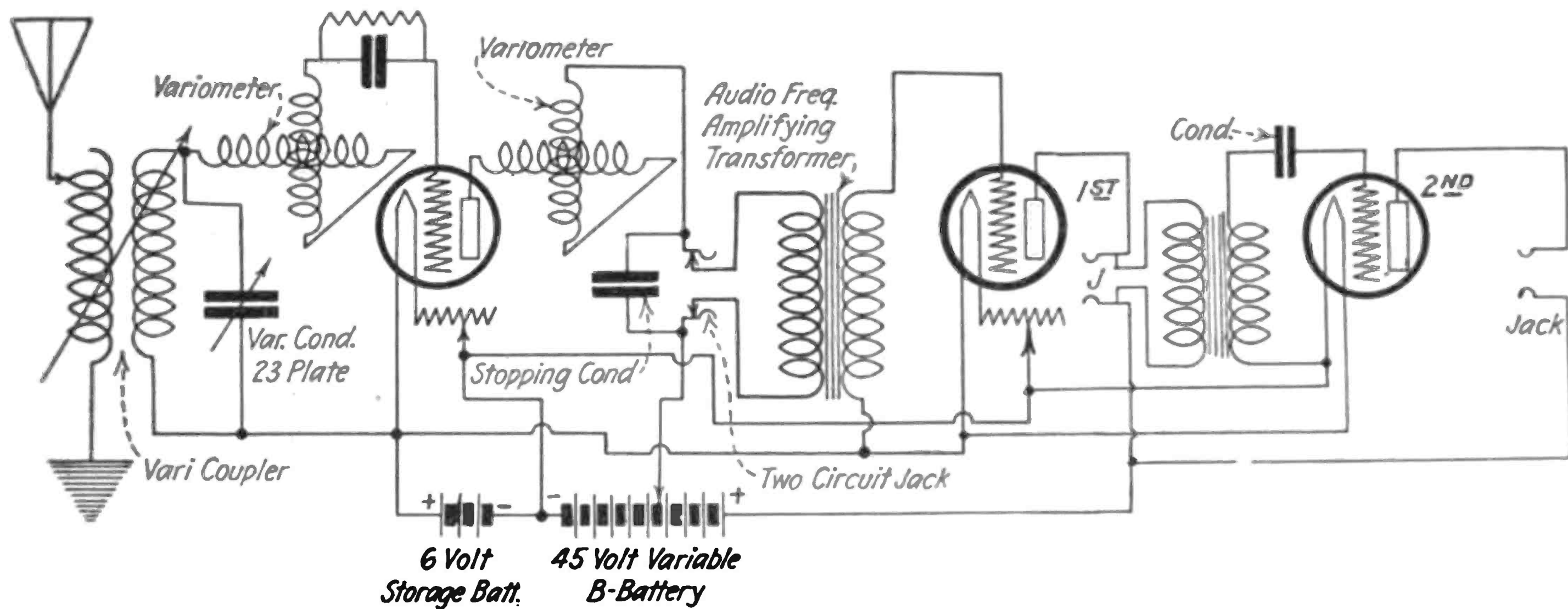


(C. Central News Photo Service)

Radio on motor cars adds to their luxury! This was shown at the First Radio Exhibit held in London. In the ancient, venerable halls of Westminster, modernity held sway. A motor box was fitted up with a receiving set, as seen in the photograph. All you see is the receiving apparatus safely ensconced below the back seat and a bright parasol resting casually in front. The parasol, on further investigation, is a loop aerial, by the aid of which one may ride out to the country and enjoy life. Of course, tea was served at this British radio show, for tea is a necessary element of every British function. This show was the first held in the British metropolis and was largely attended.

Employing Jacks with a Two-Stage Amplifying Receiver

By Fred. Chas. Ehlert



Schematic diagram of a regenerative set, employing variometers as means of regeneration. Jacks are utilized in the stages, which enable the radio listener to use as many stages as he desires. The grid condenser shown in the circuit of the second stage may be left in or out. This is to be considered by experimentation. Suggested by Fred. Chas. Ehlert. Drawn by S. Newman.

TO many experimenters, a two-stage amplifying receiver represents a more difficult problem than it really is. However, it raises important points which cannot be overlooked. The accompanying circuit is a most efficient outfit employing jacks. It is a circuit no amateur should overlook. Each and every part is shown. It may be assembled in an efficient way. It will not tax the financial resources of the average radioman. If experimenters have the material handy, I would suggest that this hook-up be put to the test. One thing that must not be overlooked, however, is the wiring. If leads are run back and forth over the set,

there is sure to be trouble from "howling" because of the feed-back effects between the grid and plate circuits of the various tubes. In some equipped sets elaborate precautions have been taken, with grounded shields between the steps.

Practically all amplifying sets are equipped with jacks. Therefore, I have included these jacks in this circuit. The detector jack is of the double-circuit construction. The first stage is, also, that of a double-circuit jack; in the last stage, an open single-jack is employed. Where it is necessary to run wires close together, slip some spaghetti tubing over them.

When mounting the transformers

I suggest that this be done at right angles to each other. If all my suggestions are carefully followed, no tube noises—such as howling—should be experienced. The detector plate-circuit should have, approximately from 18 volts to 22 volts, while the amplifying plate-circuits should range about 45 volts plate-current. A 6-volt storage battery will be sufficient to light the three tubes, but it is suggested that the amateur get a large ampere-hour battery from 80 to 100 ampere-hour capacity. This will permit batteries to furnish necessary power to the tubes, for a long time, without the troublesome necessity of placing them on charge.

This Discovery May Eliminate the "Catwhisker"

By E. Farig, Ph.D.

BY means of high pressure, and at a temperature of 1600 degrees Fahrenheit, or 1593 degrees centigrade for four hours, metals of a low-melting point (850 degrees Fahrenheit) lose all their original characteristics. They become infusible, cascatic, in form of crystals—hard, brittle, sparkling all over, and have radio-crystal rectifying properties. Pieces tested on a 300-meter wavelength, recorded speech and music perfectly—no screeching—and eliminated the tiresome catwhisker hunt for a

sensitive spot. Tests will be made with alloys to insure a uniform though sensitive rectification.

This same discovery was tested, taking the place of lead batteries, elements in storage and under these tests gave very promising results. This crude substance "metalloid," is a new product not yet known to science. The treatment for rectifying is simple and the mounting of these crystals offers no difficulties.

The best rectification quality I have found, is a passage of current of from .02 to .04 M-A; whereas 5 M-A is of no use. I think this discovery is of sufficient importance to let the industry know what is being done by research engineers.

Radio Conductors and Insulators

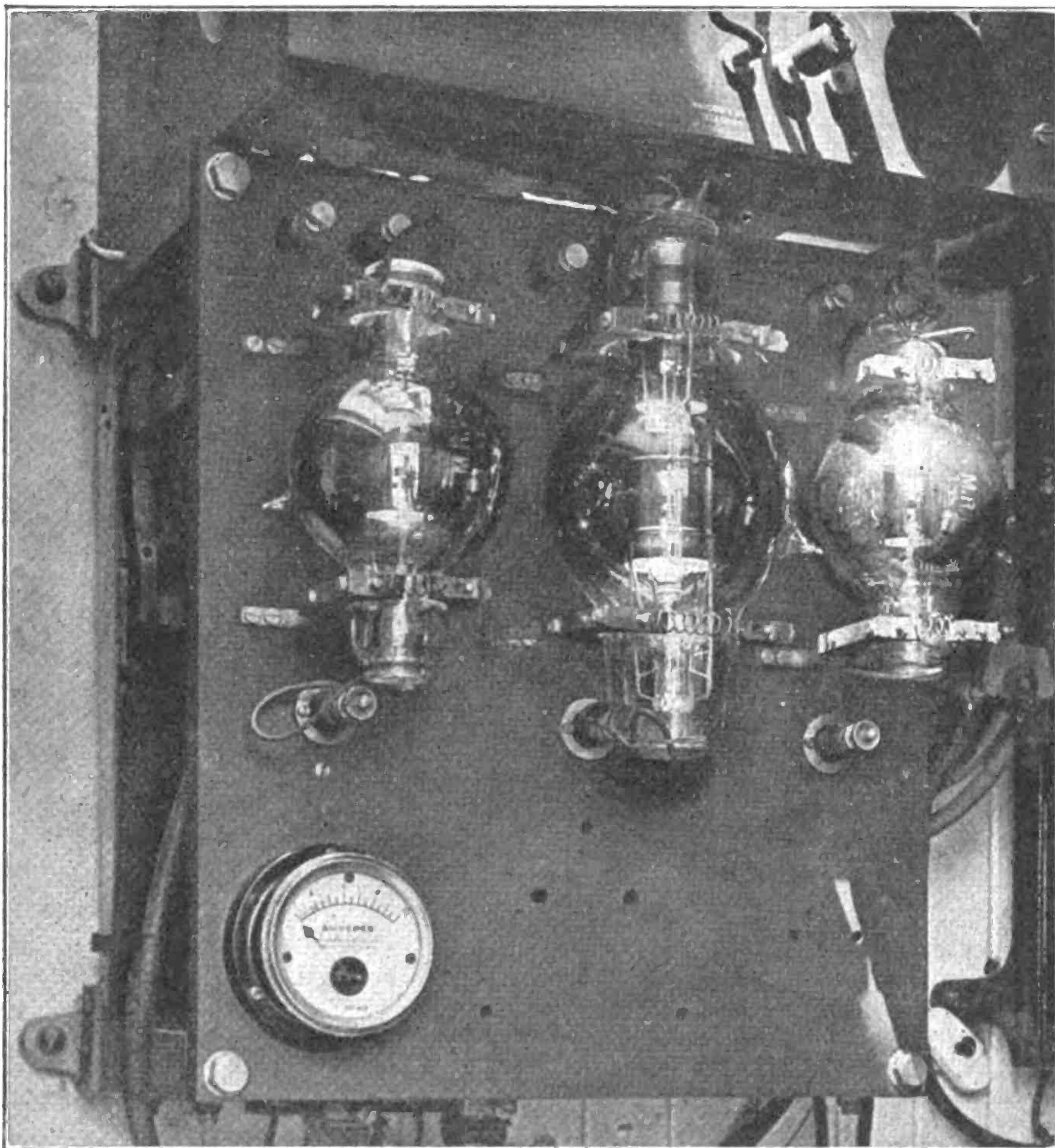
CONDUCTORS	INSULATORS	NON-CONDUCTORS
All Metals	Dry Air	Ebonite
Well-burned Charcoal	Shellac	Oil
Water	Mica	Porcelain
Moist Earth	Glass	Dry paper
Metallic Ores	Wax	Parchment
Animal Fluids	Jet	Silk
Plumbago	Resin	Gutta-percha
Acid Solutions	Sulphur	India-rubber
Living Vegetable Solutions	Amber	Dry leather
Saline Solutions	Paraffin	Bakelite

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Why it is Possible to Operate with a Vacuum Tube

By John Kent



(C. Ewing Galloway, N. Y.)

Type of Vacuum Tubes as generators for the delivery of electromagnetic waves for radio transmission.

RADIO frequencies lower than 20,000 are seldom used. If they were impressed on telephone receivers, the note—even if the receivers would respond—would be inaudible since the ear will not record frequencies much above 15,000 cycles. The problem is to reduce the frequency used in radio so it will not be inaudible in telephone receivers. This is accomplished by the detector, an instrument which groups a number of cycles of high-frequency current and delivers them as one cycle of low-frequency audible in the telephone receiver. Detectors are made in many shapes and forms. One of the best detectors ever invented is the vacuum tube. This instrument was perfected about 1910. Since that time, its use has been increasing daily.

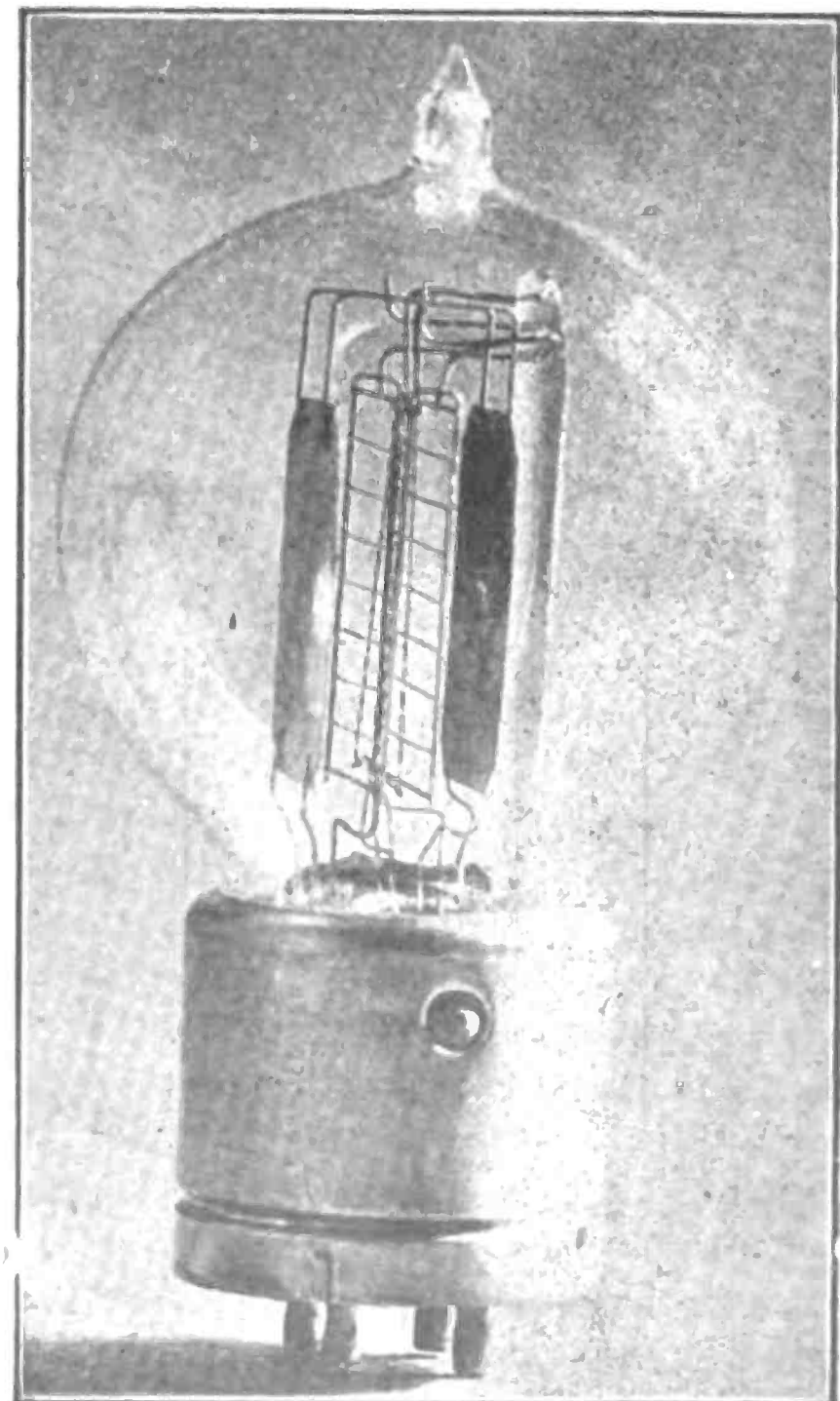
The vacuum tube consists of a evacuated vessel somewhat similar in size and construction to a small incandescent lamp. Instead of two connections—made in the case of the electric lamp—

the vacuum tube, or, more properly, the electron tube, has four connections. Two serve the same purpose as those of the incandescent lamp; namely, to light the filament. The other two connections lead to two new elements known as the grid and the plate. There are, therefore, three elements in the vacuum tube—filament, grid, and plate. These elements are arranged with the filament in the center; the grid on the outside of the filament and the plate outside the grid.

The filament consists of a tungsten wire; the grid of a small coil, or mesh of wires; and the plate of a thin sheet of metal. The tube operates as follows: A 6-volt battery is connected to the filament which, when lighted, shoots off small particles of electricity in every direction. A battery of 22 volts is connected with the positive side to the plate and the negative side to the filament. When the battery is connected, the small particles of electricity which are shot off from the filament,

and which are negative in character, are attracted to the positive plate. Therefore, a current flows between the filament and the plate.

If a third battery, or an alternating current such as that due to a signal, is connected to the grid—and the voltage of the grid is changed—it will be found that the current flowing in the circuit formed by the plate and filament, will vary in exactly the same manner. The variation, however, will be much greater than the small voltage impressed on the grid would warrant. The current will increase when the grid is positive, and decrease when the grid is negative. The fact that the plate current is so much greater than the grid voltage would warrant, shows that the vacuum tube is acting as an amplifier. This is a valuable property, one which makes the vacuum tube successful in its application to radio. The same property, by a slight alteration of the circuit, may be used to make a vacuum tube and an efficient detector. The use of the amplifying property is familiar in the construction of numerous two-stage amplifiers now on the market. Amplifications of many hundreds and, frequently, thousands of times are possible. The plate current is sufficient to operate a pair of telephones, or ear pieces.



(Photo by Paul Thompson)

The 5-watt Transmitting Tube now used by the United States Navy.

Radio Big Help to Airship C-2 on Western Trip

By Carl H. Butman

WASHINGTON, D. C.—Radio aided the United States Army airship C-2, on the westward leg of her transcontinental trip. During the sixty-hour cruise, hundreds of miles of which were traversed in darkness, radio was always available to lend a guiding hand when any doubt as to the position of the airship existed on what was the first transcontinental airship cruise.

All Army airships and airplanes are equipped with the latest radio apparatus. In many instances, radio has informed the pilots as to location, course, or weather. In the event of an accident or trouble, it has been the means of bringing aid.

The first thousand miles of the western trip was made in approximately twenty hours, flying time, Major Strauss, the commander, reported from Belleville, Illinois. All along her westward route from Norfolk over Akron, Belleville, Fort Sill, San Antonio, El Paso, Yuma, to Arcadia, California, Captain G. A. McEntire, the radio officer, kept in touch with Army, weather bureau, and private radio stations which advised him regarding the meteorological conditions to the westward. Radio will again guide C-2 on her return trip to Langley Field, Virginia, this week.

The radio equipment of the C-2 consists of a modified SCR-67-A radio telephone and telegraph vacuum-tube set, with a sending radius of about ten miles for the phone circuit and forty miles for the telegraph. The transmitting wave used was 480 metres, but messages on nearly all wave lengths were receivable. In the present installation batteries are used in sending, but the radio experts of the Army Air Service have been experimenting on a generator geared to one of the driving engines, which will give these radio sets more power. The antenna is a single wire trailed below the airship and is about 100 feet in length.

The C-2 will remain at Ross Field for several days in order to afford her crew a needed rest and give the people on the Pacific Coast an opportunity to witness several exhibition flights. After some slight overhauling she will return to Langley Field over the same route, Major General Patrick, chief of the Army Air Service, stated a few days ago. This transcontinental flight was intended merely to point the way for flights across this route for larger airships. The southern route was

chosen because hangar facilities and landing crews were available at the several stations en route.

Arrangements were made whereby most of the flight of the C-2 across the United States was done at night. Airships are in their element in night flying, as atmospheric conditions are much calmer than during the day, less hydrogen gas is lost through expansion and better static equilibrium is main-

tained. Night flying in airships is a reasonably safe proposition, for even should motor trouble develop, repairs can be made while the ship is drifting in the air, no forced landing being necessary.

It was during the night trips that the radio equipment proved most valuable as well as a means of entertaining the crew, who frequently listened in to radio concerts while en route.

M. R. Brennan, Superintendent of the N. Y. Police Telegraph Bureau at WLAW Station



(C. International News Real Photo.)

The interior of the radio broadcasting-station of the New York Police Department has been assigned the call letters, WLAW. M. R. Brennan, Superintendent of the Police Telegraph Bureau, is photographed at the transmitting apparatus. Tubes are used as means of power transmission. The filament current-control of each vacuum tube requires about 6.25 amperes. Current for lighting the filaments is supplied from a constant-current generator. The modulation system used with this equipment, in connection with the Western Electric tubes, insures the highest efficiency in clearly reproducing speech and music. It has complete and perfect modulation. In this photograph the transmitting gear is at the right. It is better known as the panel-control board. On this board all adjustments of power are made. The horn is a Western Electric power amplifier-unit, used as a loud-speaker in connection with the receiving set. To the left of the horn is the receiving set. The little round object lying on the table is the transmitter. Through this the broadcasting is started. This transmitter, in turn, sends the spoken words to the main transmitter, where the vacuum tubes perform the necessary work. To obtain the best results, the magnitude of the feeble currents produced by the microphone must be increased many times before they are impressed on the radio transmitter. For this purpose, an input amplifier provides the necessary amplification. This consists of a three-stage amplifier so mounted that all the controls of the amplifier are accessible. Current to operate the microphone is supplied by an 18-volt storage battery and is regulated by a rheostat on the input-amplifier panel.

The Passing of Poldhu—MBD

Famous Cornwall Station where Marconi First Used Transatlantic Radio Had a Romantic History

By Arthur G. Shirt

AS science progresses, instrument after instrument go their silent way to the junk-heap, forgotten by all except a few, whose duty it is to classify and preserve the remembrance of radio gear that has come and gone. There is little or no sentiment attached to this process. Like obsolete theories, the wireless antiques are of no interest. On the other hand, when a unit of a great system of communication passes into the discard, such as the famous MBD, at Poldhu, Cornwall, Wales, it is only too proper that due respect should be paid to its memory. Poldhu, now abandoned in favor of the station at Clifden, Ireland, has played its part in the building up of the immense world-circling Marconi system of radio communication. It has stood the test, and from

the night of December 12, 1901, when the first weak signals were pushed across the Atlantic to the day, in September, 1922, when the station was closed to traffic, Poldhu has maintained its end of the system.

