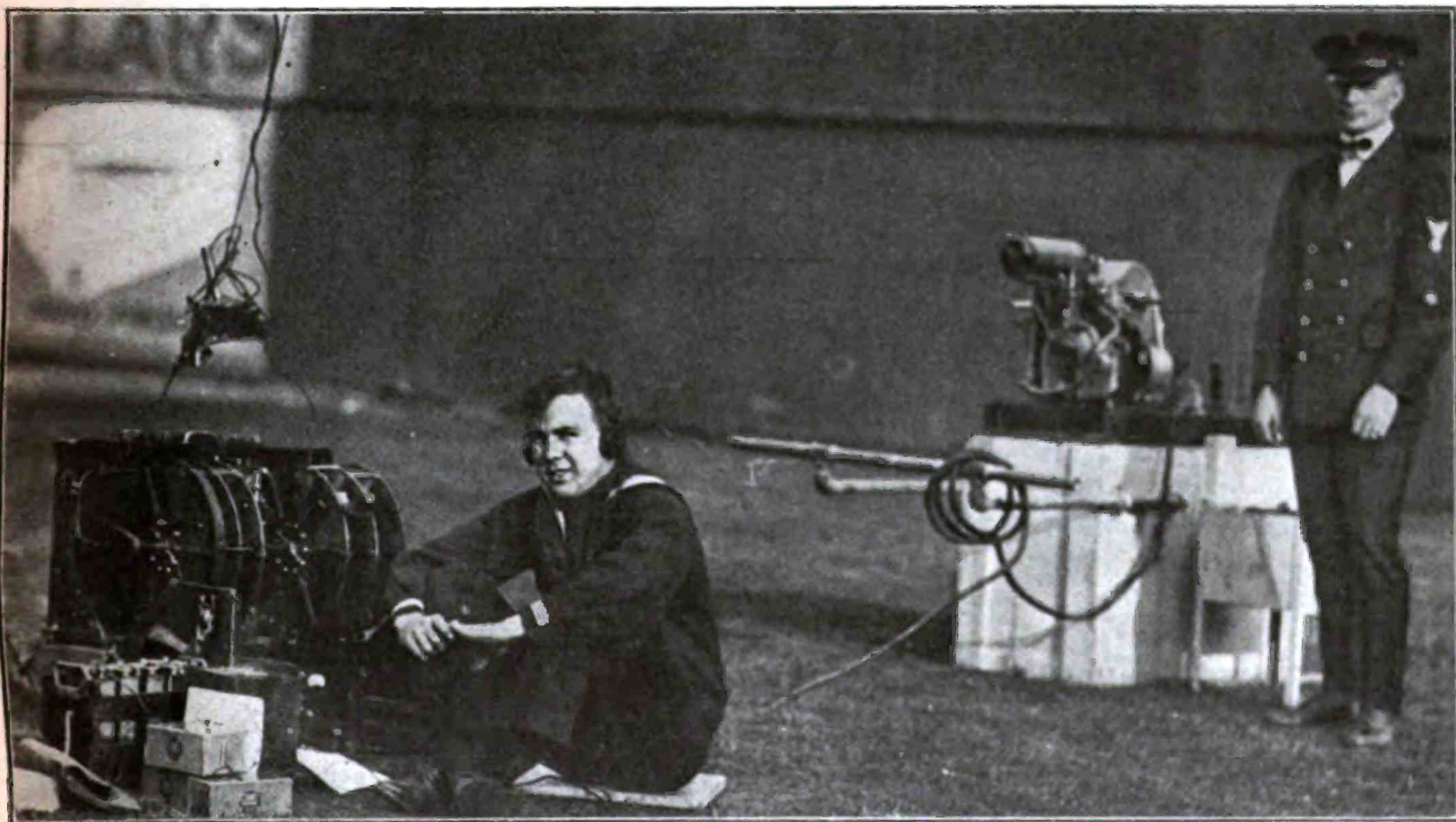


RADIO WORLD

(Trade Mark)

ILLUSTRATED. WEEKLY

Field Sets Used by U. S. Navy



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

Here is a transmitting set used exclusively by the United States Navy. It should be of interest to every radioist. It is different from sets in ordinary use in this respect: It is made so that it fits in a suitcase, making it possible to carry it ashore for land duty. In the left of the photograph is the transmitter with its compact inductance coils, making it possible for the operator to broadcast on a wave-length fixed for any particular purpose. With radio transmitters, high voltage must be secured to apply to the necessary tubes. In this case, a special machine is used as shown at the right to supply this power.



"He is rich," said Confucius, who knows when he has enough! Would you find the richest man? Look for the owner of a Grebe Receiver.

Doctor Mu

The whole world is at your fireside when you own a Grebe Receiver.

Ten years of radio manufacturing experience has taught us the importance of simplicity. Recommended by most good dealers because they know the shortcomings of ordinary apparatus.

Ask your dealer for a demonstration. Get your copy of "Musings of Dr. Mu"—the story of the development of the Perfect Receiver.