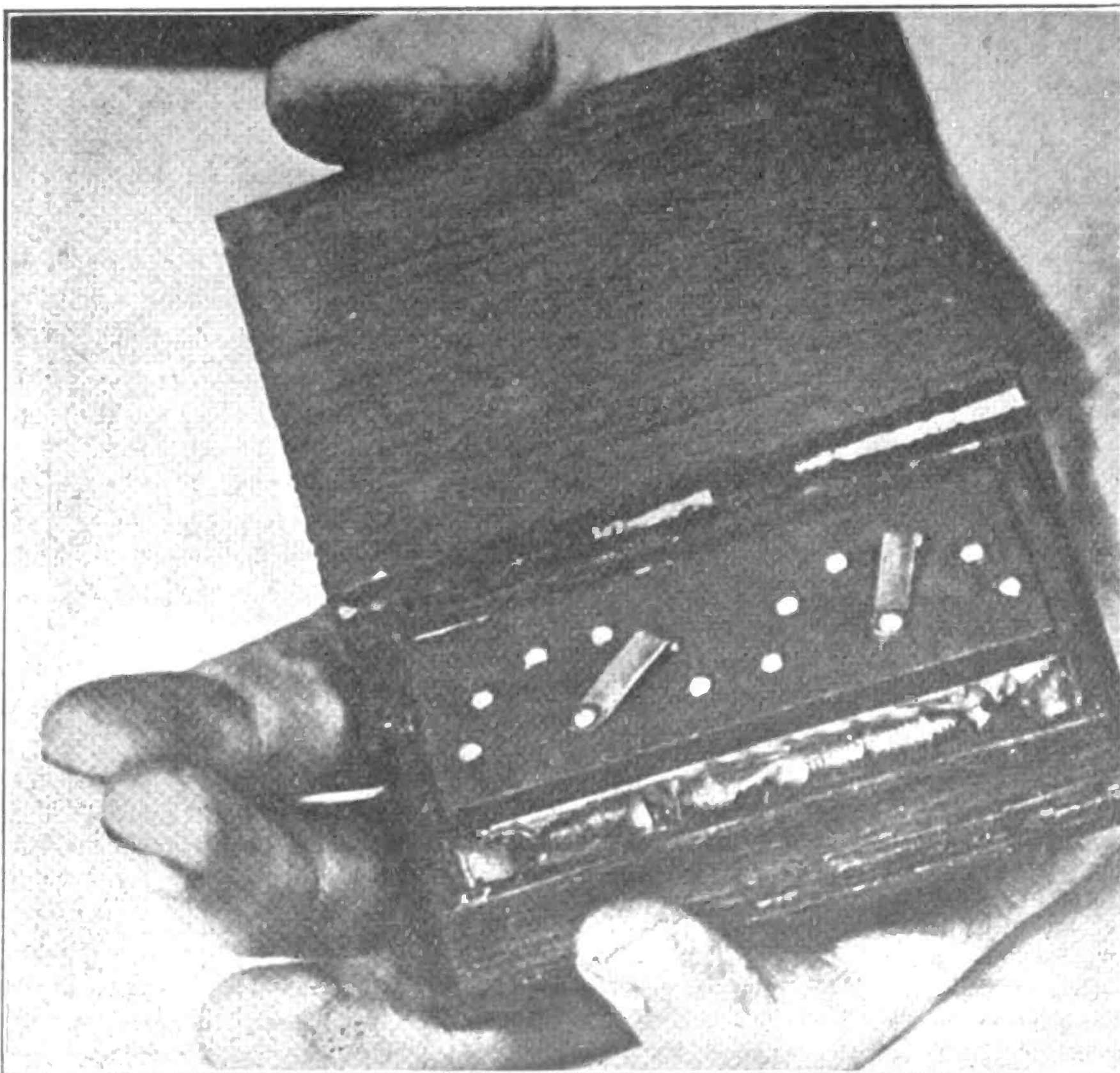
The story of the first transatlantic signals weaves itself around the Poldhu station. Marconi was in England at the time, conducting experiments before the officials of the postoffice department, and demonstrating, with the rapidly increasing range of his crude instruments, that the limit of radio signalling was practically unlimited. But men who called themselves practical—men opposed to Marconi, who was supposed to be visionary,—said that the curvature of the earth would prevent transmission to any great distance. They were

judging the capabilities of this new force which follows the contour of the earth by the conduct of other systems of signalling, such as the heliograph and other sight devices. Marconi, not as well acquainted with wireless phenomena then as he is to-day, thought differently; but up to that time, the distances covered proved neither one thing nor the other. Naturally he was particularly anxious to establish transatlantic records, so that for once and all this question of limiting the scope of radio waves should be settled. For him, it meant a matter of gaining the backing of those who withheld their valued support unless this particular controversy was cleared up.

So eager was Marconi to prove that curvature of the earth would not interfere with the progress of electromagnetic waves, that he started on the station at Poldhu at a time when his instruments had accomplished the record of only thirty-six miles! What greater tribute could there be to Marconi's faith in the possibility of his invention? At the same time, a similar high-powered station was commenced on Cape Cod, which was to be the American side of the great test. Marconi knew that to produce electro-magnetic waves of a force sufficient to bridge the Atlantic, he must have instruments far in advance of what he then possessed. He couldn't have instruments that differed to any great extent, for what he had already evolved represented the peak of radio progress; but he could and he would have them larger and more powerful in every respect. So the layout of the station at Poldhu, as it was when the signals were hurled across the Atlantic, were no different in theory than the amateur spark-coil outfit of to-day, with a transformer, condenser, and inductance coil. But there was a generating plant consisting of an alternator capable of an output of about twenty kilowatts, which through suitable transformers, charged a condenser having a glass dielectric of great strength.

The aerial at Poldhu consisted of fifty almost vertical wires, arranged in the vertical fan style, and supported at the upper end by a wire

Radio Set Just Fits Man's Hand



(C. Underwood & Underwood, N. Y.)

So many amateurs have been making miniature radio-sets that we are showing in the accompanying illustration an unusually small one. It fits into the palm of the hand. There is no question that it works but no records are claimed for receiving long distance with it.

Remember it's only a miniature set, but it works.

(Continued from preceding page)
 stretched between two masts. The masts were 150 feet high, and 200 feet apart. As first erected, they were not strong enough to withstand the gales of a Cornwall winter, and on September 18, 1901, were blown down during a raging storm. Work was again started immediately, in an endeavor to have the Poldhu station and the Cape Cod station ready at about the same time. But a further delay came in the form of a storm on the American coast, which wrecked the masts at Cape Cod. This was in November of the same fatal year, and Marconi's discouragement was extreme. But with a determination that characterized his actions from the very start, he completed the reconstruction work at Poldhu, and then journeyed across the Atlantic with a few assistants and a makeshift receiving set, which he installed in a rough building on the cold shore of St. John's, Newfoundland. He could build no masts, and so sent his aerial aloft by the means of kites, which made the stupendous task he was then engaged in doubly hard. The variation of the wind produced constant changes in the angle and the altitude of the aerial, so that capacity and period of electrical resonance was never the same, making it almost impossible for Marconi, tuning with the temporary instruments below, to remain on any one wave length for any period of time.

On the night of December 11, all was ready. The operators at Poldhu had been instructed to begin sending the test signal—which was the three dots of the letter S—on and after December 11, keeping a steady transmission of that letter for ten minutes and then resting five minutes. When Marconi first listened in at the appointed time, he knew that so far as it was possible to depend on human co-operation, that Poldhu was working and periodically directing her signals towards the anxious inventor in Newfoundland. Across the ocean! Could it be done? Some of the greatest scientists in the world had said that the feat was impossible! But as in the case of the amateur trials, just twenty years later, the momentary failure was no indication of what was to follow. Marconi listened all the night of the 11th, and heard nothing. The day of the 12th was spent in correcting the receiving instruments so that they responded to Marconi's ideas as to what should obviate last night's difficulties, and in the evening of the 12th, to the overjoyment of Marconi, the monotone signals from Poldhu station were

An Amateur, to Get a License, Must Read Ten Words a Minute

(Republished by General Request)

INTERNATIONAL MORSE CODE AND CONVENTIONAL SIGNALS

- 1. A dash is equal to three dots.
- 2. The space between parts of the same letter is equal to one dot.
- 3. The space between two letters is equal to three dots.
- 4. The space between two words is equal to five dots.

A	• —
B	— • • •
C	— • — •
D	— • •
E	•
F	• • — •
G	— — •
H	• • • •
I	• •
J	• — — —
K	— • —
L	• — • •
M	— —
N	— •
O	— — —
P	• — — •
Q	— — • —
R	• — •
S	• • •
T	—
U	• • —
V	• • • —
W	• — —
X	— • • —
Y	— • — —
Z	— — • •
Ä (German)	• — • —
Á or Å (Spanish-Scandinavian)	• — • • —
CH (German-Spanish)	— — — —
É (French)	• • — • •
Ñ (Spanish)	— — • • — —
Ö (German)	— — — •
Û (German)	• • — —
1	• — — — —
2	• • — — —
3	• • • — —
4	• • • • —
5	• • • • •
6	— • • • •
7	— — • • •
8	— — — • •
9	— — — — •
0	— — — — —

Period	• • • • •
Semicolon	— • — • — •
Comma	• — • — • —
Colon	— — — • • •
Interrogation	• • — — • •
Exclamation point	— — — • • — —
Apostrophe	• — — — — •
Hyphen	— • • • • —
Bar indicating fraction	— • • — •
Parenthesis	— • — — • —
Inverted commas	• — • • — •
Underline	• • — — • —
Double dash	— • • • —
Distress Call	• • • — — — • • •
Attention call to precede every transmission	— • — • —
General inquiry call	— • — • — — • —
From (de)	— • • •
Invitation to transmit (go ahead)	— • —
Warning—high power	— — — • • — —
Question (please repeat after)—interrupting long messages	• • — — • •
Wait	• — • • •
Break (Bk.) (double dash)	— • • • —
Understand	• • • — •
Error	• • • • • •
Received (O. K.)	• — •
Position report (to precede all position messages)	— • — •
End of each message (cross)	• — • — •
Transmission finished (end of work) (conclusion of correspondence)	• • • — • —

heard in Newfoundland. They were faint, of course—dot, dot, dot # #, dot, dot, dot # with a few omissions when the wind got to playing havoc with the fixed capacities of the aerial system. But they were signals! The impossible had been achieved! The Atlantic had been bridged! That accomplished, Marconi could bid for all the support in the world, confident that the radio waves he employed were capable

of something revolutionary in the way of communication. Such is the story of Poldhu—of its building and of its mission. From that day, when its fan aerial was the object of much wonder and speculation, to this, when its arrangements are antedated and its presence in the chain of Marconi stations no longer needed, it has made wireless history. Now it passes forever from our view.

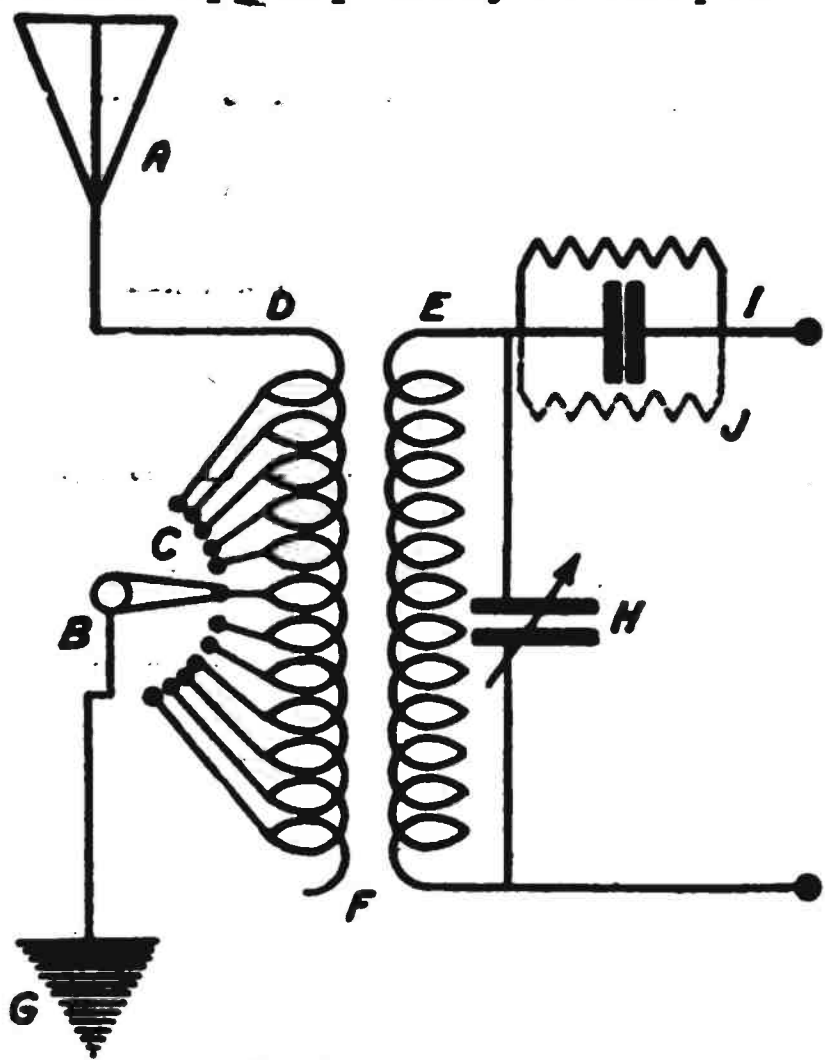
The Radio Primer

A Weekly A. B. C. of Radio for the Beginner, in which Elementary Facts and Principles Are Fully and Tersely Explained and all Words and Terms Used by Amateurs and Experts Defined

By Lynn Brooks

WHAT is a circuit? What are the different parts and what do they represent? Are all circuits illustrated alike?

The accompanying circuit is a good example. It shows the tuner up to but not including the detector circuit. It is a desirable circuit for tube detectors. It is a circuit which may be found in any form of publication. A is the aerial; B the primary switch-handle. C is the tapped primary of the primary



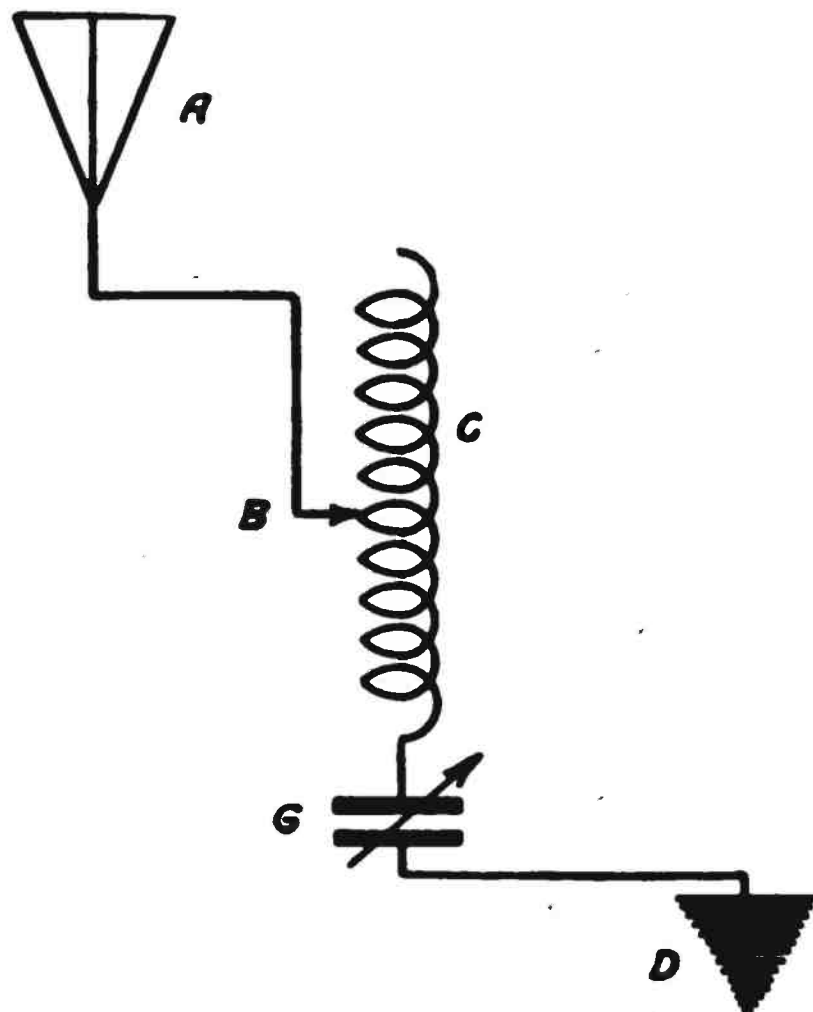
Schematic diagram showing the tapped primary and the secondary of any loose-coupler or vario-coupler. Whenever this diagram is shown it represents the parts explained herewith.

coil marked D. E is the secondary coil. F shows how the coupling of the magnetic waves are induced into the secondary. G is the ground connection. H is the variable condenser in shunt to the secondary of the tuner. I is the grid condenser. J is the grid leak. Usually the grid condenser and leak come together. The grid leak is drawn in either position as shown in the diagram by letter J.

How can the primary winding of a loose coupler, or vario-coupler, be determined when using a variable condenser? When drawn in a circuit does it always appear this way?

A schematic diagram is herewith published with the variable condenser in series with the primary of the vario-coupler, or loose coupler. This is often termed a tuned circuit. The inductance of the coil is varied by cutting in or out of the circuit a number of turns of wire at a time. The variable condenser consists of two sets of plates—one being stationary and the

other movable. By rotating the plates, we vary the electrical capacity of the condenser. This tuned circuit will re-

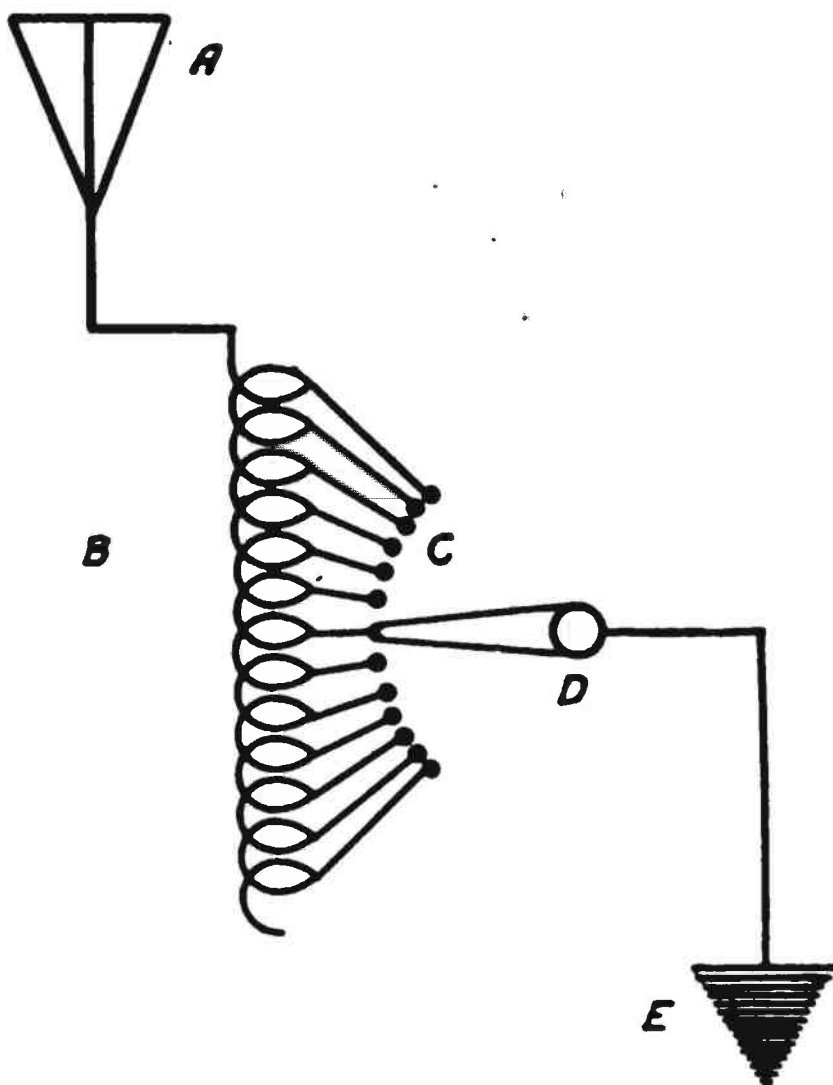


This diagram shows the variable contact on the primary which makes it possible to increase or decrease inductance in the primary circuit. A variable condenser is also inserted in series with this primary inductance.

spond to a number of wave lengths at the same time; or, in other words, it will tune broadly.

Is there any other method used that will answer the purpose of the slider principle?

This has been overcome by making taps on the winding. Wires are soldered on these taps and then brought out to the front of the panel on switch points and a switch handle. The ac-

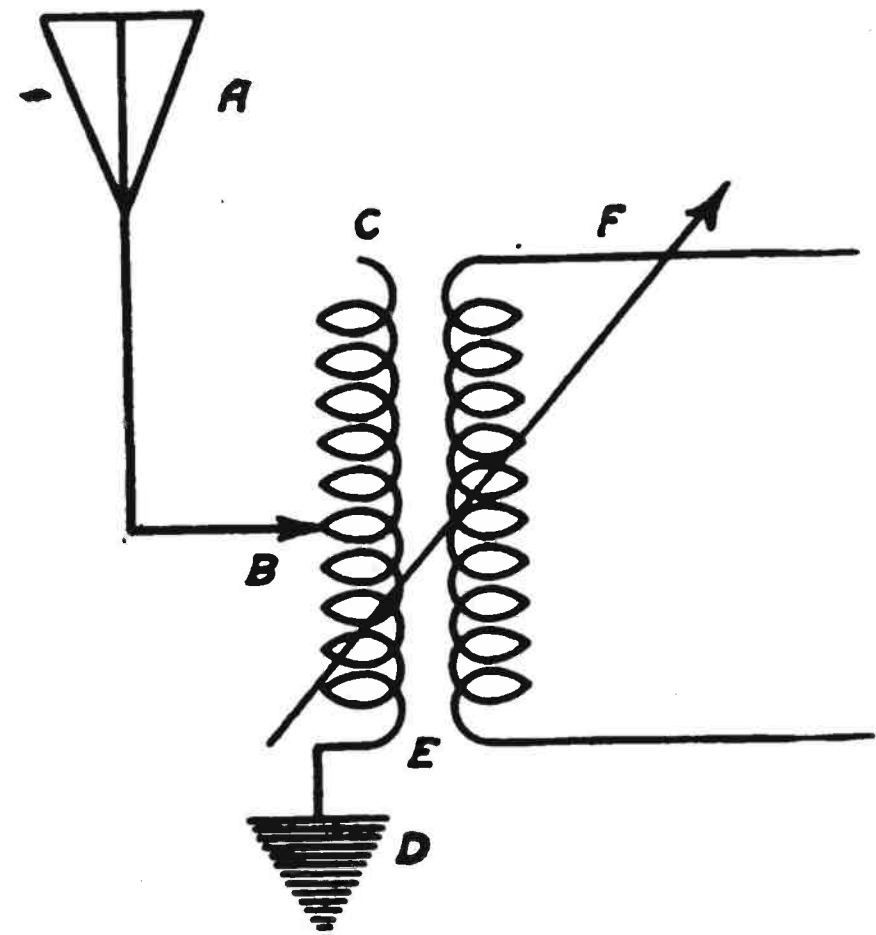


A tapped primary is illustrated in this manner. It may be seen that if the switch handle is moved, inductance of that coil will be increased or decreased according to the way it is moved.

companying sketch shows how the taps are brought from the primary winding to the handle.

In using a vario-coupler, or loose coupler, with a variable condenser in shunt to the primary, how should this appear in a diagram? Does it look the same in every illustration?

When using a vario-coupler, or loose coupler, where two windings are employed—such as primary and secondary—the accompanying sketch will show how it is always illustrated. Here the secondary is in shunt to the primary winding, while the arrow shows that the coupler is variable to the principle



When this diagram appears it means that the variable condenser is placed in shunt to the primary of the loose coupler or variocoupler. The arrow drawn through the primary and secondary means that the coils are variable.

of coupling. The secondary coil is usually arranged so that the magnetic field may occupy the same space as the field of the primary coil, or may be varied in position so that it occupies only a part, or none, of the same space. This is called the varying of the coupling between the coils. A is the aerial. B is the primary-coil tap. C is the primary coil. F is the secondary coil. H is the primary condenser in shunt. E is the coupling. D, ground.

In summing up in regard to the diagrams published on this page, symbols are drawn the same in all circuits no matter where such circuits are printed. I would advise every radio amateur or experimenter unfamiliar with such diagrams, or symbols, to study them carefully so that he may readily and easily understand any hook-ups that may appear in radio literature.

Radiograms

Latest Important News of Radio Garnered from the World Over, and Reduced to Short Wave-Lengths for the Busy Reader.

RADIO will be one of the most efficient means of capturing fugitive criminals, says Richard E. Enright, police commissioner of New York City. Mr. Enright made this important statement in an address before the conference of American and Foreign Police Chiefs last week. He added that in a year's time most of his department's out-of-town business will be carried on by radio. In a few years, the police of all parts of America will be in touch by radio, making it possible to co-operate in the apprehension of criminals on a scale heretofore impossible. The days of the guilty are numbered.

An average of 2,500 radio messages a day are handled during each five-day trip across the Atlantic, by the radio operators of the Cunarder "Majestic."

Under the auspices of the Australian government another very large radio station is to be erected near Sydney, its cost to be more than \$5,000,000 and its operation to be conducted by the Amalgamated Wireless, an organization springing from the Marconi Wireless Telegraph Company.

Sweden awarded the contract for equipping her new powerful radio station, to be erected forty miles south of Gothenburg, to the Radio Corporation of America in spite of a lower bid from the German Telefunken Company. The reason was that the American company offered better terms of payment.

The amount of the equipment contract is \$432,500, one-third cash and the balance from future receipts without interest charges. The total cost of the station will be about \$1,300,000.

The first American singer to have his voice broadcast by European radio telephones is Charles Hubbard, a tenor born in Auburn, N. Y. He sent out several numbers from the Eiffel Tower station which has a wave length of 1,760 meters.

The Virgin Islands will install radio apparatus for broadcasting official information and entertainment, according to Adolph Sixto, delegate from St. Thomas. Recently he visited Washington officially, and called at the White House, where he told the reporters that, as a member of the Manufacturers' Commercial Association of the Islands, he was hoping to introduce radio broadcasting as soon as suitable equipment could be secured for sending and receiving.

Rear Admiral H. J. Zeigemeier, director of Naval Communications, who has been designated to represent the Navy at the First Pan-Pacific Commercial Conference, at Honolulu, October 25 to 31, will speak there on communication and transportation, giving special attention to a survey of the present cable and radio activities. He will discuss the establishment of lower special rates, fixing responsibility and granting improved facilities for the press.

New vacuum-tube transmitters are being installed on the submarines of the U. S. Navy. Tests on submarines have been very satisfactory, according to naval experts. The set makes use of equipment already in the hands of the Navy, with some additional material necessary to modernize it. Tests show daytime ranges of from 150 to 250 miles while a submarine was on the surface. It is claimed by experts that it is possible for the submarine to operate its radio while submerged.

WLAW, broadcasting station of the New York City Police Department, although in operation less than two weeks, has been reported from points in New Jersey as coming in so strong and clear-cut that its modulation is a distinct improvement over other stations in the metropolitan district.

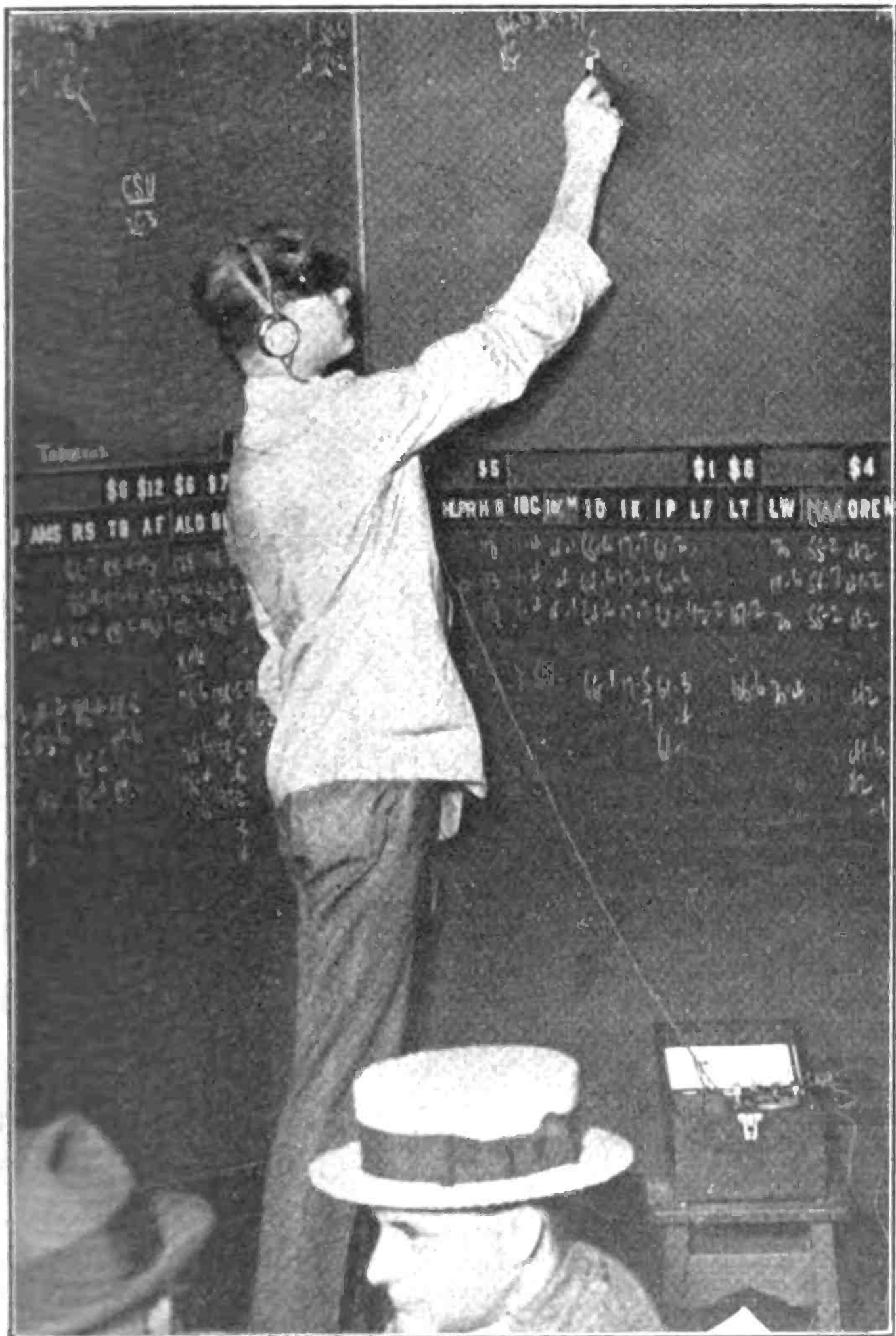
Three other cities besides New York are applying radio extensively to aid their police systems in suppressing crime. They are Denver, Col.; Dayton, Ohio; and Chicago.

When William Gibbs McAdoo, former Secretary of the Treasury, and a party of his friends, including George E. Hill, of Rigby, Idaho, electrical dealer, started down the Snake River on a fishing and hunting trip, recently, the raft on which they were carried was equipped with a Crosley Harko Senior and two-step amplifier, used in connection with a loud-speaker. Mr. McAdoo is an ardent radio fan, and has expressed a determination to take a receiving set with him every time he enters territory in which there are no facilities of obtaining news.

Just over the crest of the Kaiser Range in the High Sierras, at an altitude of nearly 10,000 feet, the Southern California Edison Company is operating three continuous-wave radio stations at the highest altitude in which radio communication ever has been installed. Radio communication is being used by the company for the direction of practically all the construction work under way by its tunnel workers, who are a part of an army of 4,500 employees engaged in the company's enormous water power electric development in the mountains of Northeastern Fresno County, on what is known as their Big Creek-San Joaquin River development program, which will bring into service 125,000 horsepower of new electric energy next year.

The Troy Polytechnic broadcasting station was made possible through a large gift from Washington A. Roebling, the late Charles G. Roebling, and John A. Roebling, of the John A. Roebling Sons' Company, Trenton, New Jersey, all graduates of the Institute and famous as the builders of the Brooklyn Bridge. The equipment was installed during the summer months under the supervision of the professors and instructors of the Department of Electrical Engineering, in the Russell Sage Laboratory, erected in 1906 with a part of the million-dollar gift from Mrs. Russell Sage in memory of her husband, who was one of the Trustees of the Institute.

Quotations Received by Radio!

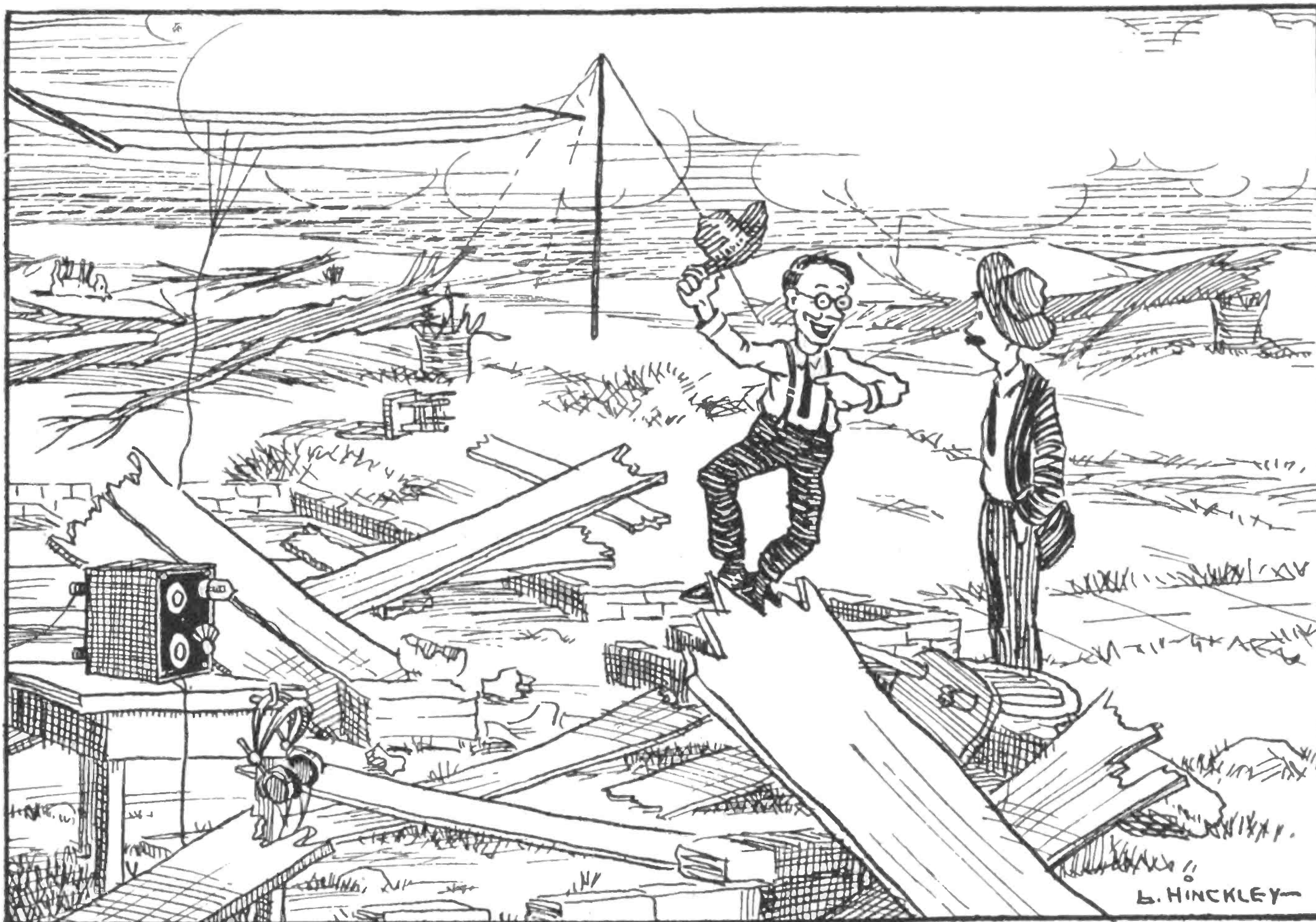


(C. Kadel & Herbert News Service.)

Radio in Wall Street is the very latest innovation for the radiophone. The above photograph shows the interior of a prominent Wall Street brokerage, using the radiophone to receive stock quotations and current prices.

After the Tornado—Something Was Saved!

Cartoon by L. B. Hinckley



Radio Bug—"Whoops! neighbor. I claim I'm the original lucky guy. Look! It never touched my radio set!"

Latest Important Radio News

THE Federal Telegraph Company of Delaware is soon to be launched to take over the \$13,000,000 contract with the Chinese government, recently secured by the Federal Telegraph Company of California. Owen D. Young, president of the General Electric Company, will be chairman of the board, and R. P. Schwerin, head of the California corporation, will be president. The new company will be capitalised at \$9,500,000, divided into \$3,500,000 preferred stock and \$6,000,000 common. Profits from the Chinese contract are estimated at \$4,500,000, in addition to a percentage of the net earnings of the stations for a long term of years.

Notice of a 10 per cent. increase in wages, effective October 1, has been posted in all the larger copper mining camps in Arizona. Companies granting the increase include the Phelps Dodge Corporation, the Calumet & Arizona, Miami Copper, Inspiration, Old Dominion, New Cornelia, United Verde, Ray Consolidated and others. This increase is due very largely to the demand being made by radio manufacturers for copper.

A prominent radio manufacturer notifies us that, according to his estimate, over one hundred million dollars' worth of radio apparatus will be sold this winter.

United States Government experts report that high frequency waves from radio broadcasting stations have caused vegetation to take on a

larger growth and reach maturity sooner than under ordinary conditions.

Lee de Forest, the eminent radiotrician, arrived from Europe on the "Berengaria," last week. He brought with him his latest radio invention, the phonofilm, by which he will reproduce speech in moving pictures.

Radio has been utilized to intercept rum runners on the high seas. According to the "Times," New York, a ship ostensibly bound from New York for Greece was halted by the authorities after radio had notified them of her position and cargo.

The aerial for the new broadcasting station on the Municipal Building, New York, is in place.

American radio exports during July totaled 225,475 pounds of apparatus, valued at \$385,861, which shows that some American exporters are taking advantage of trade opportunities.

Radio Success in Bahamas

About a year ago, the Bahaman Government purchased three radio transmitting sets from the United States Shipping Board and put them in operation with such successful results that three more sets have been purchased for inter-island communication. The equipment is of the 1-kw spark type such as is used on Shipping Board vessels. It gives excellent communication between the islands of the group.

13 More Broadcasters

THIRTEEN limited commercial broadcasting stations were licensed by the Department of Commerce during the week ending September 16, as follows:

WLAN—Putnam Hardware Co., Houlton, Mo.

WMAF—Round Hills Radio Corp., Dartmouth, Mass.

KFCD—Salom Electric Co., Salom, Oregon.

WEAN—Shepard Co., Providence, R. I.

WNAC—Shepard Stores, Boston, Mass.

WLAQ—A. E. Shilling, Kalamazoo, Mich.

WOAI—Southern Equipment Co., San Antonio, Tex.

WLAK—Vermont Farm Machine Co., Bellows Falls, Vt.

WLAT—Charles G. Bosch Co., Burlington, Iowa.

WLA?—W. V. Jordon, Louisville, Ky.

WLAR—Mickel Music Co., Marshalltown, Iowa.

WMAF—F. Edward Page, Fernwood, Cazonovia, N. Y.

WGAX—Radio Electric Co., Washington Court House, Ohio.

Don't Miss This!

(Radio World, Vol. 1, No. 2, dated October 7, will contain a complete list, alphabetically arranged, of every broadcasting station in this country up to the day of going to press. Be sure to get a copy of Radio World, containing this list, as you will need it during the fall and winter months.)

Radio and the Woman

By
Crystal D. Tector

"MY Dear Crystal," writes a girlhood friend who has just married, "we—that is, John and I—have decided to live in the country. Of course, he had to give in to my whim to have my home where I want it. He dearly loves the big town, I know, and has terrible hankering for his club and all that sort of thing; but I do cherish a little home in the suburbs and all that goes with it. It does seem so cuddly and dear—and he will have to be home every night. But I could not let my selfishness run away with everything, and John finally capitulated provided I would let him install a radio set. He says it will be a nice thing which to entertain the neighbors. Now, what is a radio set?"

* * *

Poor misguided thing. I won't betray her by even mentioning her first name; but to imagine that there is even a woman in all this world who does not know what a radio set is! It seems absolutely preposterous. What, my RADIO WORLD readers, do you think I did by way of reply to such a letter—even if it was from an old and very dear friend? Well, I had the impertinence to tell her that if she would buy a copy of this issue of RADIO WORLD, she would find her answer in my department. It just took her off her feet, and she phoned me hoping that I wouldn't write anything to make John angry.

* * *

My Dear Mrs. Newlywed—and all others who may be in your state of ignorance—a radio set is just about the one thing that will make your home, especially if it be in the country a perfect haven of joy. Friend Husband and I are commuters—that is, we belong to the vast army of the American citizenry who live a suburban life and come to the city just every so often for our pleasure; but we do notice that whenever we invite any of our big-town friends to visit us, their faces beam with more than customary satisfaction. We were among the first to take up radio. It seemed a heap of trouble and looked like a terrible expense; but we have been more than repaid; in fact, we said, the other night, after listening to one of the most wonderful concerts that I ever heard—the music coming in clear and distinct and absolutely without a blemish—that we would not be without our set for more than a thousand times what it has cost us. And the expense hasn't been so very much at that.

* * *

To tell the gospel truth, I would rather have a radio set than a motor-car any day in the week. It affords more keen and honest enjoyment—and it is such an unselfish pleasure! The satisfaction that one gets in entertaining one's friends—and in a manner so absolutely original and fascinating! Why, the other night, we actually heard an entire play—"The Wolf," by Eugene Walter—broadcast from Schenectady. The manner in which it was explained and the clearness in which the lines were spoken and the action brought out, made it a feature of more than ordinary interest. Some of my friends tell me that I am too much of an enthusiast—that I let my happiness run away with me—but I just want to tell you that if the drama can be broadcast so entertainingly as this play, very few trips to New York will F. H. and I make to take in the theatre.

* * *

But speaking of the city, I did notice the last time I was on The Avenue—as all good New Yorkers term their famous Fifth Avenue—that several of the better-class tea shops were equipped with radio sets. And I was told that with the new arrangement regarding broadcasting it is very easy to tune in whenever anything particularly interesting is on the ether. In this way, one need not listen to everything that is being broadcast. For instance, there is nothing particularly interesting in a lot of women sitting around tea tables hearing the latest market quotations or the weather reports; but if a good concert or some vocal music or health talks are in the air, why it is an easy matter to tune in and catch them.

* * *

And I do feel that the broadcasters would do well to broaden their programs for the women, particularly during the daytime. So much is being done for the farmer—and we all recognize his great and important place in the course of events—but we women should not be overlooked. I would suggest more easy-to-make recipes. Every woman is interested in her kitchen whether she has one or not. I think, too, that practical advice on washing fine lingerie would not be amiss; for few women, to-day, will trust that part of their wardrobe to the laundry. Domestic science is good in small

doses, particularly if it is practical. Rich or poor, we women are all alike so far as our households are concerned. We want to be told how to keep them in order.

And just now, I wish some clever bugologist would radio to me how to get rid of cockroaches!

* * *

I have received several letters during the past week from mothers who want to know if they can really count on radio to keep their babies quiet. Now I am not so foolish as to say that you can clamp a pair of headphones on a baby's cranium and let the wave lengths do the rest. Many mothers have that idea. Imagine the poor child if an unruly bit of static should jar it. Then, too, baby isn't going to be very much enthused or its teething be made less painful by listening to the latest market reports or a sermon. Children are uncertain beings and they must cry and be uneasy during a



(U. Central News Service.)

"I did notice that several of the better-class tea shops were equipped with radio sets."

goodly part of their young lives. They wouldn't be normal if they didn't. But I do say that many a mother is going to find in radio a very pleasant form of recreation for her little ones. I know that several of my neighbors do not hesitate to leave their babies with me when they want to go to town for a shopping spree—and that these little ones have been sort of quiet and pleased whenever my radio set has been tuned in—and it generally is.

* * *

Friend Husband told me the other day that he read in "Apartments To Let, Furnished," of one that gave "radio" as a modern convenience. That shows what we are coming to. The day is not far distant when every woman who is renting an apartment will examine the radio set as closely as she examines the kitchen.

* * *

Mrs. Hattie Kolb, of Chicago, writes me that she is studying the science of radio in the hope of taking a position as radio instructress in one of the Chicago public schools. She says that, in her city, radio will soon be a part of the public-school courses. Teachers will be wanted and she will be a pioneer in the field.

WBAY to Serve a Commercial Purpose with Radio Toll Station

By Golda M. Goldman



Photo by Morris Rosenfeld, New York.

The American Telephone and Telegraph Company's Building, Walker Street, New York City, the home of WBAY. The building is 350 feet high, and the antenna is 100 feet above the roof.

THE commercial uses to which the radiophone is being put are far removed from the knowledge of the amateur. Only he who possesses a set beyond the average is in touch with the manifold ways in which the radio is serving the business world. And now comes the latest development in the commercialization of this power. The American Telephone

and Telegraph Company is presenting New York City with a radio toll-station, known by the call number, WBAY.

While mechanically inclined radioists for years have been contriving receiving sets and snatching messages in code out of the air, it is really only within the year that the perfecting and popularizing of radio broadcasting has

swept the country with a wave of interest. Broadcasting stations appeared almost simultaneously in many of the principal cities, and every dealer whose business was in need of expansion or new blood immediately stocked in radio accessories and did a thriving business. The result, as all fans know, was that Herbert R. Hoover, Secretary of Commerce, found it necessary to call a conference of radio experts who made recommendations of proper wave-lengths to be used for various purposes, so that, today, most stations are working on a 360 wave-length. This necessitates a schedule to which all broadcasting stations in one vicinity must adhere, only one operating at a time, and so avoiding confusion.

When it became evident that the public had become even more interested listening-in than in reading anything except the radio page in the papers, big business men began to consider it as a tremendous possibility for advertising, and the American Telephone and Telegraph Company could have installed over one hundred broadcasting stations in New York's business section alone. The difficulty was that these merchants knew nothing of conflicting wave-lengths, of government regulations, or of the fact that, after installing a station at tremendous cost, they would be able to use it only a few minutes each week. Therefore, as one of the officials put it, "It would have been like taking money from a baby," these stations were never built. Instead, The American Telephone and Telegraph Company decided to extend its own "leased facilities" business, by which private wires for banks, newspapers, etc., are arranged, and so built one of the finest stations now operating, which it plans to rent to advertisers for a quarter or a half hour at a time, much as they might pay for a telephone call.