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VOLUME TWO

RADIO WORLD

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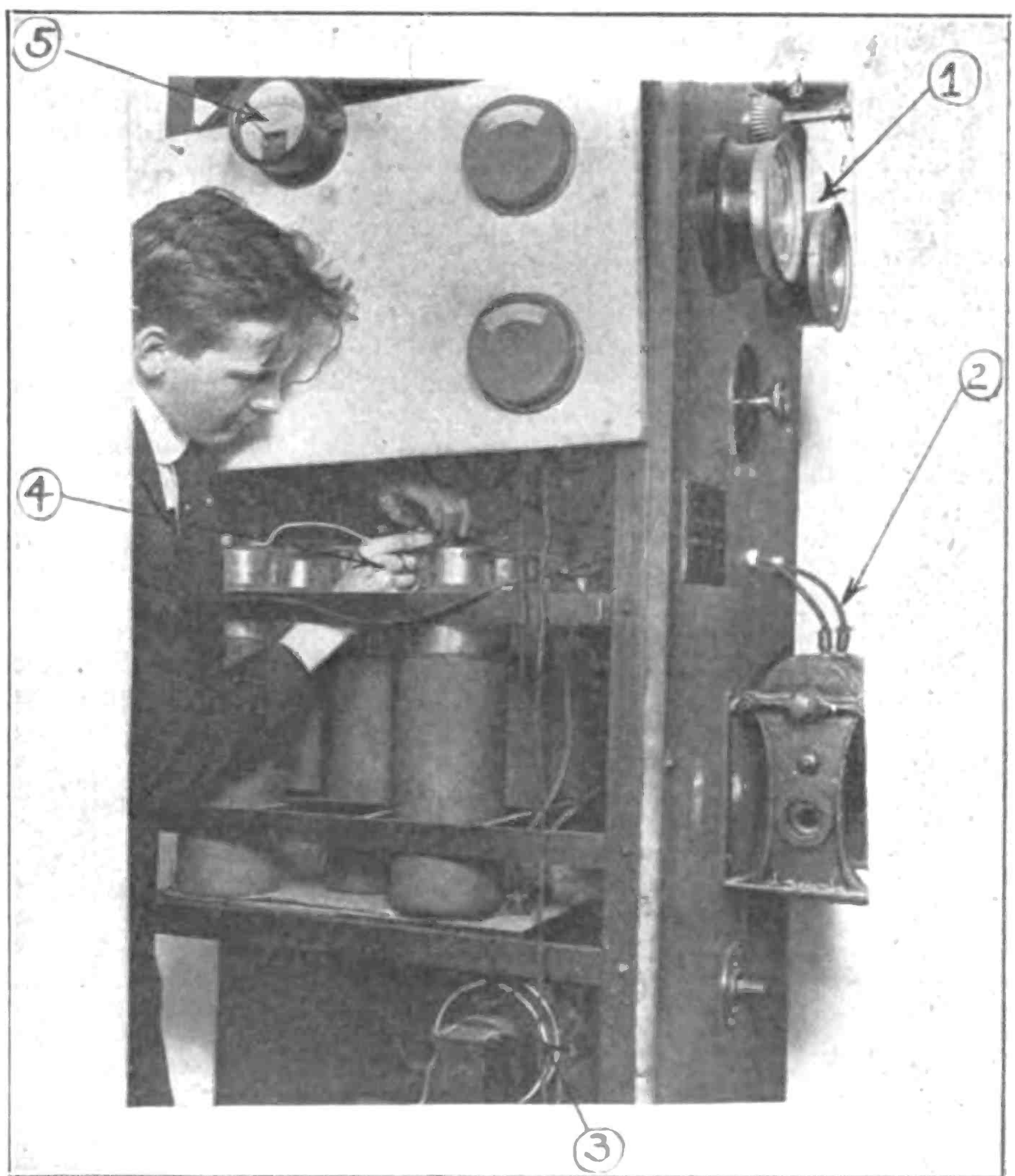
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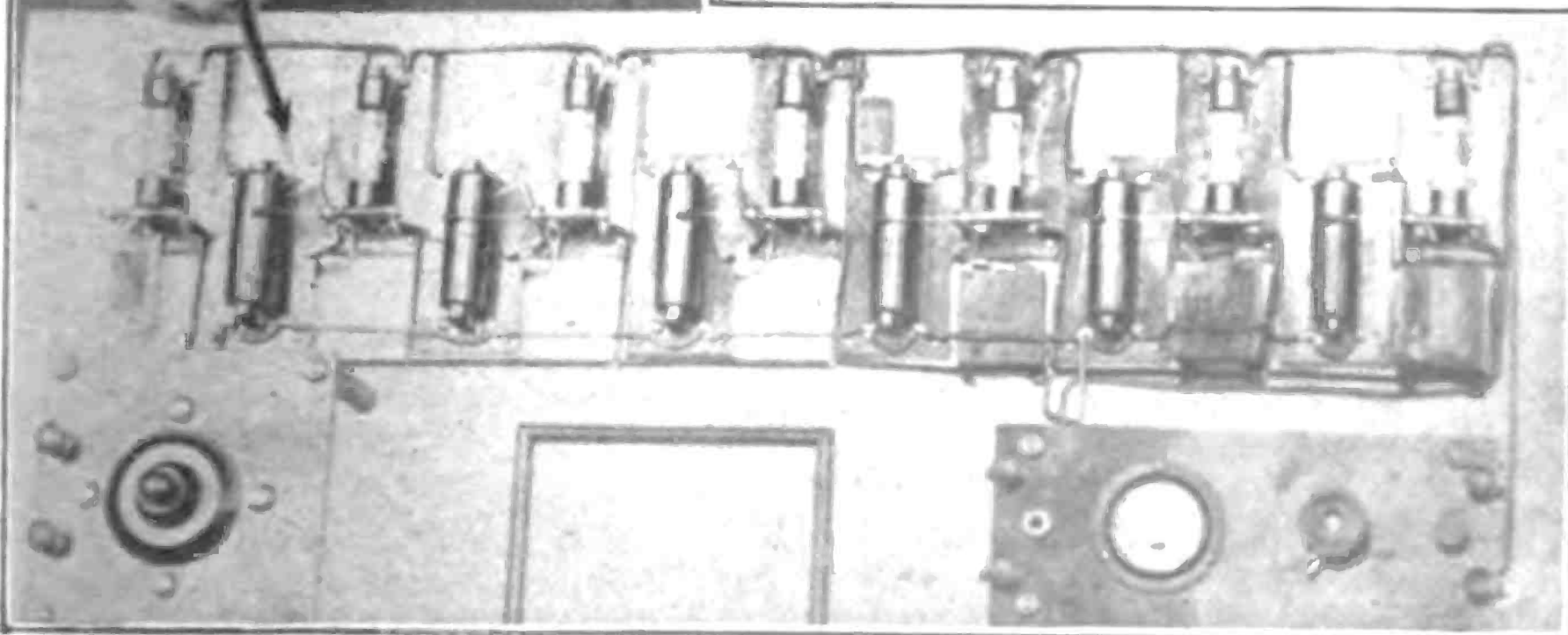
Radio Devices You Should Understand

THE lower picture shows Elman B. Myers, inventor of the Myers vacuum tube, photographed with his new radio-receiver. Mr. Myers is using the well-known circuit of radio frequency—three stages of radio frequency before the detector tube with which to amplify weak signals. When weak signals are amplified after having surged their way through the three amplifying tubes, they are then sent through the detector tube for rectification. The detector tube rectifies the radio frequency to audio frequency, making it possible for the signal to be heard in the telephones. After the detector tube, Mr. Myers employs three more



(C. Kadel & Herbert)

Spark transmitter and leyden-jar condenser



(C. International News Reel)

Elman B. Myers with apparatus for three stages of radio- and audio-frequency.

stages of audio amplifiers. With 3 radio-frequency amplifiers, 1 detector, and 3 audio-frequency amplifiers, Mr. Myers should hear everything.

The radio transmitter shown in the (upper) larger photograph is one of the old-type sets that made its appearance about six years ago. The explanation of the numbers is as follows: 1, The pair of meters for registering the motor-generator. 2, The quenched-spark gap. 3, The power transformer. 4, The leyden jars, better known as the condensers. 5, The hot-wire ammeter.

The Counterpoise

Its Advantage as a Complete Reducing Agent in the Resistance of the Antenna Fully Explained

By *Frederick J. Rumford, E.E., R.E.*,

THE counterpoise is a sadly neglected hook-up. Few radioists have experimented with the counterpoise since Sir Oliver Lodge, as far back as 1890 made a number of experiments.

The advantage of the counterpoise for the receiving station is a general complete reduction of the resistance of the antenna, or aerial, which with this reduction would result in a decided decrease or lowering of the decrement of the circuit, or circuits, in use and would increase greatly the circuit, or circuits, selectivity which would also increase the intensity four-fold or more.

The writer in one particular instance of experimenting found that with one of his many experimental antennas and counterpoises he had decreased the resistance of the circuit from about 50 ohms down to about 8 ohms when he had used the counterpoise instead of the usual water-pipe ground connection. Radio fans who live where the earth is very dry should try one of the counterpoise connections illustrated in the four figures accompanying this

article; for the earth being dry, it functions very poorly as a ground conductor of radio waves.

Figure 1 represents the antenna and the counterpoise as erected—when the antenna is on the roof—on the usual masts or poles. Should the antenna be mounted on poles about 12 feet from the roof top with the counterpoise exactly 6 feet below it, the method of mounting is as follows: The antenna should be either 1 or 2 wires—No. 14 bare copper or any other good aerial wire—from 60 to 100 or 150 feet long, spaced about 3 feet apart. That is, if 2 wires are used with the usual insulators at each end, the counterpoise should be 6 feet under the antenna. If possible, it should be several feet longer than the aerial and spaced about 4 feet apart, if 2 wires are used. The method explained above is for the fan who hasn't the space to erect his aerial on mast from the ground up; who, by necessity, must have his antenna on the roof.

Figure 2 shows another method of making an efficient antenna counter-

poise. This method is for the fan who has plenty of room to erect his antenna on masts implanted in the ground. This counterpoise may be of either 1 or 2 strands of No. 14 bare copper or any other good aerial wire. It should be at least 30 feet high from the ground's surface and either 60, or 100, or 150 feet long. If 2 wires are used, they should be spaced from 2 to 3 feet apart and the counterpoise should be mounted about 6 feet from the ground. If possible, it should be several feet longer than the antenna. At the double end, these wires should be spaced at least 5 feet apart. This type counterpoise is known as the V anti-ground conductor. If this type is chosen, the writer feels certain that the prospective builder will have no reason to be disappointed.

Figure 3 shows another view of the antenna counterpoise which may be erected where one end of the antenna and the counterpoise may be connected to the attic or the weather-head of the house by means of suitable insulators, and a pole of 30 or 40 feet high and 60, or 100, or 150 feet from the house. The antenna in this particular instance, was 1 No. 14 bare copper, or any other efficient aerial wire, with its respective insulators. At either end, the counterpoise is of 2 wires spaced about 3 feet apart and, if possible, several feet long. The antenna should be erected about 7 feet from the ground so as to not interfere with anything passing beneath it. It is insulated at either end with the usual insulators. This hook-up has proved

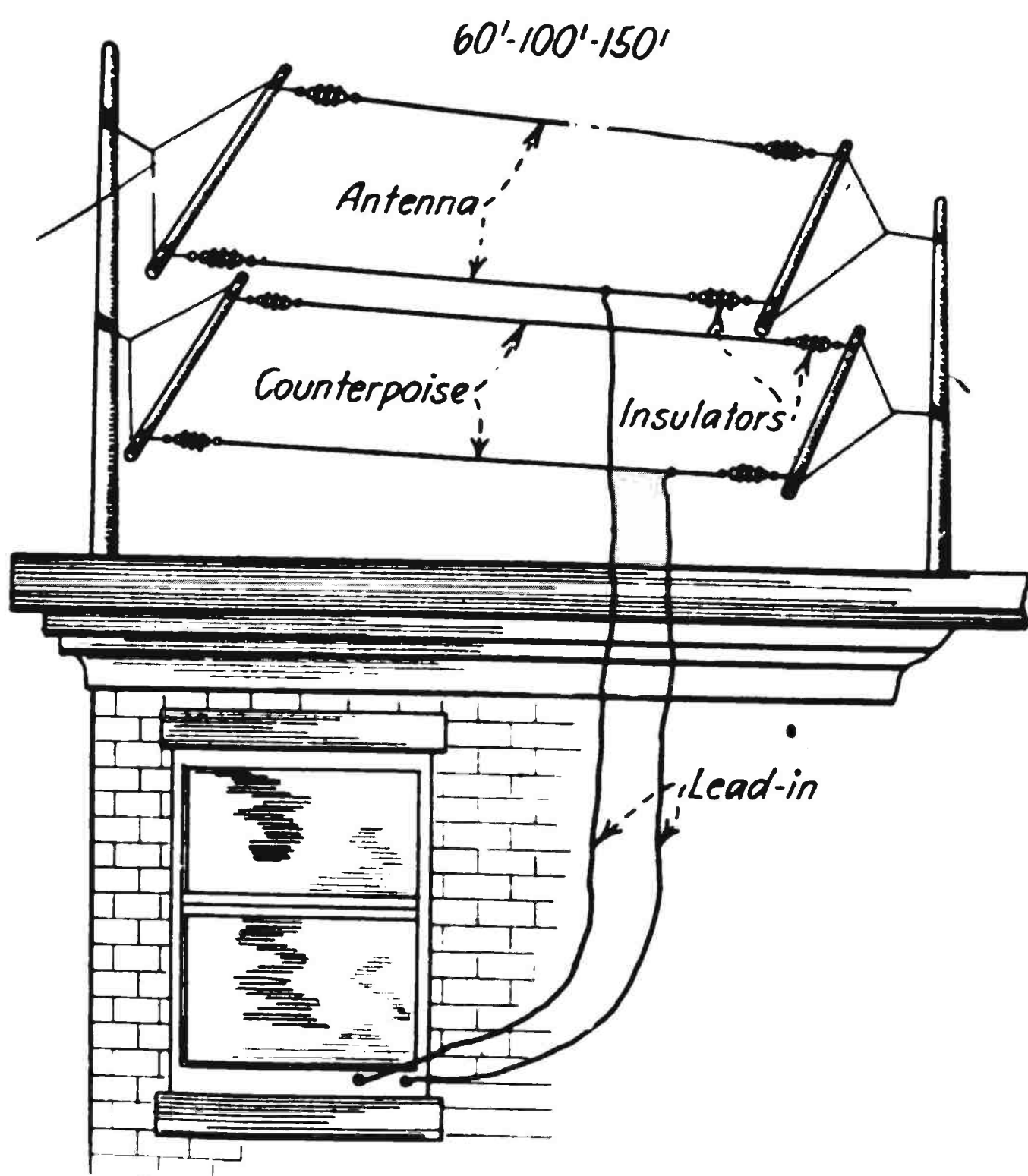


Figure 1—Antenna and counterpoise as erected when the antenna is on the roof. Suggested by Frederick J. Rumford. Drawn by S. Newman.

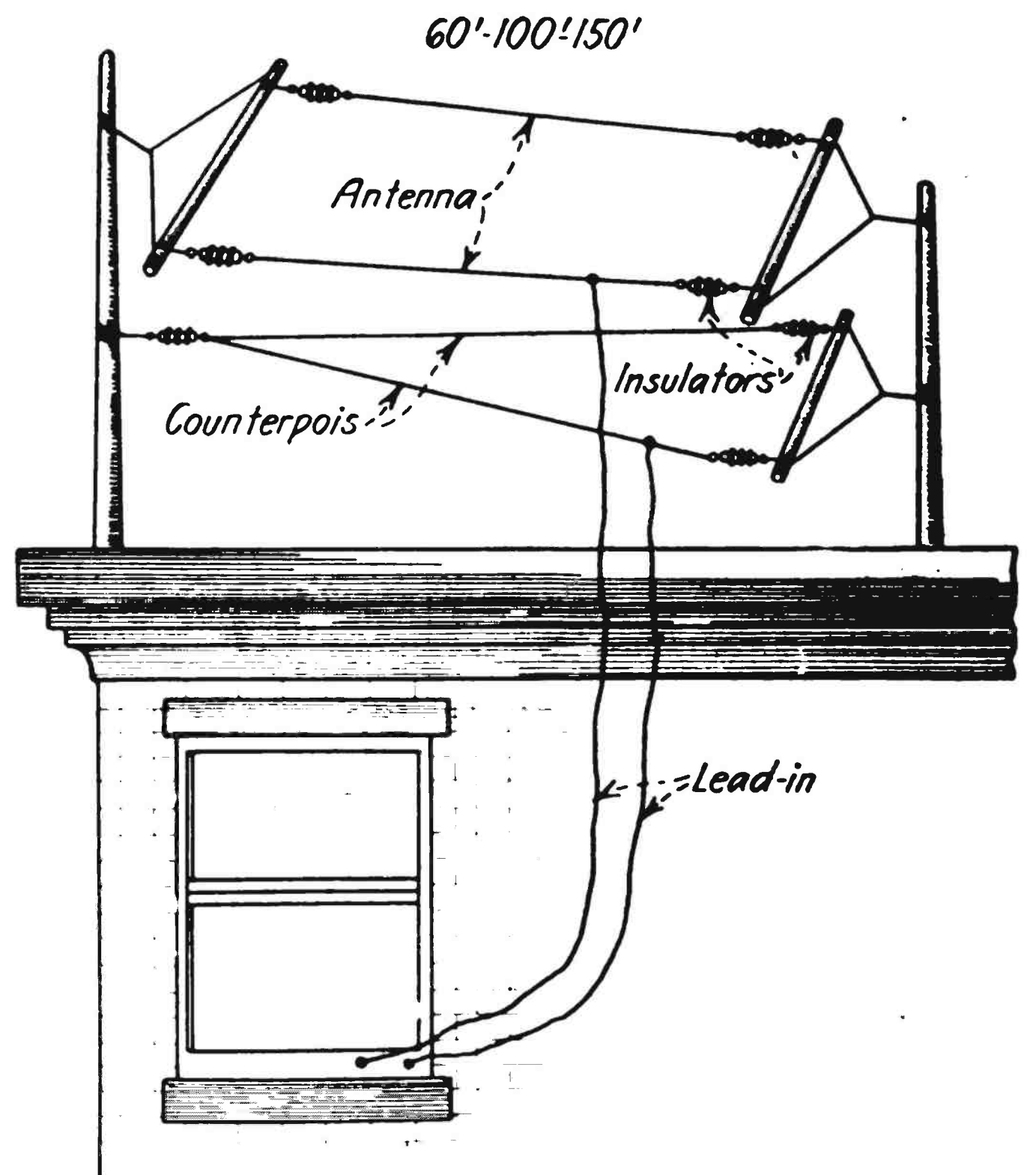


Figure 2—Another method of erecting an efficient antenna counterpoise. This method is for the fan who has plenty of room. Suggested by Frederick J. Rumford. Drawn by S. Newman.