The public has, however, been educated up to a high standard of broadcasted material, and there is no intention of lowering these standards through the manner of presenting the advertised commodity. John Doe, real estate broker, is not expected to announce merely that there will be a sale of particularly fine lots on the following day, with details concerning their desirability. The number of fans who would listen for any length of time to any crudities of the sort would be decidedly limited. Instead it is intended that all matter shall be

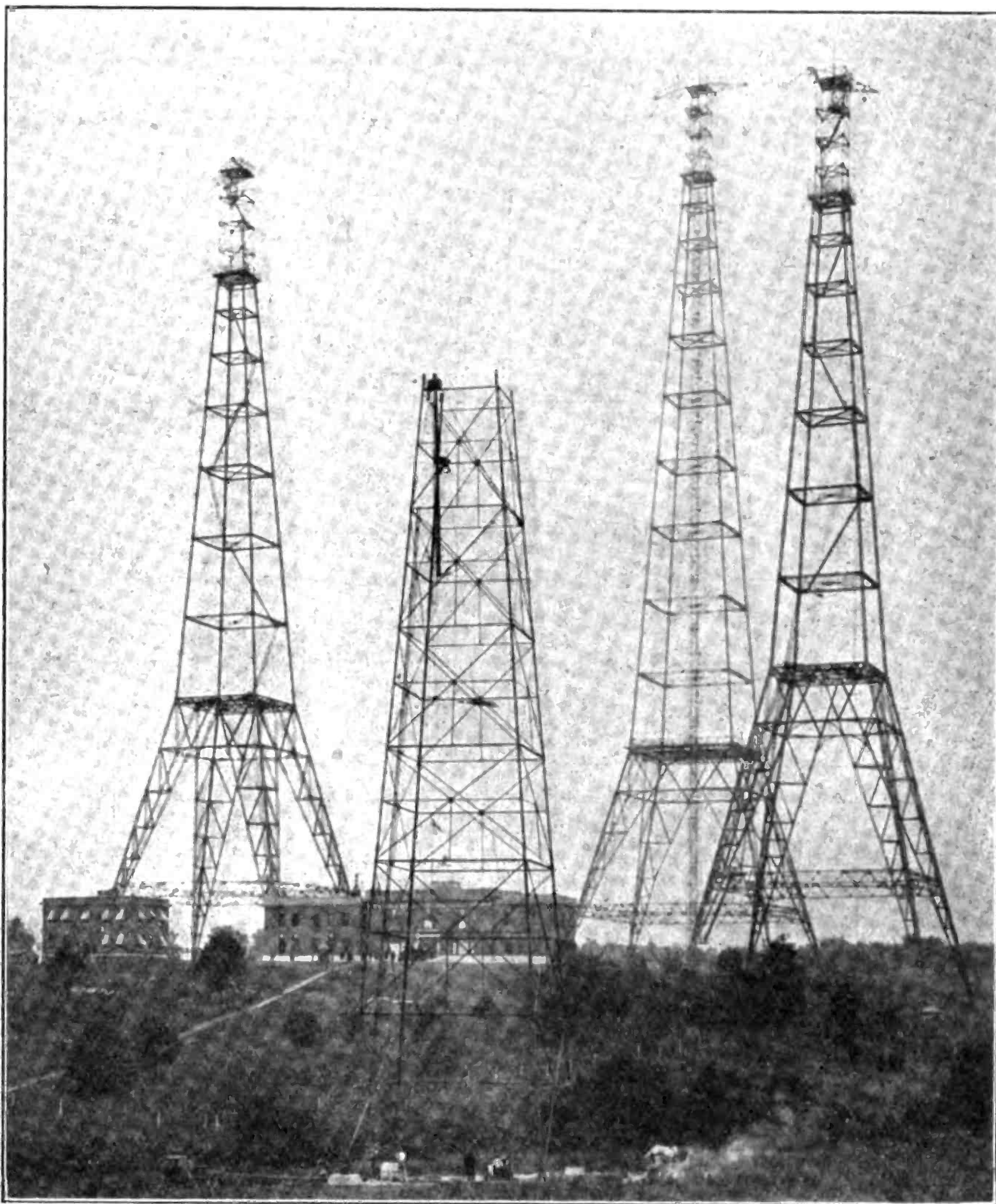
(Continued from preceding page.) presented in artistic form, through speeches on allied subjects, the advertising to be subtle and indirect. A life-insurance company, for instance, rather than send out a stereotyped list of benefits to be derived from a policy, will send one of its skilled physicians to give a health talk. It will mean merely this: At present the purpose behind most broadcasting is to entertain the unseen audience to such an extent that it will buy new improvements for its outfit, and stimulate friends to buy, which is of course advertising in itself. So are the present programs advertisements for the artists and lecturers, which in no wise detracts from the value of the donated services. Primarily the present stations emphasize entertainment, with the advertising incidental, while WBAY will only use the entertainment as a means for much valuable advertising.

At present the operation of this plan is held up by the limited number of wave-lengths legally permitted, and the schedule of hours in operation. Relief is expected from two bills now in Congress requesting broader powers for the Department of Commerce, and through the department an increase in the number of wave-lengths available. As most amateur sets will cover quite a wide band of lengths, it would then be possible for more than one station to operate at the same time. With the press of business before Congress, it may be months before this new departure will be inaugurated. Meanwhile, WBAY sends out the afternoon and Thursday evening programs which it started on August 3., and continues to experiment with and perfect its apparatus.

There are many features of this apparatus in the new station which are of note. In the first place, the studio itself has been so skillfully built and arranged that it is echoless. Felt padding on the walls and parts of the ceiling assists in giving to all voices the effect of a clearer enunciation. A second advance in technical apparatus is to be found in the microphone, or transmitter, which like all the rest of the electrical equipment was designed and manufactured by the Western Electric Company. It is so perfected that it is no longer necessary for the speaker or singer to limit his movements to such positions as will bring him close to the transmitter. This gives him the opportunity to exercise all the freedom of action which is so essential a part of a finished entertainment.

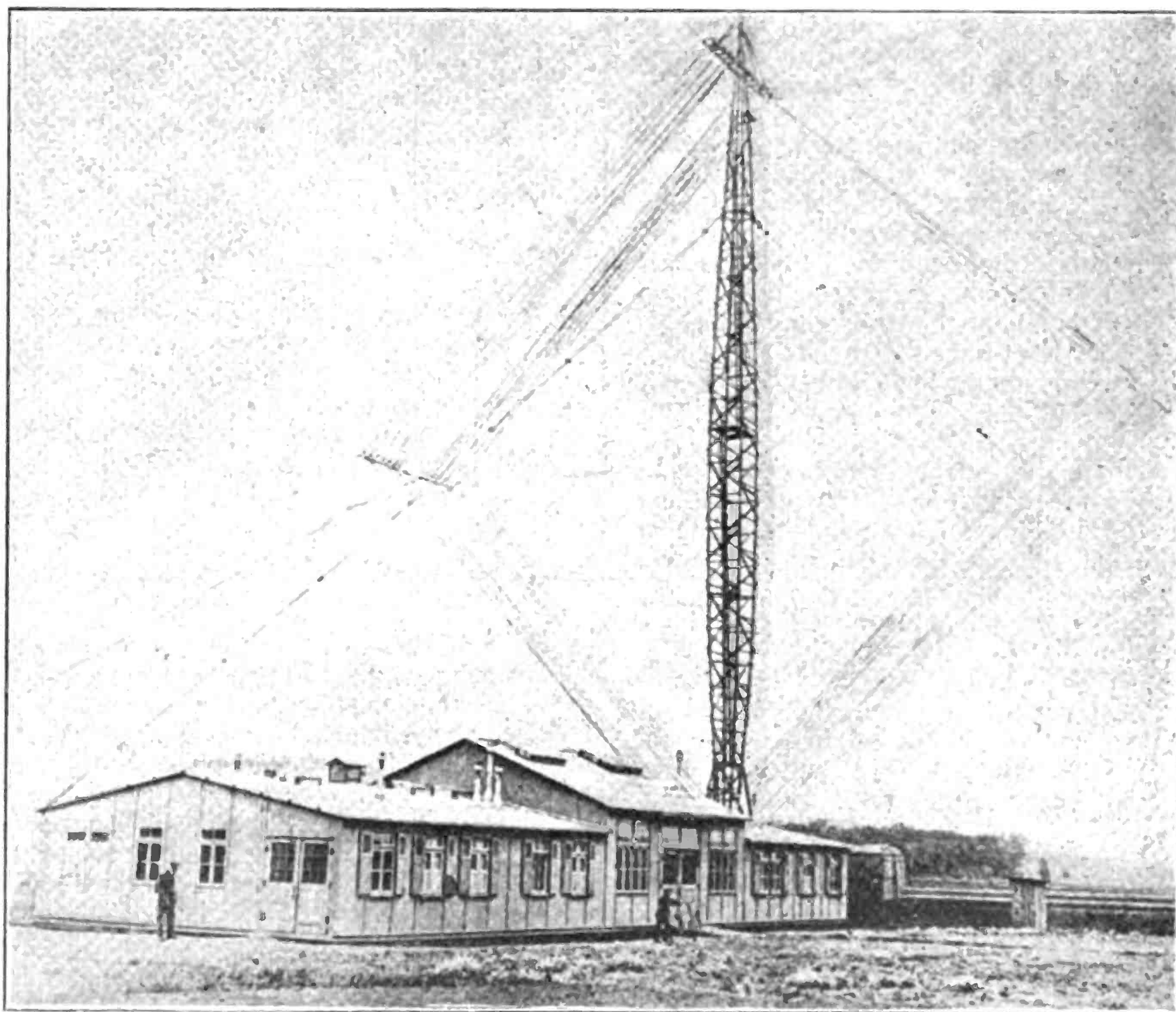
A photograph of the interior of the operating room of WBAY, with a complete description of all the important parts of the apparatus, by our technical editor, will be found on the front cover of this issue.

Two of the World's Greatest Radio Towers



(C. Underwood & Underwood, New York)

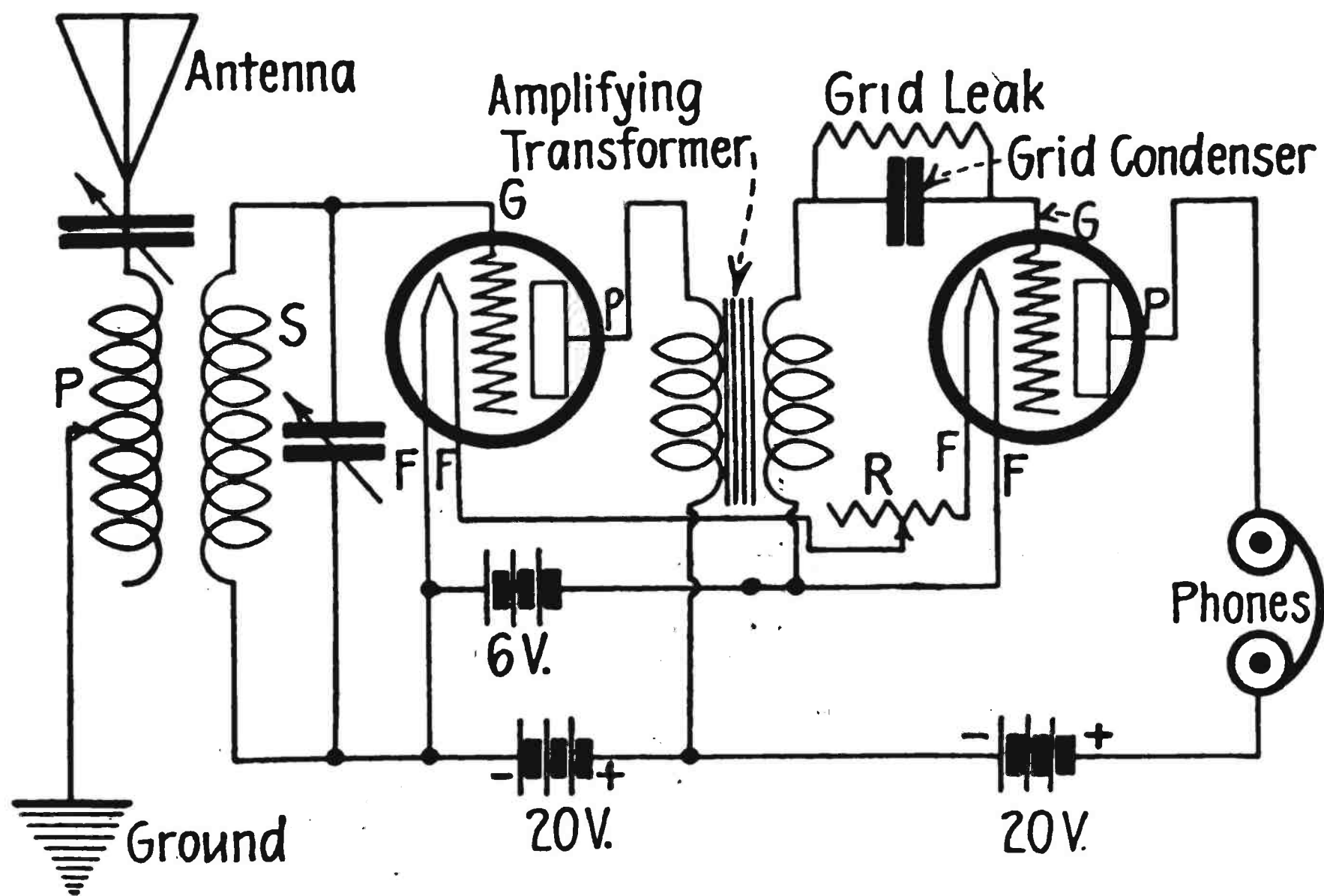
The famous station at Arlington, Va. The towers are 450 feet high.



(C. International News Reel Photo)

Center of Germany's radio: The new powerful station at Oranienburgerstrasse

Answers to Readers



Schematic diagram requested by Mr. William Lang, St. Louis.

PLEASE publish a hook-up showing the necessary connections when using a vario-coupler and one stage of amplification of the straight amplifying-type receiving set.—William Lang, St. Louis.

The accompanying diagram shows the proper hook-up for the straight-type amplifying receiver. It will be noticed that the grid condenser and leak are inserted in the grid of the amplifying tube, however, we suggest that it be placed in the grid circuit of the detector tube for better results. Sometimes it is more of an experiment; therefore, we advise the experimenter to try out the grid condenser in the tube of the detector circuit.

Do the radio-frequency amplifiers increase the range of a set. Do loop aeriels work best with such amplifiers?—Albert Murphy, Rosedale, L. I.

Radio-frequency transformers are made to increase the range of a receiving set. They are placed prior to the detector tube and amplify the original frequency-wave before it reaches the detector. Loop aeriels are used almost exclusively in order that most of the unwanted noises may be eliminated. The loop aerial also has the function of giving directional effect upon the signals desired.

Where can I buy plans to build the superregenerative receiving-set invented by Major Edwin H. Armstrong? I have a regenerative set and am getting good results. I would be gratified if I could see a description of the circuit and how it is assembled.—S. A. Masters, Lakeland, Fla.

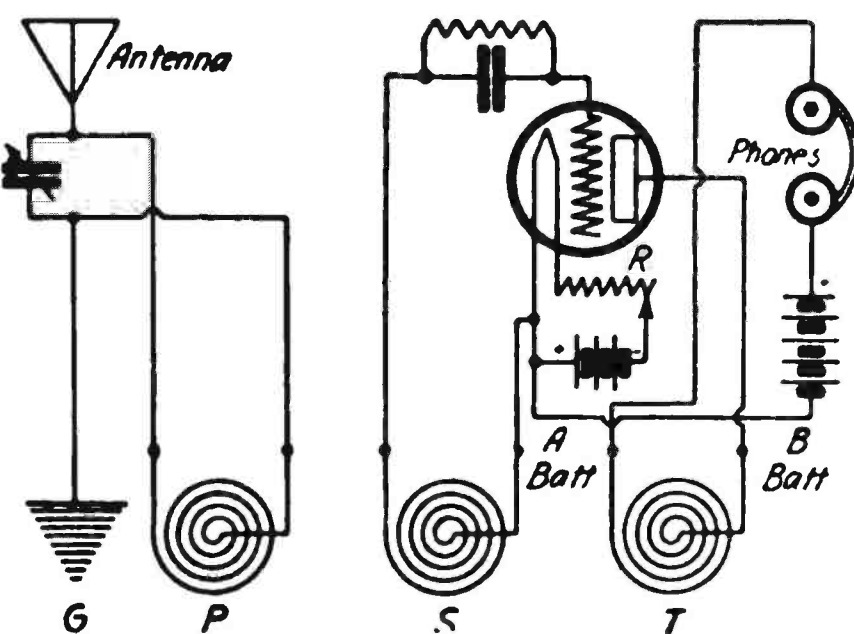
A full description of the Armstrong superregenerative set was published in RADIO WORLD No. 25, dated September 16, in an article entitled "How to Make a Two-Tube Superregenerator," by Frederick J. Rumford.

I have a short-wave regenerative set which I made, as described in RADIO WORLD, No. 22, dated August 26, with jacks in each stage. The detector works fine, but when I plug in on the second step, signals are not so loud as the detector. What is the trou-

ble? I am using Thordason transformer.—John Kelly, Camden, N. J.

Test each tube out separately. In some cases, amateurs connect up incorrectly the secondary of the audio-frequency transformers. Make a good check-up of this and experiment awhile until you locate the trouble. Test out each and every part as you go along, from tube to tube. See that the proper plate-voltages are had, as well as the correct wiring to the tubes and jacks.

Will you publish a hook-up for a regenerative receiver employing honeycomb coils, 43-plate variable condenser and a variable condenser? Does it matter which binding post you take the lead from in a honeycomb coil?—William J. Kelly, Rockaway Beach, N. Y.



Schematic diagram requested by Mr. William J. Kelly, Rockaway Beach, N. Y.

The accompanying is a diagram of the so-called regenerative receiver. This is the honeycomb type. In the above hook-up, it is very easy to discern where the honeycombs are placed. VC is a variable condenser of 43 plates. P is the primary, S is the secondary and T the tickler. The rest of the circuit is self-explanatory. Either binding post may be connected from the honeycomb to such connections as needed.

What do you consider the best hook-up for a crystal set? My set consists of a two-

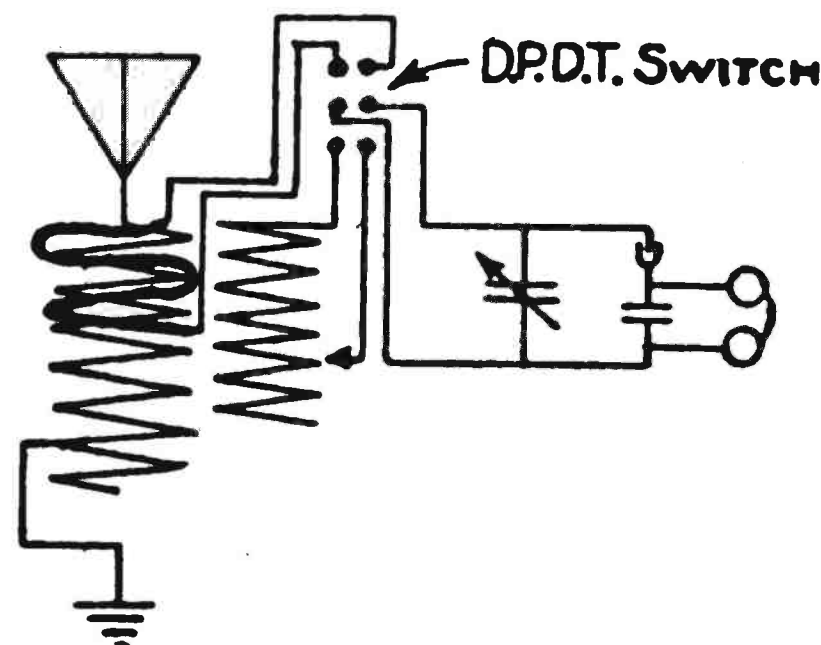
slide tuning coil, one detector, one condenser and a set of 3000-ohm phones. I have seen and tried various hookups, but none seem to work.—Norman Blankenship, Cushing, Okla.

RADIO WORLD No. 11, dated June 10, in "How to Construct One- and Two-Slide Tuners," by George W. May, covers your query fully.

What is the rated voltage for the V-T-1 tubes?—RADIO reader.

As the writer has had years of experience with these tubes, he considers it most essential that you secure a 6-volt battery. In all cases, the tube will draw approximately from 5 to 6 volts. As amperage is the big factor, these tubes are limited to about 1.25 amperes and, in all cases, should not be allowed to go beyond this rating as it may mean the burning out of the tube. It will be found that the tube will work best when kept at a cherry-red glow.

Is there a circuit I could use in which I could have both a tuned circuit and an untuned circuit? If possible I would like to see a hook-up of such a circuit.—James Brandon, Boston.



Schematic diagram requested by Mr. James Brandon, Boston.

There is such a circuit. We have had one drawn, and it is published herewith for your convenience. A double-throw, double-blade switch is used which enables the operator to switch from the untuned circuit to the tuned circuit. It may be said that these principles are used in the Navy type receiver, used both on battleships and in land stations. The idea is to keep the switch placed in—on the untuned circuit—which has a coil about the primary winding. This makes it possible to allow signals of a broad interfering-wave possible. If the operator wishes to eliminate interference in order to read some distant station he will then throw the switch over to the tuned circuit and start tuning in the desired station. This will make a valuable circuit for such work, especially where a close watch is to be kept on everything that is transmitted.

Radio Club Starts School

A RADIO school four nights a week will be conducted this fall by the Hudson City Radio Club, of Jersey City. Code will be the first thing taught because, says the secretary, "a lot of people don't know what they are missing. Don't holler about the ham with his spark and write to the radio inspector when it is some ship on WNY or NAH or some

The Hudson City Radio Club was organized in April, 1920, and incorporated in August, 1921, with thirty-six members. It aims to have at least 136 during the coming year. Anyone interested should write to H. A. Bremer, No. 89-91 Franklin street, Jersey City, N. J.

Civil Service Examination for Junior Radio Engineer

For Men and Women—Opens October 10, 1922

THE United States Civil Service Commission announces an open competitive examination for junior radio engineer on October 4, 1922, at which examination is requested in applications received in time to mail examination papers. Vacancies in the Signal Service at Large, Camp Alfred Vail, N. J.; a vacancy in the position of radio laboratory assistant, Fairfield Air Intermediate Depot, Fairfield, Ohio, and vacancies in positions requiring similar qualifications at Washington, D. C., or elsewhere in the United States, at \$1,200 to \$2,000 a year, or higher or lower salaries, will be filled from this examination unless it is found in the interest of the service to fill any vacancy by reinstatement, transfer, or promotion.

As the Commission has had considerable difficulty in securing sufficient eligibles for this position, qualified persons are urged to enter this examination.

Range in salary.—The entrance salary within the range stated will depend upon the qualifications of the appointee as shown in the examination and the duty which assigned.

Bonus.—Appointees whose services are satisfactory may be allowed the increase authorized by Congress of \$20 a month.

Certification.—In filling vacancies in positions with headquarters outside of Washington, D. C., certification will be made of the highest eligibles examined in the vicinity of the place at which the appointee will be employed except upon the request of the department certification will be made of the highest eligibles on the register for the entire country who have expressed willingness to accept appointment where the vacancy exists.

Citizenship and sex.—All citizens of the United States who meet the requirements, both men and women, may enter examination; appointing officers, however, have the legal right to specify sex desired in requesting certification of eligibles.

Duties.—The duties of the appointee will include the development, design and construction of practical and radio apparatus, and other related duties.

Subjects and weights.—Competitors will be examined on the following subjects, which are given the relative weights indicated:

Subjects.	Weights
General physics.....	20
Mathematics through calculus	25
Technical questions on radio engineering	30
Education, training, and experience	25

Tools.—Competitors should provide themselves with a slide rule; in case of a pocket calculator it will be so stated in the examination sheet.

Academic requirement.—The applicant should show that he has been graduated with a degree from a college or university of recognized standing with a minimum of at least 118 credit hours that he is a senior student in a college or university and furnish proof of graduation within three months prior to the date of the examination. The applicant must show that his undergraduate record included a course in electrical

engineering, and also the usual college course in general physics, general chemistry, and mathematics through calculus. Special credit will be given for experience in a scientific, industrial, or technical laboratory.

Statement of college course.—The applicant must submit a statement of courses taken at college signed by the proper authority of the college or university attended, and give a detailed record of his technical experience and have the vouchers filled out by men professionally qualified to vouch for his ability, fitness, and personality.

Age.—Applicants must not have reached their fifty-fifth birthday on the date of examination. This age limit does not apply to persons entitled to preference because of military and naval service.