Radio Don'ts

- D**ON'T hook-up a pair of poor phones with a good receiver.
- Don't drop the ear pieces on the floor. Keep the magnetism intact.
- Don't take the covers or caps off just to see the inside. Leave well enough alone.
- Don't add a loud-speaker to any type of crystal receiver.
- Don't expect an amplifying horn to produce the same results as a loud-speaker.
- Don't connect the house lighting-current to your tubes.
- Don't forget that rheostats are used to light the filaments.
- Don't apply too much current to the filament.
- Don't use plate batteries to light the filament.
- Don't expect too much from a crystal receiver.
- Don't touch the mineral in the detector with your fingers.
- Don't use lead or solder in mounting the mineral.
- Don't be afraid to occasionally clean the crystal with alcohol.
- Don't forget that a fixed adjustment on a mineral detector will not hold its sensitivity permanently.
- Don't leave your tickler coil at maximum with your tube oscillating and generating radio-waves.
- Don't insert condensers in series with the ground and expect to increase your wave length.

Changing Inductance and Capacity

By Fred. Chas. Ehlert

THERE are various methods of changing inductance in a circuit. A straight wire has very little inductance. Make a coil of the same wire and the inductance is considerably increased. The coil may be made either by winding it smoothly over a form, such as a broomstick, or by winding it spirally in the same place. Electrician's tape may be purchased in a roll. The inductance of a coil is changed by changing the number of turns of the coil in the circuit.

done by having both sets of plates that make up the condenser movable in respect to each other. When every part of the plates in one set is opposite the plates in the other, the capacity is the greatest. Capacity is made smaller by having only a part of each plate in one set opposite the plates in the other.

There are, also, various methods of changing the capacity in a circuit. A second method is by changing the capacity of a single condenser. This is

The inductance and capacity needed in an oscillating circuit is contained in the antenna of a radio transmitter. The antenna of radio set is that part of the set which radiates the energy by setting up the waves in the ether as explained. The wires making up the antenna give both the capacity and inductance.

(Continued from preceding page) very practical, but it is mostly for the fan who has the space to span his wires any number of feet from the house.

Figure 4 is the antenna counterpoise the writer experimented with and which he found efficient, reliable, and practical. This antenna counterpoise is intended for fans who have any amount of space at hand in order to erect it complete. The instructions:

Erect 2 masts, or poles, of some seasoned wood; or, better still, erect 2 steel towers. These should be from 30 to 60 feet high and spaced 60, or 100,

or 150 feet apart, to suit the convenience of the prospective builder. One wire, either No. 14 bare copper or any other efficient aerial wire, should be stretched from mast to mast with suitable insulators at either end. The counterpoise is then erected about 7 or 8 feet from the surface of the ground. It should be several feet longer, if possible, than the antenna and should have suitable insulators at either end for perfect insulation. It must be placed sufficiently high from the ground so as not to interfere with anything passing under it.

erecting of any of the above antennas or counterpoises.

They must be thoroughly insulated from the ground.

The lead-ins must be thoroughly insulated from the ground.

The counterpoise lead-in connected with the ground is usually connected up on the receiving set.

The writer feels certain that the builder will not meet any great difficulty in erecting one of the counterpoises described, but if he does, I will answer gladly any questions that he may ask, if accompanied by a self-addressed, stamped envelope.

The following are necessary in the

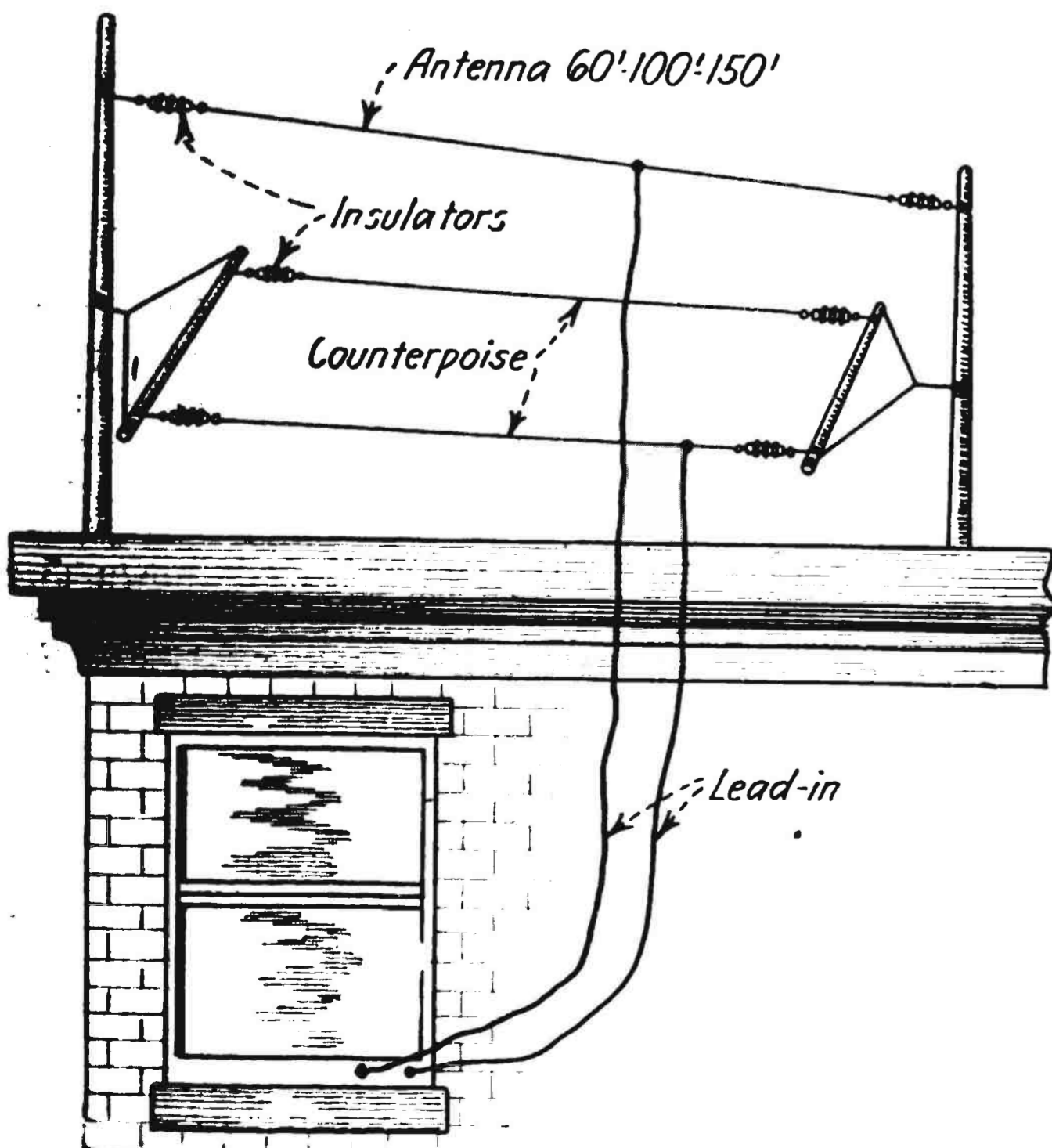


Figure 3—The antenna counterpoise so erected that one end of the antenna and the counterpoise may be connected to the attic of the weather-head of the house by means of suitable insulators. Suggested by Frederick J. Rumford. Drawn by S. Newman.

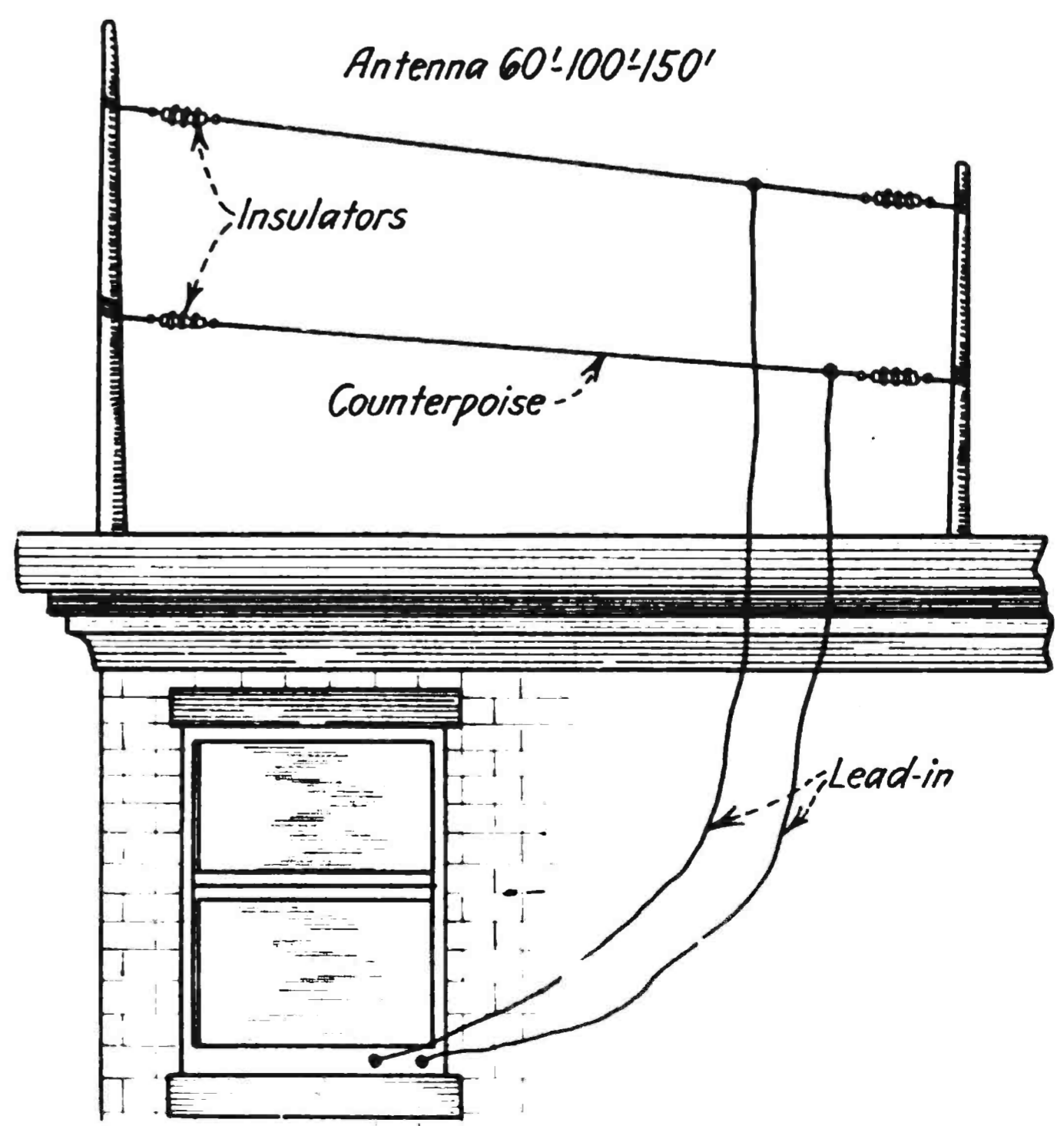
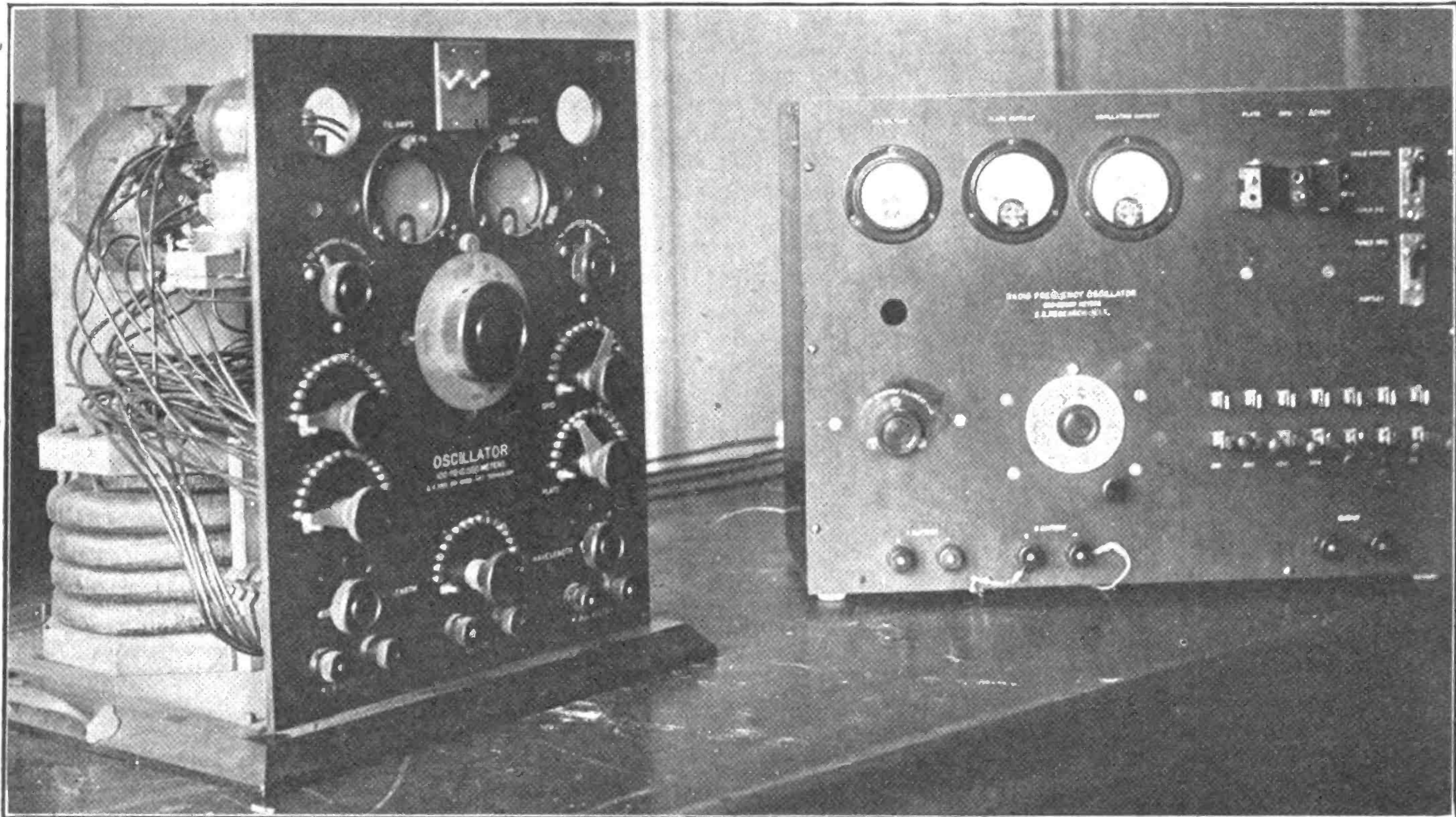


Figure 4—An antenna counterpoise that was found efficient, reliable and practical. It is for fans who have plenty of space in which to operate. Suggested by Frederick J. Rumford. Drawn by S. Newman.

The Importance of Understanding and Testing Radio Apparatus

By C. White, Consulting Engineer



Radio testing apparatus used by Mr. C. White in the tests described in this article.

THE general practice of scientific-laboratory testing and research has been neglected in the radio field. While it is quite true that certain manufacturers have taken special interest in the practical trying-out and testing-station work conducted by various scientific and semi-scientific journals, still there are comparatively few who have actually put themselves to the additional trouble and expense to have a definite line of scientific experimenting on their apparatus. Although an actual try-out will bring to light many of the serious inherent troubles in a radio receiver, yet, owing to the uncertainty of varying atmospheric conditions, it is utterly impossible to determine the absolute or definite relative value accurately by such methods.

We are about to enter upon the second year of our unusual radiophone popularity, and it would do well for many of us to think over the problems that must be solved if the wireless science is going to progress. And the most important problem we are facing for solution is the development of more supersensitive receivers. From developments and inventions brought forth during the past year we do know that, by means of more sensitive receiving apparatus, we could be able

to receive from stations (radiophone) at least 5,000 miles or more distant. At present such a feat—if, indeed, it could be fully realized—would be considered a miracle.