Retirement.—Classified employees who reached the retirement age and have served fifteen years are entitled to retirement with an annuity. The retirement age for railway mail clerks is 62 years; for mechanics and post-office clerks and carriers, 65 years, and for others 70 years. A deduction of 2½ per cent. is made from the monthly salary to provide for this annuity, which will be returned to persons leaving the service before retirement with 4 per cent. interest compounded annually.

Photographs.—Applicants must submit to the examiner on the day of the examination their photographs taken within two years, securely pasted in the space provided on the admission cards sent them after their applications are filed. Proofs or group photographs will not be accepted. Photographs will not be returned to applicants.

Residence and domicile.—Applicants may be examined at any place at which this examination is held regardless of their place of residence; but only those who have been actually domiciled in the State or Territory in which they reside for at least one year previous to the examination, and who have the county officer's certificate in the application form executed, may become eligible for permanent appointment to the apportioned service in Washington, D. C.

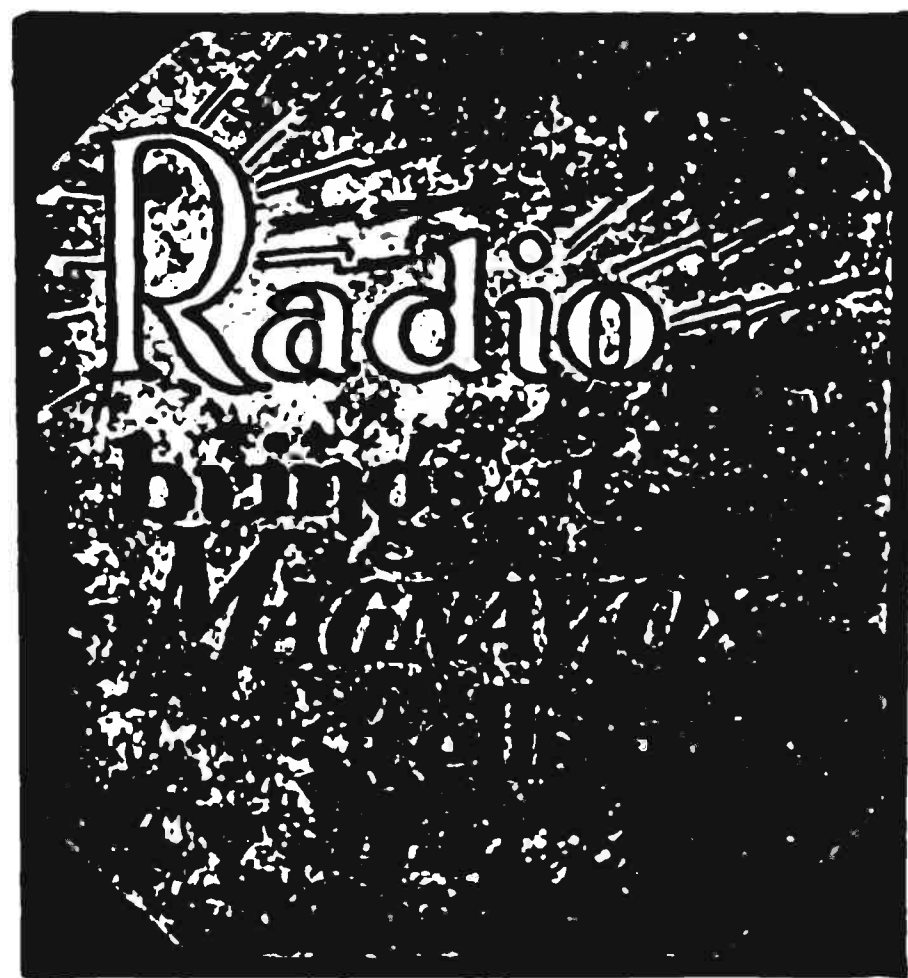
Applications.—Applicants should at once apply for Form 1312, stating the title of the examination desired, to the Civil Service Commission, Washington, D. C., or to the Secretary of the United States Civil Service Board at any place listed hereon. Applications should be properly executed, excluding the medical certificate, and must be filed with the Commission at Washington in time to arrange for the examination of the applicant.

The exact title of the examination, as given at the head of this announcement, should be stated in the application form.

Preference.—Applicants entitled to preference should attach to the applications their original discharge, or a photostat or certified copy thereof, or their official record of service, which will be returned.

There Is Hope!

Since large corporations find it profitable to provide entertainment by means of radio for their employees in isolated places, this may also be the solution of keeping the hired girl back on the farm.

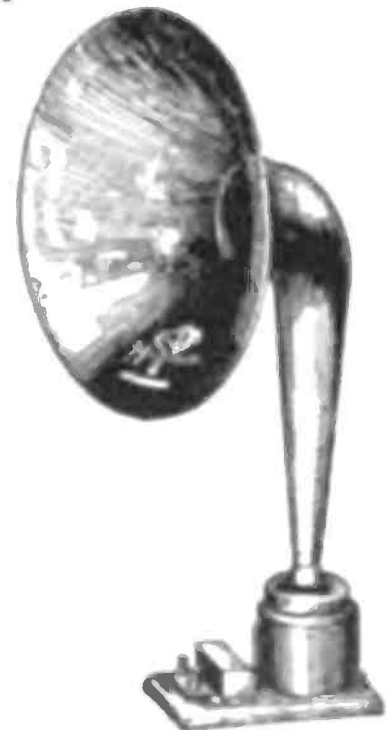


THOUSANDS of families have only "gone in for wireless" after hearing demonstrations of Magnavox Radio—the Reproducer Supreme.

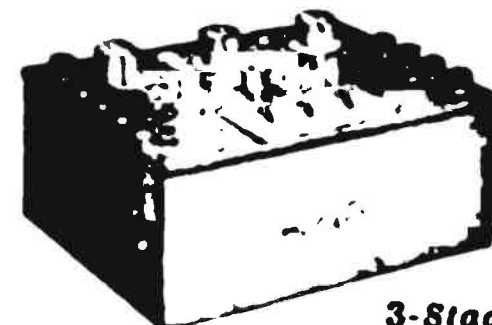
It is the Magnavox Radio which gives every receiving set its greatest enjoyment and use—doing away with the restrictions and limitations of the individual headset. The receiving set only brings the message, while Magnavox Radio tells it clearly and in full volume to all within reach of its voice.

In perfection of mechanism, quality of manufacture and satisfaction in actual service, Magnavox Radio has absolutely no competition.

R-3 Magnavox Radio with 14-in. horn (here illustrated), is ideal for use in homes, offices, etc. Requires one ampere field current from your filament battery. **Price \$45.00**



R-2 Magnavox Radio with 18-inch horn for those who wish the utmost in amplifying power; for large audiences, dance halls, etc. **Price \$85.00**



3-Stage

Model "C" Magnavox Power Amplifier insures getting the largest possible power input for your Magnavox Radio.

- AC-2-C, 2-Stage - - \$99.00
- AC-3-C, 3-Stage - - 119.00

Our interesting new booklet (illustrated in 3 colors) sent on request!

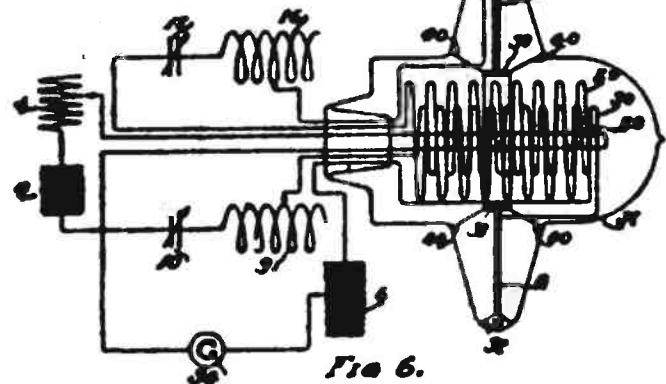
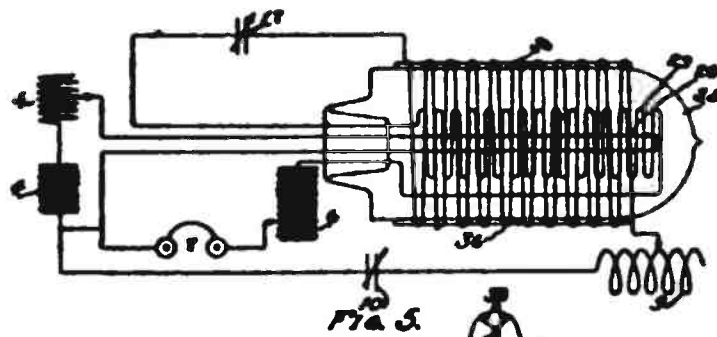
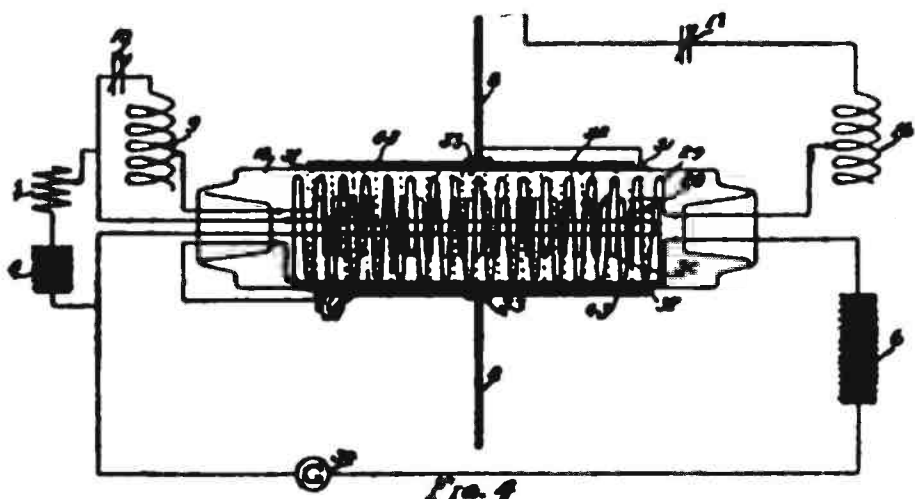
THE MAGNAVOX COMPANY
Home Office and Factory: Oakland, Cal.
New York Office: 370 Seventh Avenue

Radio Patents

Invention Will Locate Distant Transmitting Stations

No. 1,427,833. Patented September 5, 1922
 Patentee: Frederick S. McCullough,
 Cleveland, O.

THE invention on which Mr. McCullough has received letters patent, is important to radiotelegraphy—first, because it will determine the direction of distant transmitting stations; secondly, because it will detect incoming electromagnetic waves. In the radio directional-systems hitherto used, there have been employed large antennae arranged in certain shapes and directions, and also loops or coils of wire, these coils generally having a number of turns wound on a square frame with the sides several feet,



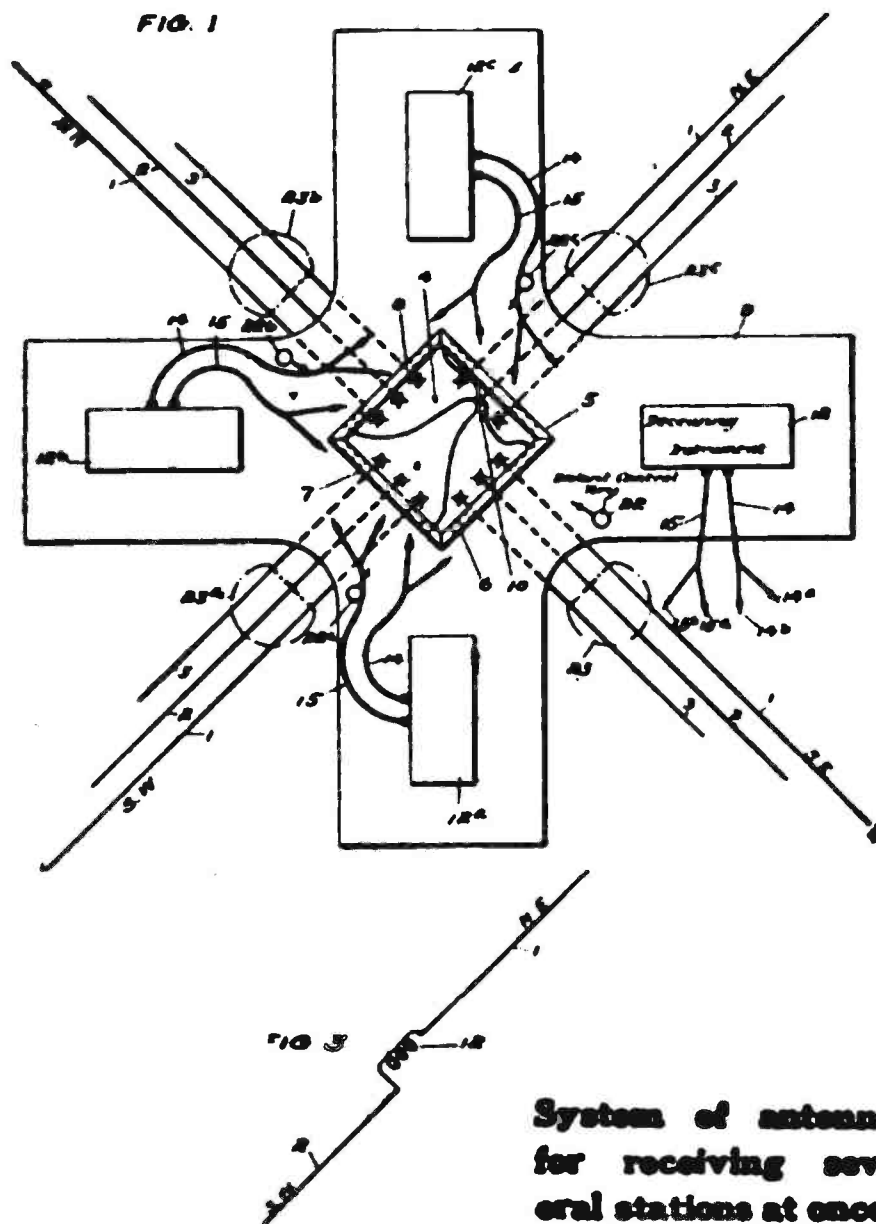
Three schematic diagrams showing modifications of Mr. McCullough's system. Figure 6 shows the flat spiral coil enclosed in an evacuated tube.

or several yards, in length. While directional loops of such size may answer for permanent land-stations, it can be readily seen that there are grave objections to them for portable stations such as those on a small boat, and more particularly on aircraft. For the latter, it is essential to have the apparatus in as compact form as possible, and by his system, Mr. McCullough provides means of small size which will satisfactorily determine the direction of transmitting radio stations. Together with his direction finding, he provides for the detection of the incoming electrical oscillations.

Low-Antenna Signaling

No. 1,424,365. Patented August 1, 1922.
 Patentees: Edward H. Loftin, Washington, D. C., and Henry H. Lyon, Hyattsville, Md.

THIS invention relates to radio antenna systems and, more particularly, to stations employing low horizontal antenna or lineal collectors. In a copending application Serial No. 371,557, filed April 5, 1920, the inventors pointed out the necessity for selecting an optimum length



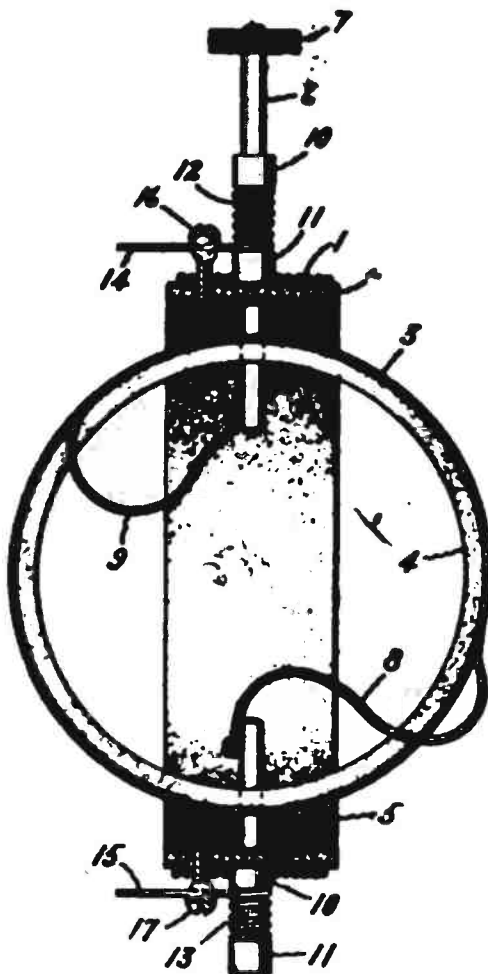
System of antenna for receiving several stations at once.

antenna for tuning to obtain the best results on given wave-lengths. The purpose of the present invention is the devising of a system of antenna for a radio station whereby advantage may be taken with facility and efficiency, of the antenna for general communication with a number of stations employing various wave lengths and having various directions.

Electrical Connection to Prevent Shock

No. 1,422,420. Patented, July 11, 1922.
 Patentee: Charles D. Filkins,
 Schenectady, N. Y.

THE object of Mr. Filkins's invention is to provide a reliable means for providing an electrical connection to a movable element in an electrical device which will allow any desired freedom of movement of



By this device, Mr. Filkins intends to provide a method of making the connections to the movable coil of a variometer which will overcome common disadvantage.

the movable element without interfering with the flow of current.

In the construction of variable-coupling-devices, or variometers, for use in radio cir-

fixed coil and a movable coil which is adapted to rotate with respect to the fixed coil in such a way that the coupling between the two coils may be varied by rotating the movable coil between a position where its plane is parallel with that of the fixed coil and a position where its plane is at right angles to that of the fixed coil. It has been customary in such devices to make electrical connections to the movable coil by means of flexible leads brought from the terminals of the movable coil to fixed terminals located at some convenient place on the apparatus. This method has the disadvantage that it is not possible to rotate the movable coil continuously in one direction, and since the leads are usually located out of sight of the operator there is the danger that the operator will attempt to rotate the coil too far in one direction and break the leads. The leads are, also, apt to be broken by the continual bending which is incident to the normal operation of the device.

By his invention, Mr. Filkins hopes to provide a method of making the connections to the movable coil of a variometer which will overcome the above-mentioned disadvantages; also, to provide a means for holding the movable coil in a desired position and prevent it from moving when the apparatus is subjected to vibrations.

To Regulate the Flow of Electric Currents

No. 1,426,465. Patented August 5, 1922.
 Patentee: Ernest G. Danielson,
 San Francisco, Cal.

VARIABLE resistance is the subject of Mr. Danielson's invention. Primarily it relates to a composition of matter, useful for providing an electric resistance device, and more particularly to a variable resistance which may be used in a potentiometer.

An object of the invention is to provide a variable resistance device of the poten-

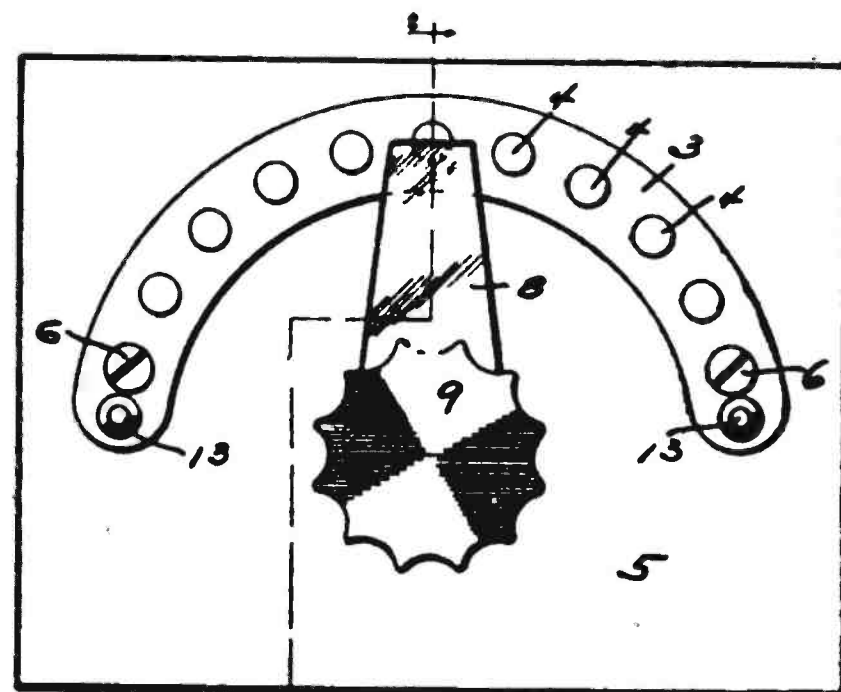


Fig 1

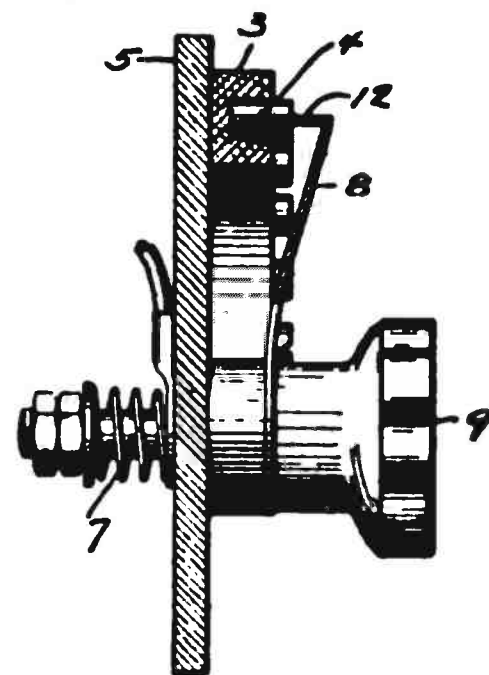


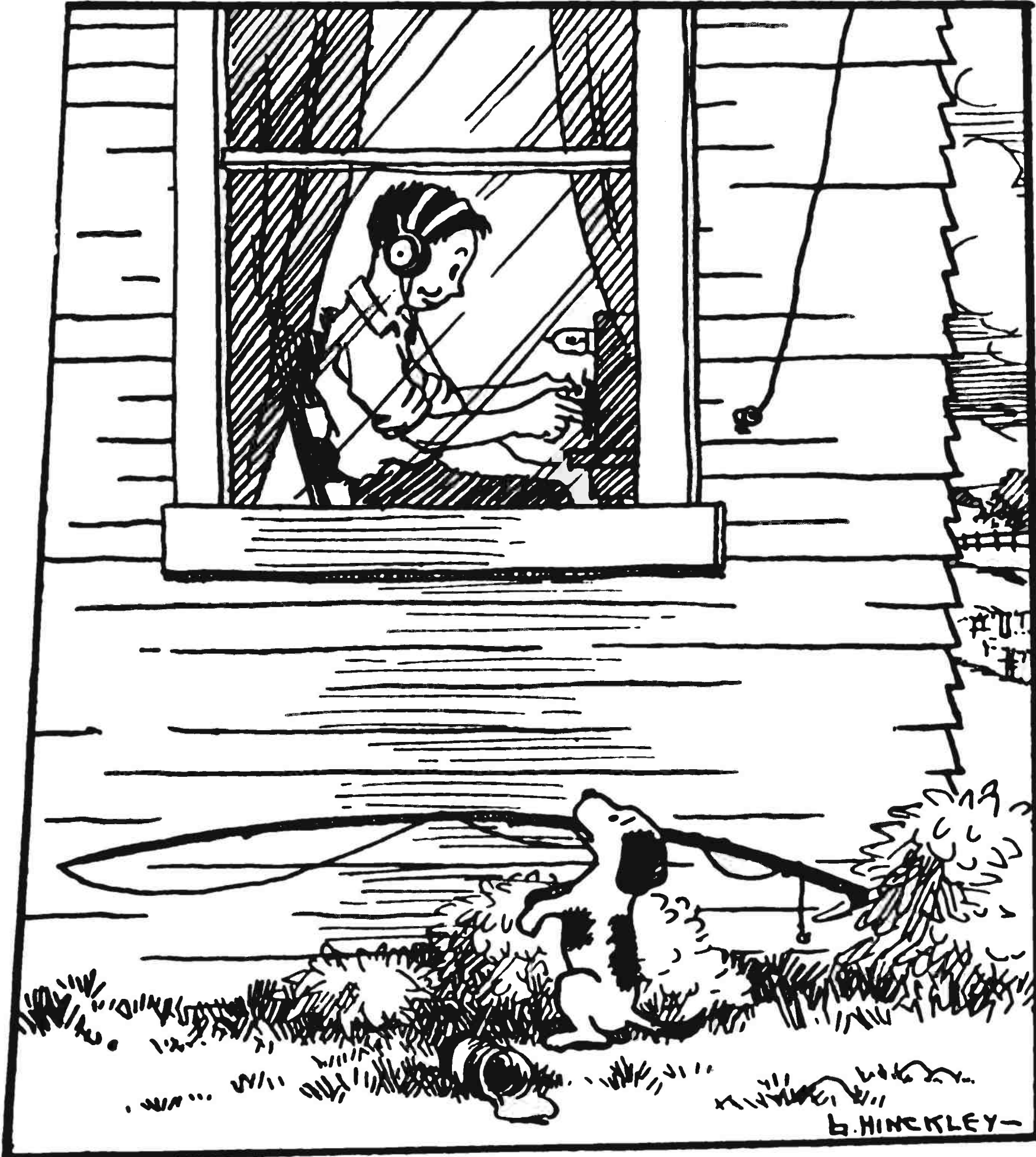
Fig 2

Figure 1 is an elevation of Mr. Danielson's invention mounted on a panel.

Figure 2 is a cross section taken on the line 2-2, Figure 1.

tiometer type in which a metal to metal electrical contact is made between the contact arm and the variable resistance element; to provide a new and useful composition of matter; to provide an inexpensive and reliable resistance element; to provide a simple and inexpensive variable resistance device so constructed

Forsaken!



Cartoon by L. B. Hinckley.

Army Radio Nights

FOLLOWING the success of the first army night broadcasting entertainment in the big station of the Westinghouse Company, at Newark, recently, all Army Corps commanders have been instructed by War Department to cooperate with local broadcasting stations in entertaining the fans especially in establishing regular monthly army nights.

Major-General H. C. Hale, of the Second Area, New York, who put on the first radio entertainment which made such that local fans demanded more, has arranged for a monthly program.

Nine corps commanders who cannot have their own show on army radio sta-

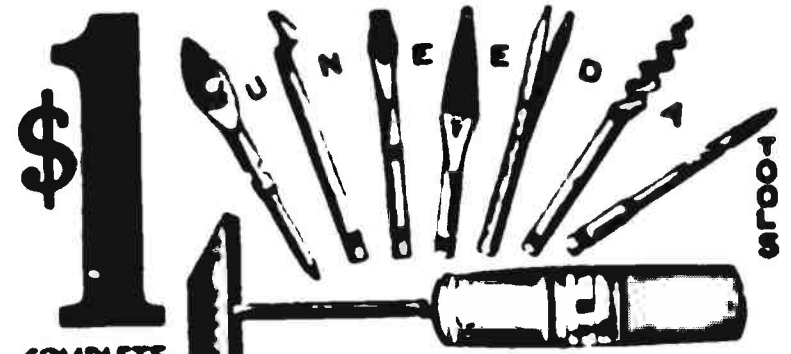
tions, will cooperate with local stations, furnishing band and vocal music, speeches on military science and training, or other forms of entertaining or instructive programs. Very soon now, each of the corps areas throughout the country will have a new source of radio shows.

Continued from preceding page)

or the same adjustment of the contact the value of the resistance thus cannot be interfered with by such as variable contact resistances or contacts. Heretofore, variable resistance devices of this nature have consisted of a strip of pressed or molded metal over which a carbon button, carrying the contact arm, is movable. The resistance of the contact between the button and the strip is variable, due to the conditions of pressure, surface condition of the strip and other causes, so that for any given adjustment of the carbon button, different resistances are obtained at different times. In the design of Mr. Danielson's device, the contact between the variable resistance and the contact arm is made of metal, so that the contact resistance remains constant.

RADIO TOOL SET

Consisting of Hammer, Screw Driver, File, Reamer, Awl, Drifter, Tweezers, Gimlet, Chisel. All scientifically tempered tools. Brass Case, nickeled finish.



COMPLETE POST PAID W.E. NICHOLS WHITE PLAINS N.Y.

Dealers: Write for Quantity Prices.

KNOCKED-DOWN VARIABLE CONDENSER

MONEY-SAVING PRICES

An accurately made, fully efficient instrument that cannot get out of order or adjustment. Fully guaranteed. Extra heavy aluminum plates. Components and pieces. All other parts heavily nickel-plated. Knob and pointer included. Furnished assembled or knocked-down at the following low prices. Easily assembled by anyone following instructions furnished. Save money—order from us. Folder upon request.



No. of Plates	M.P.I. Capacity	Assembled	Knocked-down
8	.0007	\$1.75	\$1.50
11	.0025	\$2.50	\$2.00
21	.0085	\$3.25	\$2.50
45	.031	\$3.90	\$2.90

Lott's Better Radio Condenser Co. 478 GRANGE STREET NEWARK, N. J.

CRYSTAL SET \$4

"THE LITTLE WONDER" \$2.50 UNMOUNTED

Wonder in name and a wonder in performance. Cannot be equalled for the price. Catches distinctly everything within 25 miles.

Send for FREE catalog, describing our "Little Wonder" set and listing radio supplies.

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of Radio Manufacturers, Jobbers and Dealers in the United States and Canada. Issued Quarterly—January, April, July and October. October, 1922, issue corrected to September 15th, 1922. Classified under three different headings—Manufacturers, Jobbers and Dealers—and alphabetically arranged by states, cities and towns and names of firms. Containing approximately 15,000 names and addresses.

We have been exceptionally careful to see to it that every Manufacturer, Jobber and Dealer is listed and under the PROPER CLASSIFICATION. Most mailing list concerns charge more than \$100 for a list of this kind and, as a rule, these supplied are far from being correct. Compare this list with any other, and you will find it to be the very best obtainable anywhere at any price.

October issue ready for distribution September 25th. Price \$5.00 per copy, or \$10.00 per year (four issues, including monthly supplements which keep the list absolutely correct and up to date at all times). October edition limited. Send your order with remittance today.

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Radio Goods that Stand the Test

Manufacturers, send a sample of your goods to our Technical Editor, Fred. Charles Ehlert, 8088 Pleasant Street, Queens, Long Island, N. Y. It will be carefully tested and returned. If your goods satisfy our experts, RADIO WORLD'S endorsement will be published in our merchandise department without charge or obligation of any kind on your part. This is a free service on the part of RADIO WORLD, calling for no expense whatsoever on the part of the manufacturer, except the sending of a sample of his goods.

Super-Sensitive Radiotelephone Head Set

Manufactured by the Teleradio Engineering Corp., 490 Broome Street, New York City.

A RADIOTELEPHONE head set worth testing. It was tested out in various circuits from 200 meters to 20,000 meters. When connected in on short wave-lengths, especially in copying C-W stations and spark stations, in which very good results were obtained, eliminating the hissing noise sometimes experienced in other phones. In copying long-distance transoceanic messages, these phones responded very well. The phones used were of the type C make. They are of solid construction and neat appearance, made adjustable to fit the head. The resistance of these phones was found to be 2,000 ohms.

Na-Ald V-T Tube Socket

Manufactured by Alden-Napier Co., 52 Willow Street, Springfield, Mass.

A VACUUM-TUBE socket of genuine condensite. The best part of this De Luxe socket, as it is called, is the patent clip. This clip makes a positive connection to the prongs of the vacuum tube, under all conditions. There is a wiping action across the bottom, and as the tube slips into place this contact is made at the side. The operator using these sockets in his set may be sure that he is free from the open-circuit troubles in this part of his apparatus. As this contact is slotless and made of genuine condensite, it is practically unbreakable. It serves equally well for 5-watt power tubes, as there is ample spacing between the contact strip and the bottom of the base.

Na-Ald Small V-T Tube Socket

Manufactured by Alden-Napier Co., 52 Willow Street, Springfield, Mass.

A VACUUM-TUBE socket which requires very little room on a panel when space is limited for mounting sockets. This tube socket is molded of genuine condensite and holds the standard made tube. It is neatly constructed. Spring contacts are provided to make quick connection with the different prongs of the tube. This tube socket is not affected by the heat of the tubes or the heat of the soldering iron when soldering connections.

Na-Ald Condensite Dial

Manufactured by Alden-Napier Co., 52 Willow Street, Springfield, Mass.

A DIAL of genuine condensite which will not warp. It allows the dial to run true. It is one of the 3-inch dials on which the fingers may be placed on the knob without covering the numbers on the bevel edge. It is unique in design. With its elimination of excess material, it reduces the absorption losses considerably.

"P-T" Ultra-Sensitive Crystal Detector Contact Wire

Manufactured by "P-T" Crystal Contact Co., Box 164, Boston, Mass.

AS all who have worked with crystal detectors are aware, the great disadvantage a solid rectifier presents is the difficulty of

maintaining it in sensitive adjustment. A "P-T" Ultra-Sensitive Contact gave fine results, using a light-contact mineral. When used with an ordinary good specimen of crystal it was extremely stable in operation.

Be sure to keep the crystal free from dust or moisture. Never touch it with the bare fingers, as the natural oil of the skin greatly reduces its sensitivity. If necessary, clean the crystal with soap and water or alcohol, using an old tooth brush.

To secure the best results with the "P-T" contact, use a very short piece of this delicate wire, preferably less than half an inch. Do not coil it, but press firmly on the mineral at right angles, adjusting for best sensitivity and stability; a little practice will enable you to secure both. Use the test buzzer if available as it is of great value. The "P-T" Ultra-Sensitive Contact is ideal for use in pocket, large portable sets, or in any type crystal-set manufactured.

Bakelite Socket for Vacuum Tubes

Manufactured by I. R. Nelson Co., Newark, N. J.

A VACUUM-tube socket made of genuine bakelite. Of neat appearance and solid construction. It is made for the standard vacuum tube. It has for its contacts four metal springs, which make possible instantaneous connection when the four prongs of the vacuum tube are placed into the socket for operation.

Crystal Receiving Set

Manufactured by American Radio Co., Baltimore.

A CRYSTAL receiver of neat design, made to operate over a wave band from 200 to 800 meters. It has for its primary a coil, upon which is a movable band employed to cut in or out the turns of wire needed. This is controlled by a knob on front of panel. The tapped secondary, also, is controlled by a knob and is adjusted so that secondary may be run in or out of primary for the amount of coupling needed. Tested, it was found to record radiophone messages approximately twenty-five miles, using outside antennae. It has, also, two mounted crystals whereby the listener may use either crystal he wishes in case one fails him.

Microstat Vernier Rheostat

Manufactured by Microstat Company, Williamsport, Pa.

THE MICROSTAT is a vernier rheostat on an entirely new principle, of neat design and construction. Its purpose is to allow the possibility of securing exact filament adjustment over the ordinary wire rheostat. Laboratory tests show that it is equal to ten times the possible calibration of a wire rheostat. Where the smallest amount of filament current is needed, especially when working with a critical tube, this rheostat was found to make good its name—"the rheostat with a thousand adjustments." One knob operates the control. No pushing or pulling of knobs. Just turn. The exact calibration of the microstat is due to the gradual entering of two points into a resistance material: which gives the exact and most minute measurements of current to the filament as the operator brings the points together or separates them through the screw handle. The microstat takes up very little room on the panel, with each part carefully and accurately machined.

New Firms and Corporations

Hush-A-Phone Sales Corp., Manhattan, chatela, \$250,000; A. F. Walsinger, W. J. Cobb, A. H. Hallow. (Attorney, G. Hoerner, 27 Cedar St., N. Y.)

New York Aerial Concert Corp., Manhattan, \$20,000; J. J. Huley, J. A. and M. E. Nugent. (Attorneys, Nugent & Nugent, 280 Madison Av., N. Y.)

Radiotive Corp., Brooklyn, has increased its capital from \$10,000 to \$100,000.

Radio Winding Corp., Manhattan, has increased its capital from \$10,000 to \$20,000.

Southern California Radio Trade Association. President, Leo Taufenback, president Western Radio Electric Co.; vice-president, Al Meyers, manager L. J. Meyberg Co.; secretary, Dean Farran, manager radio department C. R. Kierulff Co.; treasurer, G. S. Corpe, president Coast Radio Company of El Monte.

Balentine Radio Company, 306-300 Scollard Bldg., Dallas, Texas.

Dallas Radio Supply Co., 1927 Main St., Dallas, Texas.

Surf Electric Shop, 102 Strong Ave., Appleton, Wisconsin.

Pacific Electric Company, 116 South Main St., Sheridan, Wyoming. A. Williams, prop.

Chandler Electric Service Co., St. Marys, Ohio.

Tait Knob and Dial Co., Manhattan, radio instruments, \$50,000; R. L. Tait, H. Scutt, I. B. Caulfield. (Attorney, M. J. Spalekhamer, 115 Broadway, N. Y.)

Radihud Corp., Manhattan, radio, \$20,000; J. Perlmuth, E. A. Zadig, E. H. Bronner. (Attorney L. Bronner, 345 Broadway, N. Y.)

Pruver Electric and Machlus Co., Manhattan \$5,000; D. and A. Pruver. (Attorney, A. Weiss, 154 Nassau St., N. Y.)

Hartnett Electric, Hempstead, Nassau Co., \$20,000; T. J. and R. J. and F. J. Hartnett. (Attorney, T. J. Cuff, Hempstead, N. Y.)

Lyradion Manufacturing Co., \$1,250,000; Harry H. Phillips, F. J. Conard, Charles Orn, Chicago. (Corporation Trust Co. of America.)

Dealers Make Mistake by Rating Receiver Sensitivity in Ohms.

"YES, this is a very good receiver. It has a resistance of four thousand ohms." This is the sort of sales talk that many radio clerks give to unwary purchasers of headsets. In talking so, they not only show ignorance concerning telephone construction and design, but help to create an impression that is entirely wrong. They are responsible for the belief that the sensitivity of a headset is indicated by the resistance of the receivers.

In commenting on this, Frederick Dietrich, president of C. Brandes, Inc., recently said the policy of selling headsets on the strength of their resistance is wrong and should be discouraged by dealers. It not only hoodwinks a misinformed public but is a gross injustice to manufacturers who, for sound technical reasons, do not wish to carry the direct-current resistance of their headsets to such a high value. One might as well measure the horse power of an automobile by the size of its carburetor. The average two-thousand ohm headset is as sensitive and, in many cases, more so than the receiver with a resistance of four thousand ohms. Radio receivers should be rated by their impedance. The Brandes headset is designed to have the same impedance as the average circuit in which they are used, since it has been found that this gives maximum efficiency. This impedance varies, of course, with the frequency of the current. The Brandes company has taken, as a standard, one thousand cycles; and, at this frequency, their headsets have an impedance of twenty-two thousand ohms. It has been found that this is the resistance of the average crystal or tube circuit. This, however, does not guarantee the efficiency of a headset, since there are many other requirements and features that determine the operating efficiency and sensitivity of a radio headset.

Mysterious Selenium

Metal Discovered a Century Ago, Now Important to Radio, Will Do Many Things

*By Maurice Freidlander
Live Wire Radio Co.*

SELENIUM is an unknown substance to the layman. Scientists admit that they have not mastered this mysterious, non-metallic, hexad element which occupies an intermediate place between sulphur and tellurium.

It was discovered by Jona Jakob Berzelius, the Swedish chemist, in 1817. It has taken 105 years to perfect selenium so that, in conjunction with radio, it now becomes a foremost substance for the scientist, inventor, and experimenter. F. V. Madaler, after fifteen years of research, has perfected, at his Selenium Laboratories, the most sensitive cells on a large scale which are guaranteed more sensitive than any cell manufactured.

Selenium is produced in two different forms: rods and powder. There are two different colors: reddish brown and black. When melted it has the consistency of ceiling wax and is shiny black color. In this condition, it is practically a nonconductor; but by passing it through a chemical process, it will change in color and become an electrical conductor very sensitive to the light. That means it will alter its resistance to electricity if more or less light is reflected on it.

This very interesting action of selenium started scientific men throughout the world to discover more about this mysterious metal from a scientific and technical form of view. Selenium, it is claimed, will solve interesting radio problems: seeing by wire and producing electricity from day or sunlight.

Selenium cells are already in use for switching on and off electric lights on a life buoy and in outlying districts; starting and stopping machinery at a distant point, by wireless; measuring the light for exposure of camera films; transferring pictures by wire or wireless; measuring light of sun, moon and stars; registering railroad lights and electric-light meters; reproduction of sound waves as produced by music; avoiding friction in electric clocks, assorting cigars, coffee beans, and, in fact, any article where a difference in shade from white to black is to be distinguished; protection against burglary.

The inventor will realize the big field for selenium. The scientist of the past was unable to make or buy the proper selenium cells and, therefore, could not complete his invention. Selenium cells are not easy to make, as the most important feature must be in permanency in sensitiveness and action.

Selling Goods by Radio

Department of Commerce's "Sell-it-by-Air" Service Hailed by Merchants

TIPPING off American business men, by radio, in regard to foreign sales-openings in order to get the jump on America's competitors for the world's markets is the latest trade promoting stunt of the United States Department of Commerce.

Inquiries for American goods coming into the Bureau of Foreign and Domestic Commerce from consuls, commercial attaches, and other government representatives in foreign countries are now distributed to New England manufacturers and merchants, through the air, by the bureau's Boston office in collaboration with the WGI broadcasting station at Medford, Mass.

The service was tried out one night recently, as an experiment. By first mail the

Parthenology

The dictionary says it is pronounced like this: par-the-nol-o-je and means the scientific study of virginity.

Think of the Seventy Thousand who read RADIO WORLD every week that have never seen your advertisement.

Here is a study in virginity, for RADIO WORLD offers you a virgin field to merchandise your radio goods.

Up-to-date radio "fans," dealers, jobbers read RADIO WORLD—because they get all the radio news—four to six weeks earlier in RADIO WORLD than they can get it in any of the old radio monthlies.

Take this little lesson of parthenology to heart, make a scientific study of this new virgin field RADIO WORLD offers you. Write Fred S. Clark, manager of RADIO WORLD, 1493 Broadway, New York for detailed circulation statement, and tested results on keyed advertisements.

Better still, send us a four-time trial order at \$4.50 per inch, right now, before we double our rates. RADIO WORLD is a marvelous, quick-action result-bringer for classified ads; rate, five cents a word.

next morning, several letters were received from nearby firms. One of the leading New England manufacturers of artificial leather, who happened to be "listening in" that night, learned of two possible openings for his goods—one in Mexico and the other in Colombia. He was much pleased, commending the Department of Commerce for taking advantage of "this most valuable time saving device." In the opinion of another New England merchant, the new "sell-it-by-air" service should appeal particularly to the out-of-town manufacturers and merchants who are not in daily contact with the offices maintained by the Commerce Department in Boston, New York, San Francisco, Chicago, New Orleans and other leading cities.

"For example," says this executive, "there are many manufacturers interested in radio who wish to sell abroad, but who are prevented from keeping in constant touch by frequent visits and telephone calls with the trade openings reported to the government agents. As the radio stations reach many outlying cities, it would seem that this service should be of especial value to more distantly situated business men within a wide radius."

Selling American goods in foreign markets, by radio can be extended readily to

Coming Events

The editors of RADIO WORLD will gladly publish news items of all contemplated radio shows and expositions. Keep us posted by mailing full information.

ANNUAL SHOW OF THE ST. LOUIS RADIO ASSOCIATION, St. Louis, Mo., October 4 to 7, inclusive.

CHICAGO RADIO SHOW, Coliseum, Chicago, Ill., October 4 to 22. U. J. Hermann, managing director, 549 McCormick Building.

RADIO CLUB OF AMERICA. First autumn meeting will be held the last Friday in September. Renville H. McCann, secretary, Columbia University, New York.

CINCINNATI RADIO-AND-ELECTRICAL EXPOSITION, Music Hall, Cincinnati, O., October 2 to 7, inclusive.

TRI-STATE TOBACCO GROWERS' RADIO SHOW, Covington, Ohio, October 21 to 23, inclusive.

NEW YORK ELECTRICAL AND INDUSTRIAL EXPOSITION, Grand Central Palace, New York City, October 7 to 14, inclusive.

NEWARK'S SECOND ANNUAL RADIO SHOW, Robert Treat Hotel, Newark, N. J., October 4, 5, 6 and 7.

SECOND NATIONAL RADIO EXPOSITION, direction International Trade Exposition Co., Chicago, January 13 to 20, inclusive, 1923, George A. King, director of publicity, 417 South Dearborn Street, Chicago, Ill.

PERMANENT RADIO FAIR FOR BUYERS, Hotel Imperial, New York City. Open from September, 1922, to May, 1923.

AMERICAN RADIO EXPOSITION, Grand Central Palace, New York City, December 21 to 31, inclusive. Direction American Radio Exposition Company, 120 Broadway.

BOSTON RADIO EXPOSITION, AND NEW ENGLAND AMATEUR CONVENTION, Mechanics Building, Boston, October 30 to November 4, inclusive.

SPRINGFIELD RADIO EXPOSITION, Springfield Auditorium, Springfield, Mass., October 3 to 7, inclusive.

SOUTHERN CALIFORNIA RADIO SHOW. Combined exhibition of the Southern California Broadcasting Association, the Southern California Radio Association, and the Southern California Radio Trade Association. Los Angeles October 9 to 14 inclusive.

PHILADELPHIA RADIO SHOW, October 3 to 7, inclusive.

other parts of the United States, is the opinion of Dr. Julius Klein, director of the Bureau of Foreign and Domestic Commerce. Director Klein pointed out that his Bureau maintains thirty-four district and cooperative offices in this country in addition to the Boston branch. The sending out of the information in each case is a problem for the local manager to arrange with some nearby broadcasting station as all of them have been authorized to undertake the work.



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Two important features for next issue of Radio World, Dated Oct. 7

Shall German Vacuum Tubes Be Admitted Free of Duty?

The pros and cons of this important question answered by technical and trade authorities.

A Complete Up-to-Date List of Broadcasting Stations

RADIO WORLD of Oct. 7 will contain also a complete list, alphabetically arranged, of every broadcasting station in this country up to the day of going to press.

Be sure of getting these two important features. Place a standing order with your newsdealer, or subscribe through your news agent at \$8.00 a year (52 issues), \$3.00 six months, or \$1.50 three months. RADIO WORLD, 1493 Broadway, New York.