Research is more than testing for defects in goods already manufactured; it is the searching out of new and fertile fields for development on the border line of the unknown. For the past year I have been trying out—by means of definite and well-founded scientific principles—the comparative values of the different amateur receiving sets on the market. To receive from a certain station is not a very good test for a receiver because, perhaps, reception was due to some freak atmospheric condition, under which even an ordinary crystal set is said to produce marvels. Not even the repeated reception from a certain distant station can be taken as a good basis of judgment, for the quality of the received signal will largely depend on the amount of power received and the modulation of the transmitter, all of which is quite variable from day to day. So, in conducting this work, it was very necessary to construct within the narrow confines of our laboratory a small sending-station which we could absolutely regulate and control to give us various amounts of power.

In other words, we tested out the various receivers on what might be called a phantom signal, and by carefully arranging and shielding the various pieces of apparatus used we could quite effectively try out our theories and delve into the troubles in present receivers and at the same time compare them with newly developed circuits of our own.

In Figure 1 is illustrated two types of oscillators used in our receiving experiments. The one shown on the right used honeycomb coils for tuning inductances, while the apparatus on the left makes use of ordinary inductance coils so wound as to cut down to a minimum point distributed capacity. The former is a better oscillator for short waves, especially since it is wired up for two types of oscillating circuits, thereby allowing close and quick check operations by means of two tumbler switches. We obtain an artificial modulation by placing the secondary of a small modulating transformer (audio-transformer) in series with the plate potential supply (the B battery). The primary of this transformer is fed from a small 780-cycle alternator. So, theoretically, all we do is to impose a 780-cycle audible note on the high radio-frequency carrier wave. The output terminals of our oscillator are

Do Not Force Power Tubes

By Peter Gray

IT is unwise to overload or force a radio-tron power-tube, as its operating life will be menaced. It is a better plan and more economical to operate two tubes in parallel than it is to force one tube to deliver a power output far in excess of its rating. Economy will result from burning tubes slightly below normal brightness—to double the filament emission will reduce the operating life of the tube one-half. Burning the tube at 95 per cent of its normal brightness will multiply its life fourfold.

When first testing the circuit, or when the set has not been operated for some time, cut down all voltages to one-third of the normal voltage. This will greatly reduce the possibility of burning out the tube through a wrong connection which has been overlooked. The fault will then instantly be detected before the damage is done.

In a radiotelephone transmitting circuit a modulator tube is employed and a buzzer substituted frequently for the microphone to send out interrupted continuous waves. This imposes voltage strains on the oscillator tube.

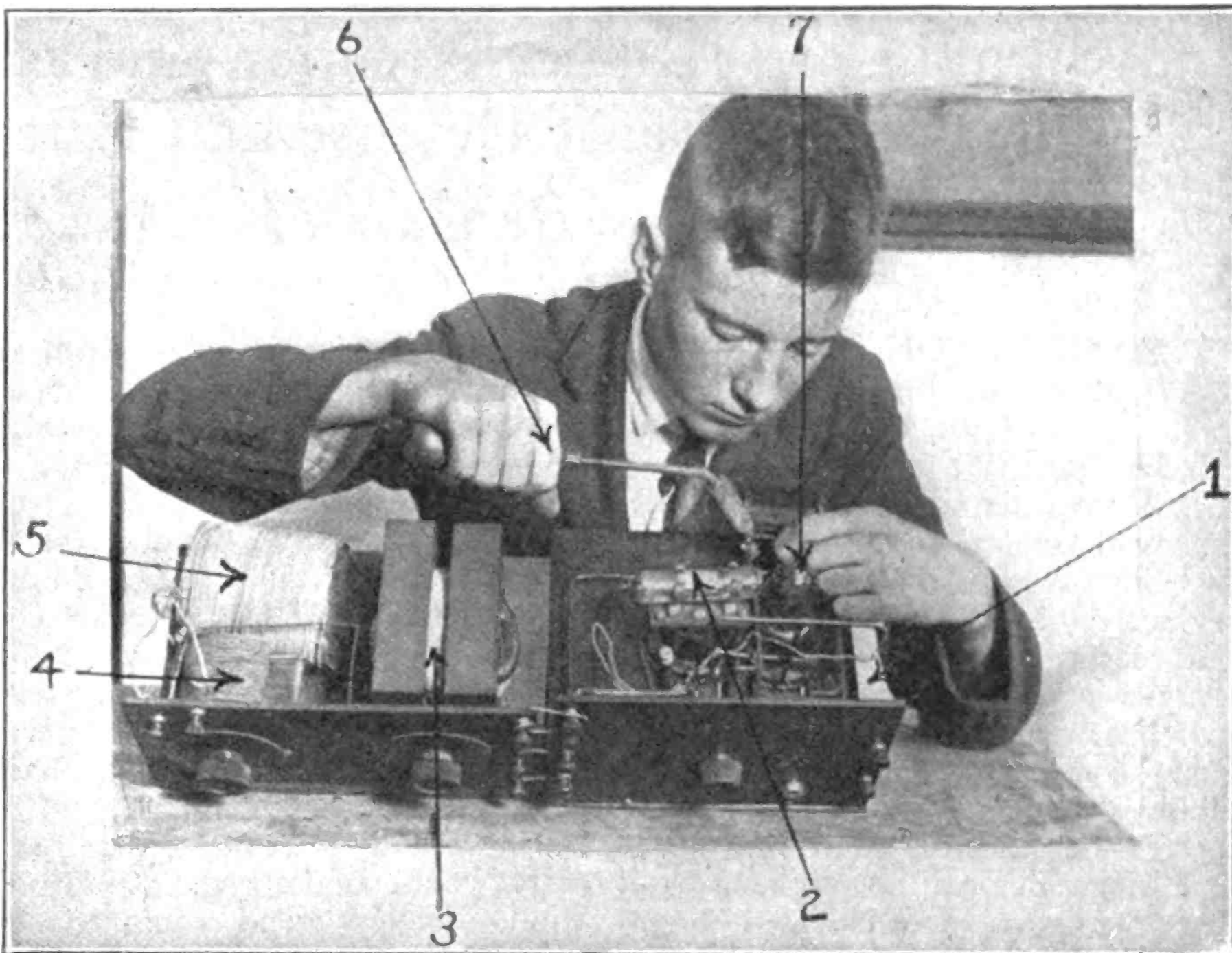
Important Insulation Necessary

IN powerful C-W transmitting sets, the circuits should be so arranged that the center tap on the filament coil and, also, the negative lead of the direct-current high-voltage source are both at ground potential relative to high-frequency potentials in order to insure safety. Great care should be taken to thoroughly insulate the grid and plate leads to the tube and the coil sections connected to these leads or to any apparatus in them.

(Continued from preceding page) fed through a mutual inductance coupling, which is nothing more than a specially constructed vario-coupler, to the antennae and ground terminals of the receiving set to be tested. By this method we not only control the frequency of the modulating circuit, but we can carefully control the relative amplitude of both the audio-wave and the radio-frequency carrier wave. Therefore it is quite easy for us to actually assimilate a nearby, or distant, station by so doing. The brief outline of this method clearly shows the theory behind the operations, but there are many practical points and considerations that must be fully taken into account before a good and authoritative comparison may be materialized.

First, we must carefully intershield all of the component apparatus we are employing in the test hook-up. This does not only include a complete shielding of the generators, radio-frequency oscillators and audio-frequency alternators, but all the parts of the oscillator. In addition to this we must place the audio-frequency set in another room to get rid of its noise, and we must carry out the tuning and audibility test on the receiver in a specially screened-off corner of the laboratory.

He Built This Set for \$21



(C. Kadel & Herbert)

The above is a photograph of Charles Murphy, radio student at Fordham University, New York, completing a regenerative receiver with one stage of amplification, which cost him \$21. With this set Mr. Murphy can hear the distant stations. By means of the Armstrong circuit which is produced by the aid of the variometer in the plate circuit feeding back the energy into the grid circuit, and a condenser, he is able to eliminate the taps on the coupler of this receiver. For a detector tube, he is using an old audiotron-tube and a V-T No. 1 as an amplifier. 1 is the amplifier case containing the detector tube and the amplifier. 2 is the detector tube. 3 is the variometer in the plate circuit. 4 is the variable condenser. 5 is the coupler, with its peculiar winding. 6 shows the method of soldering a connection in the amplifier. 7 is the amplifier tube or the V-T1. These comprise the complete receiver.

After all apparatus for generating the phantom signals are adjusted and set in operation the tester must crawl into his screened-off cage with the set that is under consideration. Generally a well-planned selectivity test is carried out to determine the relative amount of selectivity by means of slightly changing the wave-length impressed. Next, the audibility of the volume received is measured by means of an instrument known as the audibility meter; then comes the distortion test. This test is accomplished by photographing the wave-form of the audio-frequency wave as generated by the high-frequency alternator and then photographing the wave-form as received by the phones. The actual photographing of this wave is done by the aid of an oscillograph—an instrument that traces with light the wave shape of an alternating electrical-impulse. It has been proved by practice and experience that a good set, or circuit, may be readily picked out. Not only has it been able to measure volume and sensitivity, but it has been possible to incorporate many important design changes while the set was on test without the long and tiresome method of sitting up for half-a-dozen nights to get a good average of its new performance. Although this method of

testing is by no means fool-proof in operation, manufacturers who lack facilities for such work avail themselves of such service, for it is well understood that many improvements can be made on the best outfits

While I have only outlined the phantom reception test, there are many more tests—resistance, inductance, capacity, and leakage tests—that lack the complexity of the one previously outlined, yet they are quite essential and important. If we intend to perfect radio for the home, just as the kodak has been simplified and perfected, we must carry on more aggressive research. It is not enough to hitch a set up to an aerial and turn the dial until a sound is heard. We must do more. We must investigate relatively the volume and the tone quality of the same. We must try out different types of arrangements and see if the general quality can be improved. The modern radio amateur is quite willing to accept the better grade of goods, and it will not be long before he not only will request a better scientific instrument for his home, but he will demand it. Since we are facing National Radio Week let us all—manufacturers and amateurs—turn to the right and realize the possibilities of radio for home and business.

Radio Takes on More Wartime Duties

Signal Corps Radio Direction and Range Finders Will Aid in Coast Defense and Extend Distances

By Carl H. Butman

(Copyright, 1922)

WASHINGTON, D. C.—The ranges of the shore-defense guns of the United States in all probability will be extended twenty-five miles farther to sea by virtue of a newly developed radio range-finder now being tested on the Atlantic Coast. Previously the maximum range of the great coastal guns was approximately twenty-five miles when visibility was good, but with the perfection of the signal corps radio devices poor visibility is not a handicap, and it is expected that a maximum range of about fifty miles can be reached, provided the guns are elevated high enough to be fired that far. Enemy ships will have to stand farther out at sea to be safe; at least, the fleets will be prevented from anchoring or disembarking troops within fifty miles of our shores in wartime.

Employs Radio, Aviation and Plotting

Three factors make up the essential principles of the new long-range fire control—radio, aviation, and plotting. For the first time in history the post-war developed radio-compass will be employed for a purpose other than to locate stations or give ships their bearings. The use of an airplane equipped with radio for spotting the fall of projectiles is not new, but the unique feature today is the fact that the airplane itself will be out of sight over the target or ship. Without awaiting the fall of sighting shots the observer will send a series of radio signals which

will make it possible on shore to plot the successive positions of the ship and determine its course and speed.

One of the problems of the joint coast artillery and air service maneuvers, now under way off the Virginia Capes, was a test of the new radio fire control devices and a comparison with the old method. A boat visible from the shore will run various courses in an area several miles wide, stretching seaward from Cape Charles and Cape Henry, the master of the vessel keeping an accurate time record of his course and speed. An airplane from Langley Field equipped with radio-sending apparatus will fly out, locate the ship, and remain over it as much as possible by executing the figure 8 in the air. Flying at a height of several thousand feet, calculated to be safe from anti-aircraft fire, this observation plane will send special signals to the shore only when it is exactly over the vessel, continuing to do so until ordered in by the shore stations.

Radio Direction Stations Ashore Get Signals

On shore two radio-compass stations, several miles apart, have been set up and direct lines of communication laid to the batteries. Operating just as when a ship's bearing is furnished these two stations will pick up the signals sent by the observing plane when it is over the target ship. In other words, they will turn their com-

pass coils until the radio signal is received with equal strength in both receivers, then the direction, or angle, from the stations will be read and plotted. With the angles at each station read simultaneously, and the distance apart known accurately, it is a simple problem in trigonometry to locate the position of a ship and its distance from the battery. It is even simpler to plot the location of the ship on a map by laying down the angles from the two stations, extending the lines and noting their intersection. Within a few seconds a second signal comes in, then another; all of which, when carefully plotted and timed, give the course of the moving target and its speed.

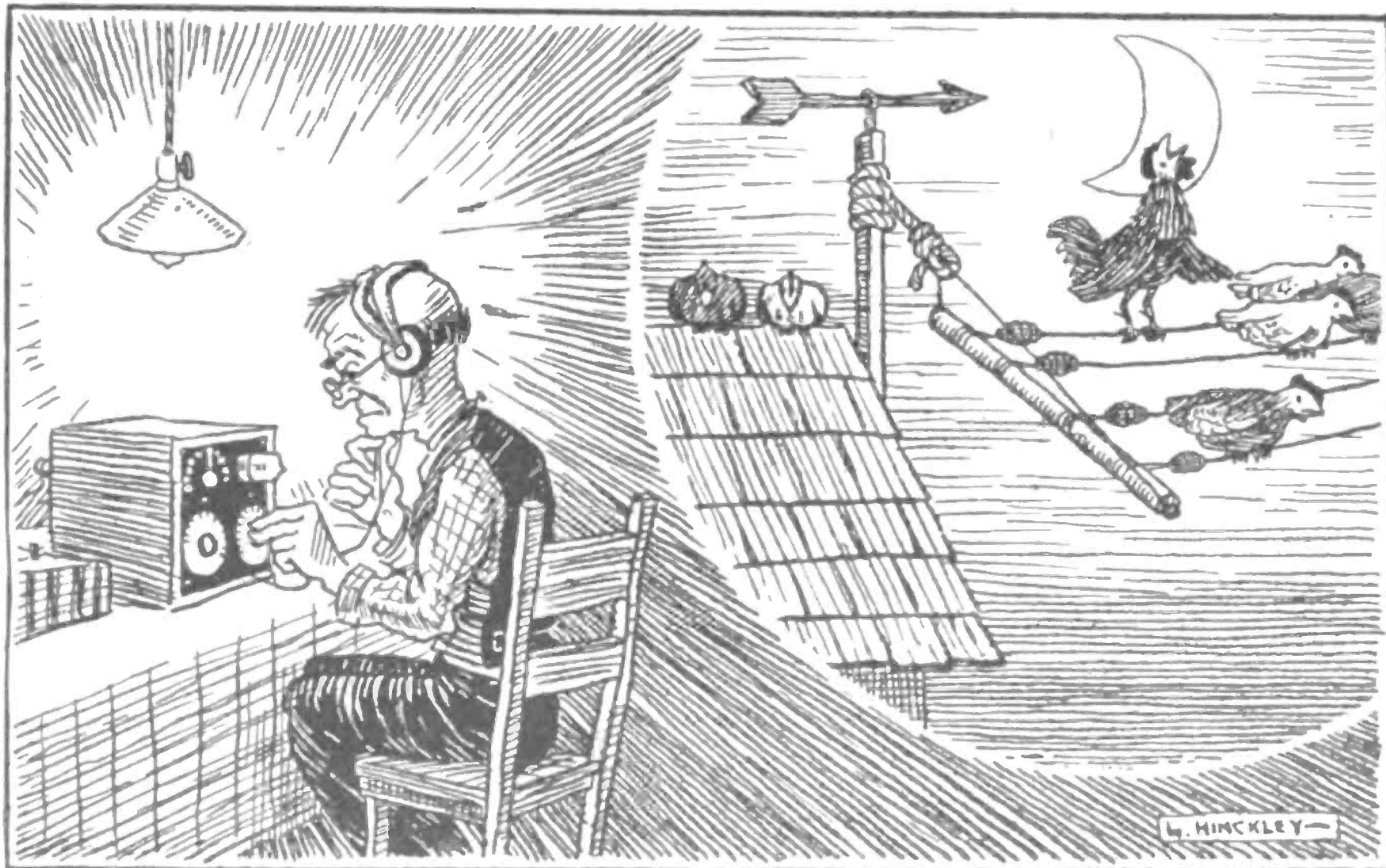
Firing at Unseen Targets Miles Away

Firing may or may not be undertaken in the initial test. This does not matter, as it is solely a problem of ordnance and ballistics after the ship's course is plotted. The artillery men do the rest, although they see nothing of their target many miles at sea. The most important feature of the scheme is its adaptability to night operations and in thick or foggy weather. Conditions do not matter so long as the observing plane can find the ship and fly over it. The distance from shore does not matter; but the range may be increased over the old range, limited by visibility from the observing towers, planes, or balloons ashore, by many miles beyond the horizon.