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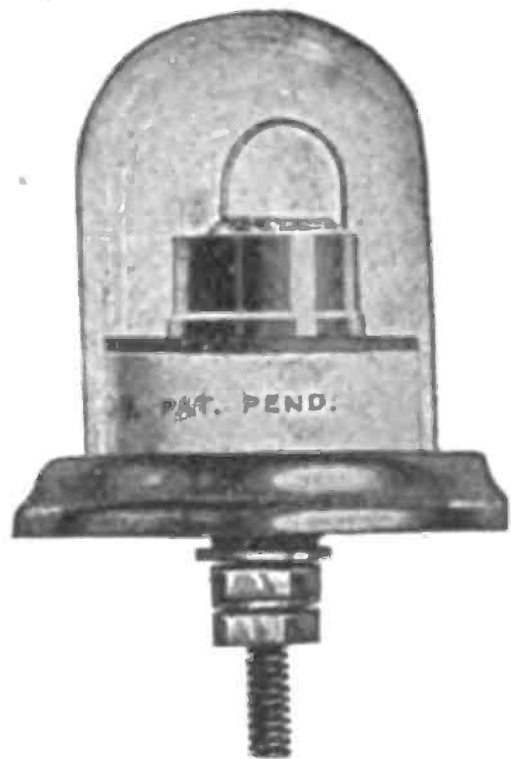
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9 Central Ave. Newark, N. J.

RADIO SYMBOLS

There appeared in Radio World No. 26, dated Sept. 23, a complete table of the radio symbols used in all circuits. If you have not secured your copy send 15 cents. Or, better still, subscribe at \$6 a year; \$3 for 6 months, or \$1.50 for 3 months, and have subscription start with that issue. Radio World, 1493 Broadway, New York.

RADIO WORLD

TELEPHONE, BRYANT 4796

PUBLISHED EVERY WEDNESDAY (Dated
SATURDAY OF SAME WEEK)
FROM PUBLICATION OFFICE,
1493 BROADWAY, NEW YORK, N. Y.
BY HENNESSY RADIO PUBLICATIONS
CORPORATION

ROLAND BURKE HENNESSY, Editor,
1493 Broadway, New York.
FRED S. CLARK, Manager,
1493 Broadway, New York

ASSOCIATE EDITORS:

Robert Mackay Fred. Chas. Whitest

SUBSCRIPTION RATES:

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six months. \$1.50 for three months.

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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
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publisher cannot possibly have control.

How Photographs Are
Radioed Across the
Atlantic Ocean

IF you were to see some one operating what appears to be an ordinary typewriter, and were to observe that the machine was producing a picture instead of a letter, you would doubtless be astonished, says Henry Smith Williams in "The American," New York. Astonishment would not be lessened when you were assured that the picture thus transcribed by the machine reproduces a photograph that had been taken within the half hour over in Europe. The explanation that the picture had come across the ocean in the form of a radio code would not offer much enlightenment.

Yet that phrase describes, after a fashion, the new method of sending pictures by radio that has been developed by Dr. Arthur Korn, of Berlin. The machine that interprets the code is an ordinary typewriter, merely modified so that it types dots of various sizes instead of letters. The operator who receives the code has nothing to do but strike in the sequence the keys representing the groups of letters that have come by radio.

The picture thus typed out is made up of dots of different sizes, much like the ordinary half-tone printed in a newspaper or magazine. The dark portions of the picture are made up of larger dots; the light portions, of small dots; and the intermediate shades of dots variously graded in size. When this is understood it is easy enough to see how the typewriter builds up the picture, and we begin to get an inkling of what the code is like. The letter A, for example, of the keyboard may be represented by a fine dot, letting white paper show to make a high light; and the letter P, toward the other end of the alphabet, by a coarse dot, building up a deep shadow.

It remains, however, to explain how the

code of grouped letters was made at the transmitting end of the line. And this, it appears, was by far the most difficult part of Dr. Korn's problem.

The method, briefly stated, is to roll a negative of the original picture about a glass cylinder upon which a beam of light plays intermittently as the cylinder revolves. Shadows of varying intensity are thus thrown on the surface of a cell made of the strange metal selenium, which has the curious property of transmitting electricity more readily when illuminated. A highly ingenious mechanism causes a telegraphic key actuated by the current passing through the selenium to produce the dots and dashes of the Continental Morse code in such groups as to represent a different letter for each of seventeen graduations of light, so that the letters from A to P are represented.

The message sent by radio consists only of these groups of letters, and, of course, the typewriter that is to reproduce the picture is constructed with the same correspondence between letters and dots.

The transmitting machine works automatically, sending its groups of letters in sequence determined by lights and shadows of the picture; and at the receiving end an automatic recorder may take the message, reproducing the groups of letters in the same sequence. Then a typist, who knows nothing whatever about radio, may reproduce the picture by merely striking the keys of the typewriter in the sequence called for by the copy.

Thus the mystery of sending a photograph by radio across the ocean disappears—but not the wonder of it. Even when we understand how the thing is done, it still remains a scientific miracle.

Amplifier Using Alternating-Current Supply

THERE has been developed at the Bureau of Standards, Washington, D. C., an amplifier which uses 60-cycle alternating current to supply power for both the filaments and plates. The necessity for storage batteries and dry batteries is thus eliminated. The final form of amplifier uses five tubes and a crystal detector, there being three radio-frequency stages and two audio-frequency stages. A description of this amplifier is contained in a paper by P. D. Lowell, "Note on the development of an electron-tube amplifier which uses 60-cycle alternating current to supply power for the filaments and plates," which appeared in the July, 1922, issue of the Journal of the American Institute of Electrical Engineers, volume 41, pages 488-490. It is expected that this paper will also be available as a publication of the Bureau of Standards in a few months.

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Had Your "Ethercise?"
Early Morning Physical Culture Now Comes by Radio Waves

SETTING-UP exercises by radio, beginning at 7 o'clock each morning, is the latest use to which the radio has been put. On September 5, a series of weight-reducing and weight-gaining exercises, designed for various members of the family, was inaugurated and broadcasted from Amrad Station WGI, Medford Hillside, Mass., as a regular feature of its program.

The object of this course is to place at the disposal of all radio users the most approved methods of physical efficiency. Three exercise-classes, lasting fifteen minutes each, are held every morning. These personal efficiency courses are in charge of Arthur E. Baird, head of the Department of Physiotherapy, Caines College of Physical Culture.

While this use for radio is entirely an experiment, being the first time such a course has ever been attempted by radio—in fact, the first time a radio broadcast has been given at this hour of the day—reports indicate that the exercises are being tried by people all over New England. One young woman wrote in that the little girl of the house, arising early one morning, saw her mother bending over and waving her arms with the telephone receiver on her head. The little girl was so frightened that she notified the neighbors.

The three sets of exercises are graded as follows: the first for the normal business man or woman who wishes merely a set of toning-up exercises; the second for those who are overweight and wish to reduce, and the third for those who are underweight and wish to build up. The exercises are accompanied by talks on personal hygiene.

An Epitaph

BILL, the burglar, tried to crack
 A safe protected through the back;
 The let-loose voltage wasn't slow,
 And Bill's gone where the burglars go.
 —"Practical Electrons."

The "COPPER GIANT" "B" Battery
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 In ANY receiving set, because it does not deteriorate while standing idle. This is a very large battery designed for stationary or semi-portable installations where absolute reliability over a period of years is the first consideration. Standard voltages—22, 50 and 100. Any voltage made to order. Write for illustrations.

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 Very finest 43 or 23 plate

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 For the Biggest Proposition in Radio.

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Pictures and Facts About Armstrong Amplifier

Radio World has published a number of pictures, diagrams and descriptive articles regarding the New Armstrong Super-Regenerative Amplifier. The numbers containing this material are dated June 24, July 8, July 15, and August 5. They will be sent postpaid on receipt of 15 cents each, the four copies complete for 60 cents. Or you can subscribe, \$6.00 year; \$3.00, six months; and have your subscription start with the number dated June 24. RADIO WORLD CO., 140 Broadway, New York.

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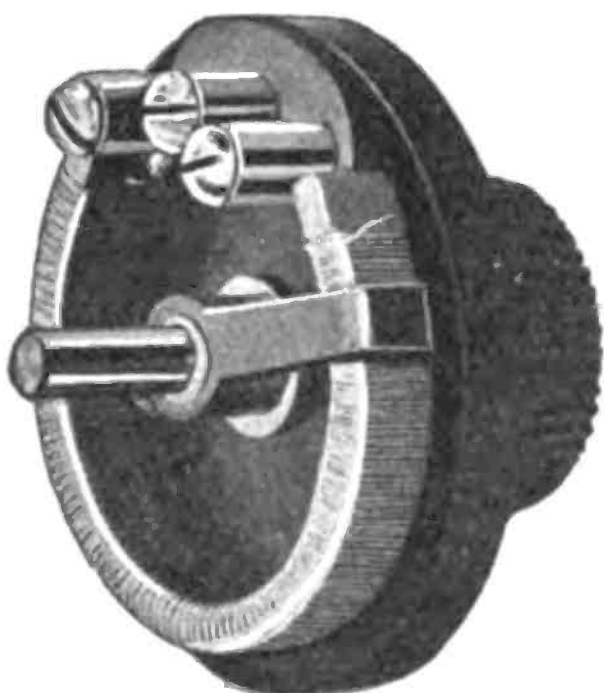
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A perfect panel engraving imitation. Fits any binding post. Black japanned, white enameled letters. Supplied in the following: Antenna, Ground, Phones, Grid, Input, Output, A Bat +, A Bat -, B Bat +, B Bat -. Lettering in two positions. Order direct from ad.



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These things make

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THE IDEAL LOUD SPEAKER

Complete with Unit and Cord

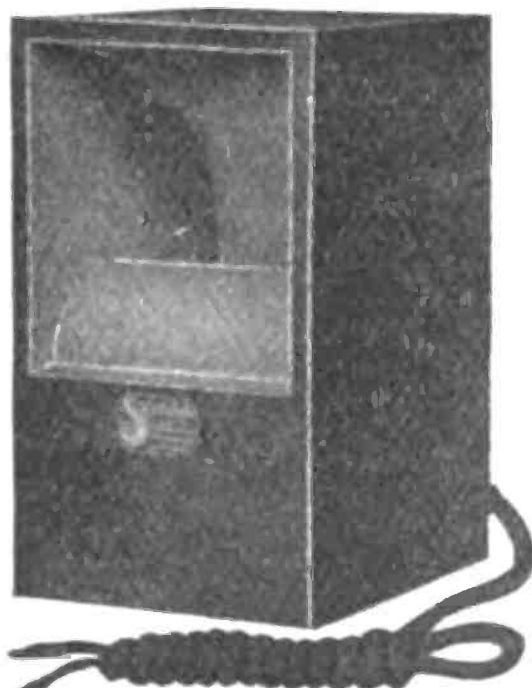
COMPACT—less than 8x5½x5 inches yet the SPIRAL sound chamber is two feet long—as long as the horns used in the very largest instruments.

POWERFUL—direct comparison with other speakers costing up to \$25 shows SPIROLA CONCERT to give greater volume. Using a small aerial and an ordinary set with two stages of amplification we receive Atlanta, Ga.; Nashville, Tenn.; Kansas City, Mo.; and St. Louis, Mo.—stations from six to seven hundred miles away—so loud they can easily be enjoyed by a roomful of people. Nearer stations come in as loud as the loudest phonograph music.

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Radiofacts

A VACUUM tube may be used as a rectifier, or detector, of high-frequency oscillations. When connected up to the proper circuit, it performs this function with as much efficiency as the crystal detector.

* * *

The chief problem connected with direct transmission by wire and radio, those of amplification with proper modulation, seem to have been solved, and the happy combination of wire phone and radiophone opens up new fields of usefulness to these twin wonders of modern science.

* * *

Practically every minute of the day and night the radio news of foreign countries comes over the radio waves. If you have a radio apparatus with vacuum tubes adapted for short-wave receiving, you might as well increase the inductance and capacity, or put up an extra long antenna and listen to the stations in almost any country on the globe.

* * *

Arlington broadcasts its time signals 11.55 a. m. to 12 noon, and from 9.55 p. m. to 10 p. m., Eastern Standard time.

* * *

Having your aerial higher at one end than the other will not be a disadvantage under the circumstances, but a complete advantage, because it will place it diagonally in relationship to the aerial of your neighbor, rather than in parallel.

* * *

Why not a "radio-order house" to supplement the mail-order business during congested shopping periods, such as Christmas?

* * *

There is one material in the many places of radio apparatus that cannot be replaced by any substitute scientists have as yet discovered. This material is mica, a mineral substance having unique dielectric properties. It resists the passage of electricity even at remarkably high voltages. It is a material which forms an invaluable function in radio.

* * *

Learn the code if you want to get the full enjoyment to be found in radio as a hobby.

* * *

In stores where the radio department represents an investment of \$1,000 or more, that department should be put in charge of, not necessarily, a radio expert but a man who is thoroughly familiar with radio parts, installations, and hook-up problems.

* * *

It is more than probable that within another year every town of any size in the United States and Canada will have a broadcasting station.

* * *

When one considers that a good talking machine costs at least \$100 and a good radio-receiver from \$15 to \$20, it is obvious, as the technical details are perfected, to what extent radio will grip the public.

* * *

American radio companies are developing systems of radio communication with Central America, with New Orleans as the main centre for American reception and transmission.

* * *

The principal reason why radio-telephony is very little known in Italy is because all the inventors find that if they wish to have a chance to sell their inventions they must go abroad.

* * *

The rheostat is necessary because it regenerates the brilliancy of the filament. If the rheostat is turned so as to increase the brilliancy, more electrons will flow in the tube.

* * *

Slate, electrically, is a very poor dielectric and nonconductor. It was used in past years as a panel for transmitters, but it has not been used for receivers. At present, nothing is superior to bakelite or hard rubber.

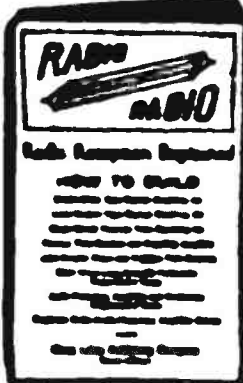
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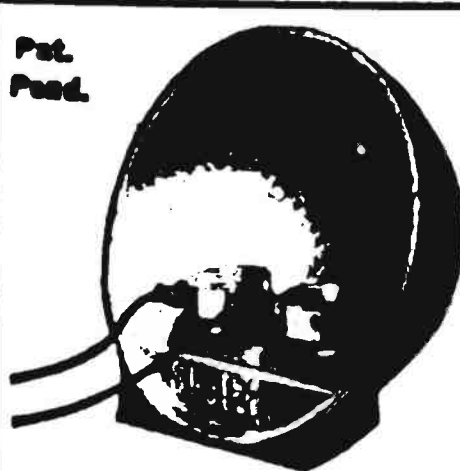
Complete 50c. instruction book for 30c. only on radio reception and how to make eight classes of crystal and vacuum tube receiving sets. Wonderful information makes you understand radio. With every order we send free our price list of parts prepared especially for the several sets described. Not direct from factory and save many dollars. Both instruction book and price list sent on receipt of 30c. only. Money back if not pleased.
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 a year easily earned. I will train you quickly, at home, in your spare time, to construct, install, operate, repair, maintain and sell radio outfits. Short course, low cost, easy terms, money back guarantee. Write for "Radio Facts" FREE. Engineer Mohaupt, American Electrical Association, Dept. U-2, 4513 Ravenswood Av., Chicago, Ill.

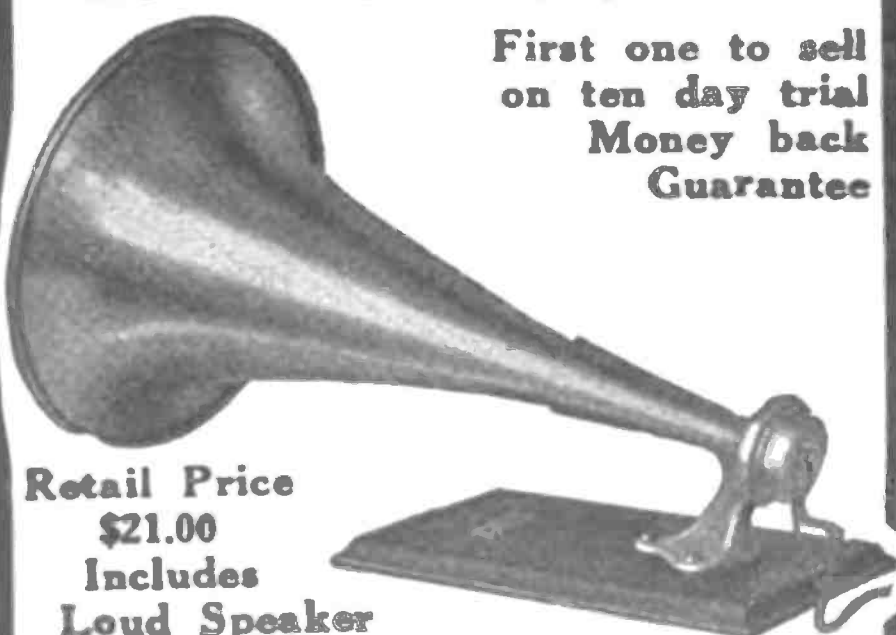
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 No tubing or horn to distort delicate notes. Swells every sound into full richness!
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\$5.00 AT ALL GOOD DEALERS OR DIRECT BY MAIL

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 Includes Loud Speaker

Trutone has been pronounced the best on the market by experts. It has a clear true tone. Every radio fan should try Trutone and compare it with others. If YOU don't find Trutone the best, your money will be refunded. It is sold on a ten-day trial money-back guarantee. If not carried by your dealer write us.
 Distributors and Dealers, write!

AUTO PARTS CO.
 1815 Trombly A

A Broadcasting Corporation to Stabilize Radio

AN interesting plan for putting radio broadcasting on a permanent basis is now being discussed among the makers of radio apparatus, says "Electrical Merchandising."

The plan proposed calls for a "public-service broadcasting corporation" organized not to earn money but to spend it, and to be operated under the direction of—not radio or electrical men—but experienced entertainment people who know the public's tastes in music, lectures, and amusement programs. To the funds of this broadcasting corporation, the manufacturers would be asked to contribute two per cent of their gross sales of radio apparatus. Figuring \$100,000,000 of radio sales this year, it will be seen that the new broadcasting corporation would start operations with an annual budget of \$2,000,000. Independent manufacturers and jobbers and dealers would also be given an opportunity to contribute to the broadcasting pool, inasmuch as all would benefit from a plan which made radio increasingly popular with the public.

In this way, at least, one of the knottiest problems in the whole radio situation seems to be on the way to a solution. With a dependable broadcasting service in operation, the dealer can sell radio outfits with the fullest assurance of his customers' satisfaction.

Navy Day in the Air

RADIO broadcasting will be employed in connection with the celebration of Navy Day designated as Friday, October 27, by Theodore Roosevelt, Jr., assistant secretary of the United States Navy, at the instance of the Navy League. While representatives of the Navy League and other Naval organizations throughout the country will undertake to promote general interest in the Navy and its gallant traditions through meetings, concerts, banquets, and with the aid of the moving-picture industry, a number of the larger and more powerful broadcasting stations have been requested to send out a radio program. In this connection, all Naval stations have been ordered to assist in making Navy Day a national celebration to be remembered by radio fans. Either the Navy or the League will furnish speakers, glee clubs, or other forms of entertainment to radio stations cooperating.

A special program is being planned for the Naval Station, NOF, Anacostia, D. C. It is probable that either Secretary Denby or Assistant Secretary Roosevelt will deliver a speech on the work of the Navy. The Marine Band is scheduled for a special concert which will probably be broadcast from Anacostia.

The gigantic scheme of entertainment for Navy Day will, by the aid of radio, be carried not only to municipalities, but into the very heart of the country in every State, and every fan who owns a radio set should watch for the schedules and prepare to listen in.

WJZ, Newark, N. J., got one step ahead of the Navy League by offering its station one night each month for transmitting speeches and entertainment. Such nights will be known as Navy nights. Naval officials of New York have accepted the offer of WJZ and plan to use, as one attraction, the Naval bands of such ships as may be in port on Navy Night.

Letters from the Navy League to the Department of Commerce District Radio Inspectors have asked their cooperation in securing the aid of broadcasting stations. It is said that most of the large newspaper broadcasters from the Atlantic to the Pacific Coast will also assist in broadcasting Naval achievements.

Fifty-two issues for \$6.00. Sub. Department, Radio World, 1493 Broadway, N. Y. C.

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6986 RETAIL RADIO DEALERS covering the United States, by states, price per thousand\$7.50
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Ford Roadster Top Recovering \$5.20. Touring \$6.95, and \$9.95. Chevrolet, Dodge or Maxwell \$13.95. All other 5 passenger cars \$16.50 with plate glass lights, Regular Side Curtains \$5.95 up. Special Winter Side Curtains that open with doors \$11.90 up. Ford Seat Covers \$8.15 up. Ford Cushions \$5.75. All goods same as car mfrs. use. Quality the best and guaranteed to fit. Printed instructions given how to apply. Send for samples. Prices above include delivery at your door.
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Manufacturers' Guarantee 1000 Burning Hours
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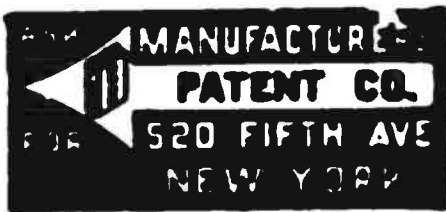
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PATENT
Your Radio Ideas.
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FREE ADVICE



Turning Print Into Sound by Radio

THE Lee de Forest talking film (or "phonofilm"), can be hitched, after the film is developed, on to broadcasting instruments, it is claimed, so that the voice pictures can be wirelessly great distances and then turned back again into sound waves, says "The Times," New York. So far, the problems of running a typewriter or a linotype by sound waves has not been mastered, but close approaches to it have been made.

By the use of light similar to the photography of sound waves by Mr. de Forest, the printed word has been turned into sound, so that the blind can read by ear. The arrangement of black and white in the ordinary letter causes such varying effects when the letters are intensely lighted and passed over selenium photoelectric cells that the electric current can be controlled by them so as to produce sounds which the blind can interpret into letters.

In both the de Forest invention and the machine which renders the printed word into sound for the blind, the key is the peculiar property of selenium. In darkness this substance is resistant to electricity. In light it conducts electricity. In varying light it modifies the current of electricity passing through it. In the de Forest invention the aperture for the admission of light for the sound-wave photography is said to be in some way controlled by the vibration of the sound. This produces the variations in the sound pictures on the film. When reproduced these variations modify the light which passes through. The modifications of light keep the electrical resistance of the selenium cells in constant variation. The electrical current, is thus controlled by the pictures of the sound waves. The current is magnified by the audion tubes and in turn it controls a diaphragm or microphone, like that of the ordinary telephone receiver, finishing up the process of reconstructing the sound.

When There's An "R" There's Radio

OYSTERS are in season and so is radio. Curiously, the two seasons coincide; if there is an "R" in the month, radio transmission is good. The radio season opened officially on September 1, and is now in full blast. In anticipation of the unprecedented interest in radio during the fall and winter, the Bureau of Navigation, Department of Commerce, is taking steps to minimize interference and insure, so far as possible, strict compliance with the law. The radio inspectors in each of the nine districts have been instructed to cover the principal radio centers and points where serious interference may be expected. On these trips they will inspect stations for license, examine applicants for radio-operators' licenses and determine whether the transmitting stations are adjusted to meet the requirements of the law.

Claims Spirits Talk by Radio

MRS. M. E. CADWALLADER of Chicago, vice-president of the National Spiritualists' Organization, says that she has made plans for the broadcasting of messages from the dead that may be received throughout the length and breadth of the land by all who care to hear. John Slader, a Chicago medium, it is reported, is working with Mrs. Cadwallader. There is no hesitancy in Mrs. Cadwallader's assertion that the dead actually converse with certain members of the living human race and her announcement that these messages can be broadcast, as if they came from the living throat, has been greeted by the true believers with acclai...

V-A-C-U-U-M-T-U-B-E-R-E-P-A-I-R-I-N-G
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Wanted in every city and town to sell radio apparatus. Good commissions. A few stocking agencies open to reliable parties.
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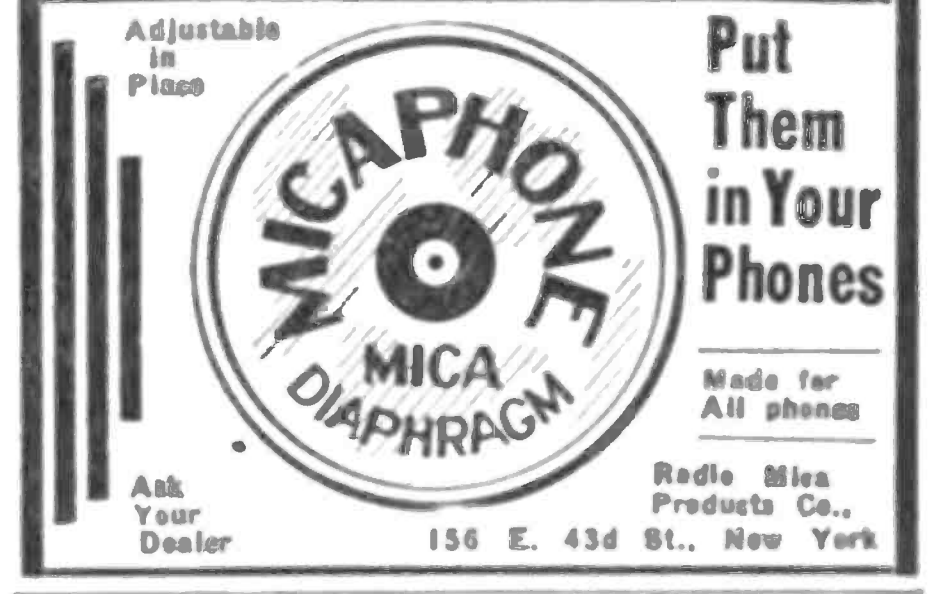
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Special "EDMAR" Mounted Crystals. If it isn't the best you ever used, return it and we will refund the money. Price each75c
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23-Plate\$1.85
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3-Plate (Vernier)..... 90c
Order Direct From Us. Sent Postpaid to You.

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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 reaches us.

The rate for this RADIO WORLD QUICK-ACTION CLASSIFIED AD. DEPT. is 5c. per word (minimum of 18 words, including address), 10% discount for 4 consecutive insertions, 15% for 13 consecutive insertions (3 months). Changes will be made in standing classified advs., if copy is received at this office ten days before publication. RADIO WORLD CO., 1493 Broadway, N. Y. C. (Phone, Bryant 4796.)

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FREE with each \$15.00 Western Electric Headset, one UV 200 Detector tube. We handle everything in Radio. NEWBURGH RADIO SHOP, 236 Broadway, Newburgh, New York.

Are you familiar with all the radio symbols used in the various hook-ups published in Radio World? If not, secure a copy of Radio World No. 26, dated Sept. 23. In this issue was a complete table of all important symbols used in radio construction and testing. Send 15 cents for a copy, or \$6.00 per year, and have subscription start with that issue. RADIO WORLD, 1493 Broadway, New York City, N. Y.

HOOUPS: Over 100 blueprints to select from at 10c. each. Send dollar for trial order. Radio Supply Co., Box 192, Pueblo, Colo.

PATENTS—Electrical cases a specialty. Pre-war charges. B. P. Fishburne, Registered Patent Lawyer, 386 McGill Bldg., Washington, D. C.

Manufacturers of Rogers Radio Receivers and Rogers Receiving Radiometers. Rogers Radio Company, 5133 Woodworth Street, Pittsburgh, Pa.

TO THE TRADE—Fixed Phone and Grid Condensers. Write for price list and sample. SALKEY RADIO CO., 2378 Eighth Ave., New York City.

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FOR SALE. Grebe CR-8 and 2 step amplifiers. Irvin Maurer, Minersville, Pa.

EDISON "B" Battery Elements, 16c. pair. 1KM 181 Pleasant St., Malden, Mass.

BOYS! MYERS' HIGH-MU AUDION. A tube which brings in the stations five times louder than other tubes. May be used as audio or radio frequency amplifier. Try one of these excellent vacuum tubes. \$5. Receptacle, \$1. Postage and Insurance free. If unsatisfactory, return within five days after receipt. The Kehler Radio Laboratories, Abilene, 50, Kansas.

WANTED: COPIES of RADIO WORLD, April 22 and May 29, 1922. Mail us copies of these issues, or either one, with an accompany postal and we will send you a copy of the latest issue for each copy so mailed. RADIO WORLD, 1493 Broadway, New York.

25 WATT C. W. and phone set including motor generator, 5 tubes, new, used less than 20 hours. Cost over \$250; sell \$175,000 cash. Box 152, Mahwah, N. J.

WESTINGHOUSE RC Regenerative Receiver and 2 stage amplifier in cabinet, \$75; 1-6 IIP. 10 Volt DC Motor-generator, \$15; 5 Ampere Battery Charger, \$8. Further details on request. A. R. Leinbach, 137 Walnut St. Reading, Pa.

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Radiosophy

COMPETITION is the life of some amateurs.

Where there's a will there's a way to own a radio set.

The slipping cat whisker gathers no broadcasting.

The man worth while is the man who can smile when his set has blown a tube.

In the bright lexicon of youth there is but one word—Radio.

Amateurs rush in where old-timers know better than to tread.

Continual dropping wears out the phones.

A radio set doeth good like medicine. Some amateurs know no law.

What's in a name?—radio by any other name would win the world.

Code speaks louder than words. If the pen be mightier than the sword, then radio is mightier than the pen.—

Florence G. Rogers in "Radio Journal."

FOR SUCCESS WITH THE ARMSTRONG SUPER REGENERATIVE CIRCUIT



which requires constant fixed capacities of .005 and .0025 m. f. d. use

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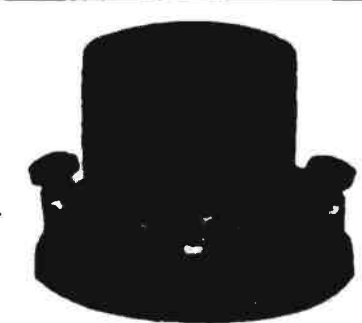
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RADIO FANS! Send for our catalogue of Electrical, Radio and Mechanical books. Includes radio outfits and amplifying transformers. Prices reasonable. A. C. UKIE & CO., 333 W. Manhattan Boulevard, Toledo, Ohio.

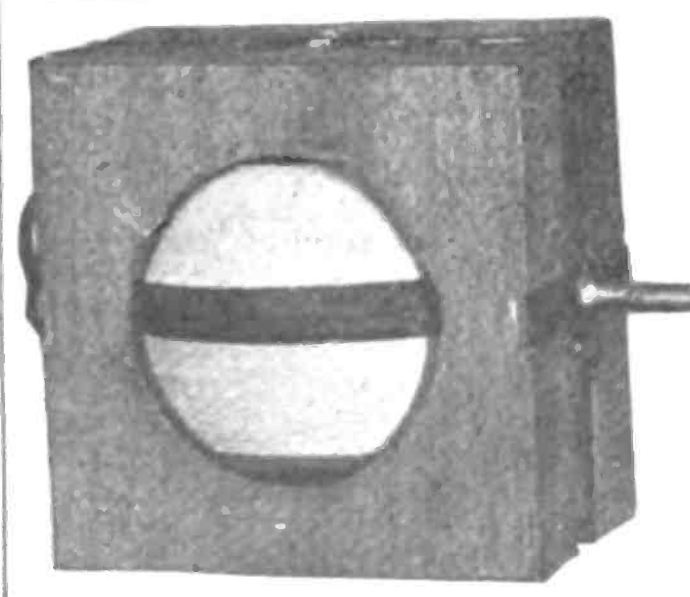
DO YOU USE A CRYSTAL DETECTOR? ARE YOU MAKING A CRYSTAL RECEIVER? Increase the efficiency of your crystal detector 1,000 per cent by using a "PT" Ultra-Sensitive Contact. Of special gauge and alloy. Makes and holds a quick, ultra-sensitive, stable adjustment. Using galena, you may pound panel or table without disturbing sensitivity in slightest. Proved practical on shipboard by an old-time Marconi operator. Using a "PT" Contact on galena, Arlington (NAA) was brought in clear at 3,300 miles (below the Equator); and Arlington came in loud at 2,200 miles (off Dutch Guiana). In both instances, nearby ships using vacuum tubes were unable even to hear NAA. As to stability, Cape May (WCY) was worked over 1,000 miles, sending right through crystal with 2 KW spark, without affecting detector's adjustment. Replace your old insensitive unstable contact with one which will hold its adjustment in addition to giving louder signals and music. Indispensable for pocket sets and crystal detector-bulb amplifier outfits. A novice can install. "PT" Ultra-Sensitive Detector Contact, with instructions, twenty-five cents coin or M. O. "PT" CRYSTAL CONTACT CO., Box 1641, Boston 8, Massachusetts.

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Radio-Frequency Amplification Explained

Interview with Charles Kilgour, Radio Engineer, Brings Out Interesting Information in Regard to Phenomenon of Radiotelephony

ALTHOUGH radio frequency amplification is no mystery to the average amateur, there are many, especially those who have but recently become radio fans, who will be interested in a brief explanation of this phenomenon. Mr. Charles Kilgour, radio engineer, in charge of the corps of engineers employed by the Crosley Manufacturing Company, operators of the radio station WLW, in Cincinnati, Ohio, has made a close study of radio frequency amplification.

"Everyone knows the purpose of the ordinary two-stage amplifier is to make louder the sound as originally received through the detector tube or crystal," says Mr. Kilgour. "This amplifier makes any audible signal louder; therefore, it is called an audio-frequency amplifier.

"The extremely weak electrical alternating currents induced in the antenna circuit of the receiving set have a frequency far too high to produce an audible effect on the head phones. Broadcasting stations usually use the 360-meter wave-length, which means that the current picked up has a frequency of more than 800,000 cycles per second. The lowest note of the piano or organ has about 16 beats, or cycles, per second, while the highest beats approximately 8,000 times per second.

"The high-frequency current picked up from the broadcasting station is called a radio-frequency current, because it is at this high frequency that the message is radi-

ated through space. Combined with the radio-frequency pulsation there is a low frequency variation which is the part we wish to hear. The detector so alters the current that the high-frequency part has no effect on the head phones, while the low-frequency part acts upon them, causing them to give out an audible note. This is called rectification.

"Understanding this, it is apparent that a radio-frequency amplifier does its work before the detector has acted. It is inserted in the set between the tuner and detector. As in the case of the audio-frequency amplifier, a vacuum tube with its proper circuits is used to strengthen the electrical current. In this case, however, this is accomplished before the current has been rectified by the detector. One stage of radio-frequency amplification will not have as great an effect on the output as a single-stage audio-frequency amplifier of proper design, but it has several important advantages.

"If a great volume of output is desired, why do we not use more stages of audio-frequency amplification? We cannot ordinarily use four or six stages because audion amplification becomes very noisy when cascaded in this manner and sounds generated in the tubes themselves have a tendency to drown out the signal. On the other hand, a radio-frequency amplifier does not have this bad quality in anything like the same degree."

VARIOMETERS AND VARIOCOUPERS UNWIRED, PER SET.....\$1.50

Variometer—2 mahogany stators, 1 1/4" x 4 1/4", Mahogany rotor, winding form and brass hardware, \$1.50 per set.

Variocoupler—Bakelite tube 4" x 3" rotor ball and all brass hardware, \$1.50 per set.

Please include 10 cents per set for postage.

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Latest Foreign Radio News

THE first radiotelephone system to be established in Japan, will communicate between Fukuoka in Kyushu and Fusan, Morea. It is planned to connect this line with land lines. Considerable delay has been experienced in its installation, but the station, from latest reports, should be in operation. The next installations planned by the Department of Communications of Japan are from Kyushu to Formosa and from Kyushu to Tsushima in the south and from Hokkaide to Saghalien in the north. A company is now being formed to establish a radiotelephone system between Kagoya and Osaka, a distance of about 120 miles.

Effective June 1 last, the legal time in Poland will be the same as that of Central Europe.

French radio-compass stations in Algeria, France, and Morocco give bearings on 450, 600, or 800 meters, as the ship station may desire. For each bearing a charge of 6 francs is made. American ship stations should obtain these bearings on the 800-meter wave.

The new wireless station at Shabolevka, in Moscow, was able to receive messages from the recent Conference at Genoa. Messages are sent by the commissariat for foreign affairs through this station. The receiving department is equipped with three apparatus, all of Russian construction. The station has two masts each 560 feet high.

The wireless coast station at Bonifacio, Corsica, will communicate with any ship desiring information of meteorological order relative to barometrical pressure, wind (direction and velocity), condition of the sky,

graph rate is 3 cents per word and the coast station rate is 8 cents per word. The same information (given by Bonifacio) is obtainable from the station at Marseilles. The rate is the same.

A Radio Necessity!
Latest broadcasting map 15c. That is, a complete broadcasting map appeared in Radio World, No. 8, dated May 20. Mailed on receipt of 15c. Radio World Company, 1493 Broadway, N. Y. C.

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TO THE RIGHT TUNE IS VERY SIMPLE WHEN YOUR CONNECTIONS ARE SOLDERED WITH THE NEW
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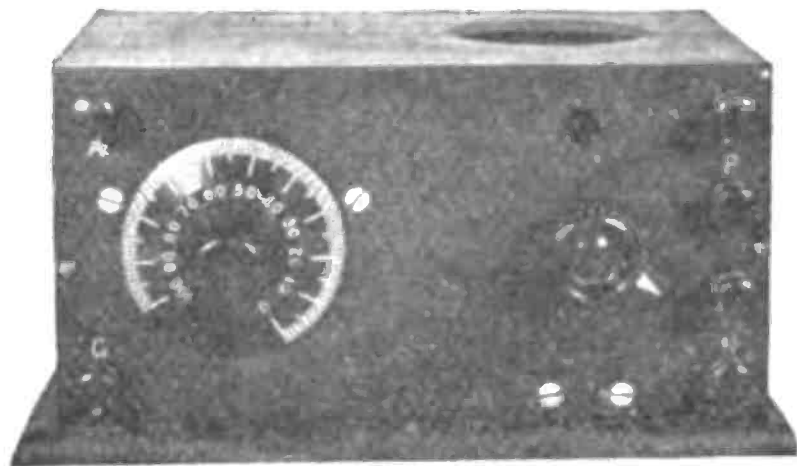
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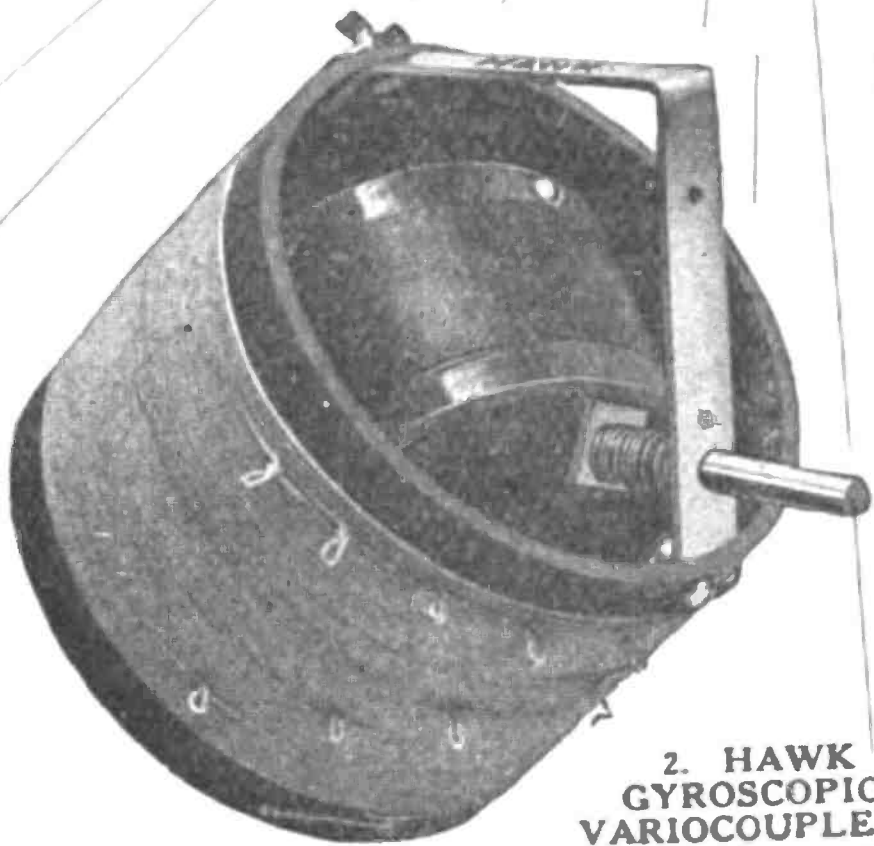
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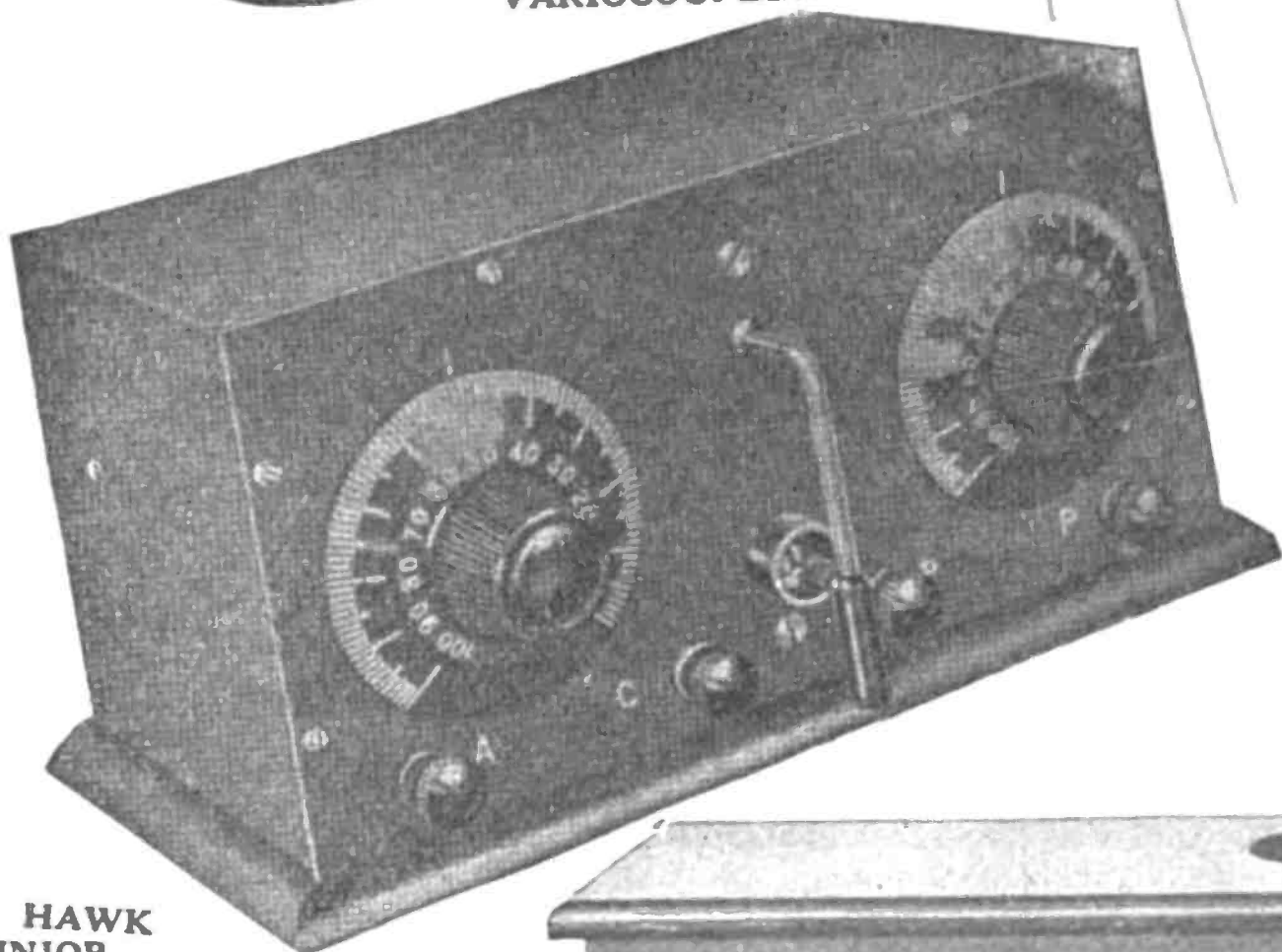
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DETECTOR TUBE SET



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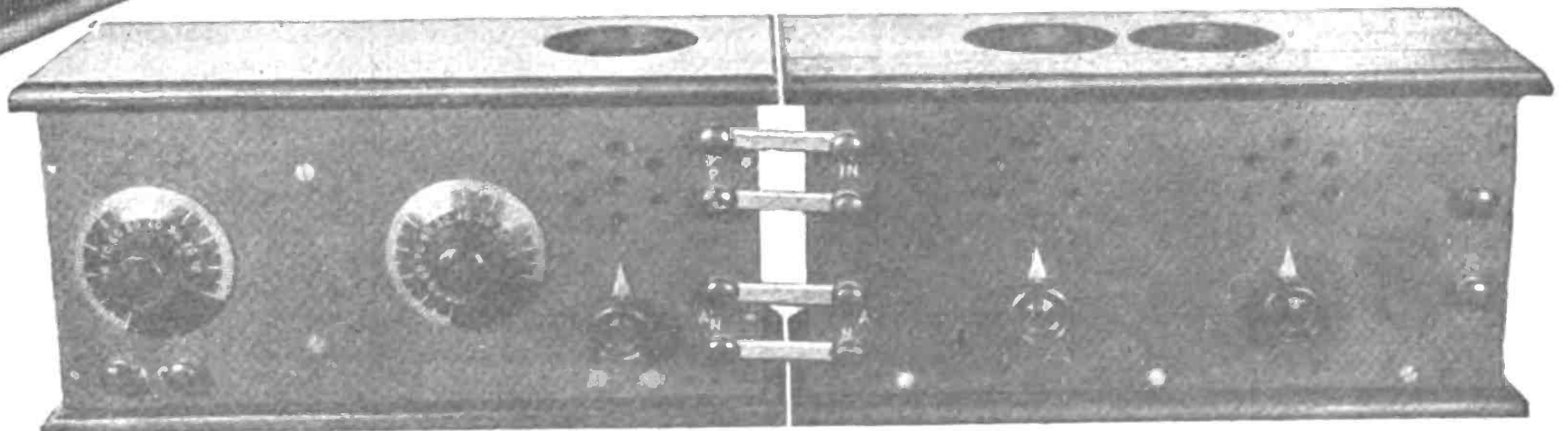


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Most complete efficient detector set at any price. Everything self-contained in unit. List price... **\$5.00**

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A wonderfully selective crystal receiving outfit receiving up to 40 miles. List price..... **\$10.00**

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Ideal vacuum tube receiver. Tuner, rotary plate, variable condenser, socket, rheostat, etc., in mahogany finish cabinet, wired and mounted. List price **\$20.00**

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