A comparative test made by another plane flying nearer shore will also be made; but as the data this observer can give will be only in the form of estimates as to the bearing, or azimuth, of the vessel, and its distance from Fort Munroe, it is not thought this old method can furnish the plotters with sufficient accurate information to compare with the more exact radio direction finding system.

Coöperating with the board of coast artillery and air service officers conducting the test, Captain G. W. Morris, of the Signal Corps, is in charge of all radio operations during the first tests of the army's new radio direction finder now applied to gunfire.

Among other experiments to be conducted during the week will be tests to determine the extent of interference to radiotelephone and telegraph messages caused by neighboring radio communications in operation.



(Cartoon by Lawrence B. Hinckley)

RADIO ON THE FARM HAS ITS DRAWBACKS

Dill: "I wonder what kin be wrong with this contraption! Just about this time every night it seems to pick up some very familiar noises."

Operating a Three-Unit Honeycomb Regenerative Receiver

By John Kent

A TYPE of tuning apparatus, operating under the inductance principle, is the honeycomb-coil unit. These coils are single units and are used in conjunction with the adjustable mountings, the coils with the mounting making up the tuning unit. Similar mountings are made for the two-coil unit.

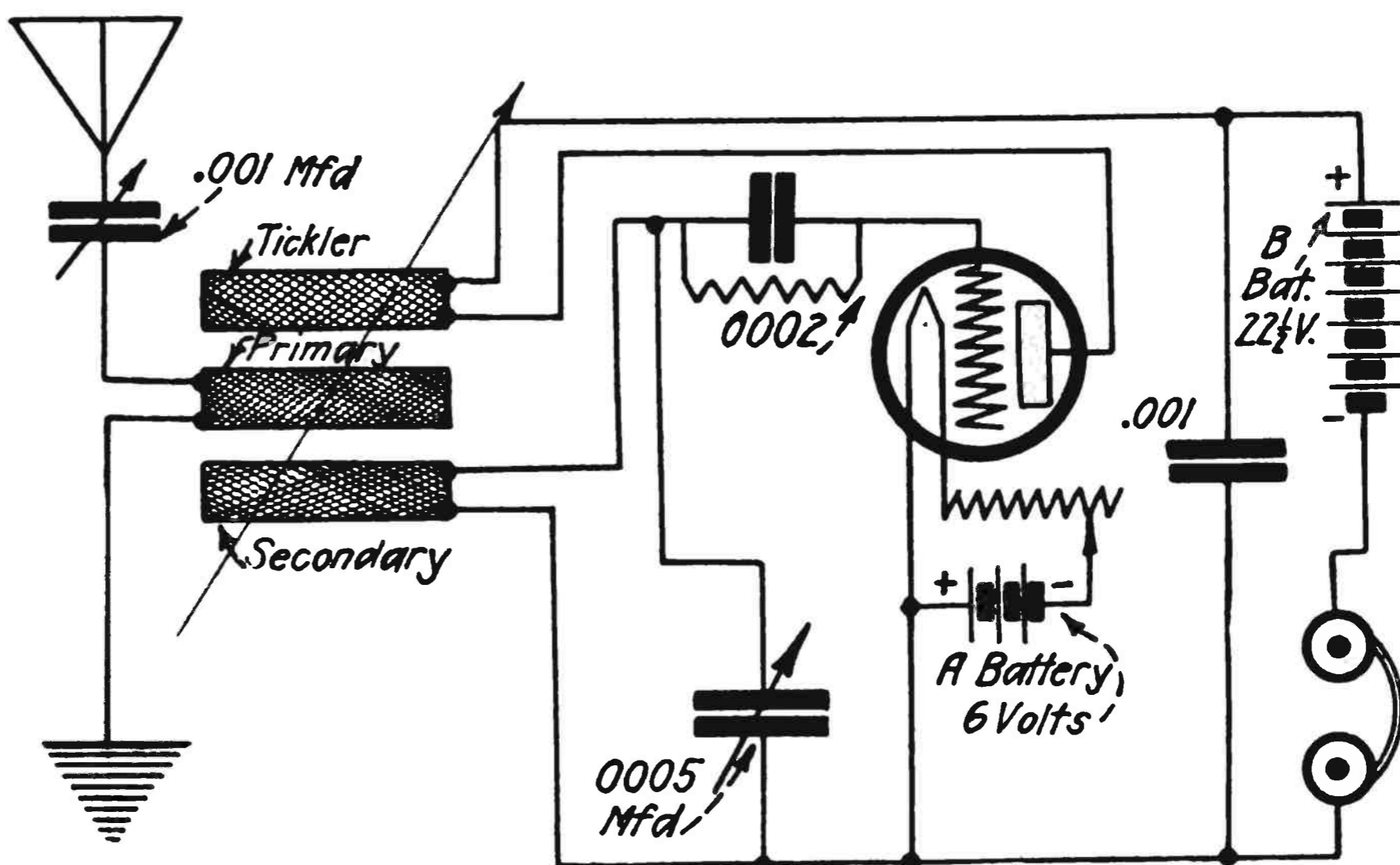
When the honeycomb-coil mounting is used, the same advantage is taken of electrical phenomena as in the case of the vario-coupler and the loose-coupler, that is, oscillatory current flowing through the honeycomb coil, which acts as a primary, creates magnetic lines of force. When flowing through the secondary coil, the lines of force induce a current. As the angle is changed between the two coils, the magnetic lines of force affecting the secondary is varied. Therefore, the angle, or adjustment, of the secondary controls the magnetic lines of force.

Instead of tapping the coils, a number of honeycomb coils must be on hand to be inserted—as the length of the broadcast wave requires. A three-coil schematic diagram is shown herewith, in which the third coil is used in the plate circuit to produce amplification. A table published in RADIO WORLD, No. 32, dated November 4, showing the different coils needed to receive from the various wave lengths.

To operate the set, light the filament of the tube to as near brilliancy as possible, the tickler coil being set at zero. Increase the brilliancy of the tube until the hissing sound is heard in the ear pieces. When this is heard, decrease sufficiently to stop the hissing. Set the coupling at maximum and the primary and tickler at its lowest value. Then, very slowly, vary the secondary coupling from zero to maximum.

If no signals are heard during this operation, change the primary setting five or ten degrees and vary the secondary through its range. Do this until signals are heard. If they are not heard, increase the tickler setting and repeat. When the signal has been heard, adjust the controls for best results, remembering that, in order to obtain selectivity or freedom from interference, the coupling must be decreased considerably to zero. This should be done gradually in order not to lose the signal.

The tickler coil may be increased to best position, but not so far as to oscillate, as oscillation spoils the signals.



Schematic diagram showing how a third coil is used in the plate circuit to produce amplification.

Oscillation becomes a small generator of high-frequency currents. In turn, this current acts as a transmitter causing current to be sent out similar to that of a sending station. Whenever hissing sounds, varying in pitch, are heard, it is a certain sign that some re-

ceiving station nearby is radiating waves because its tickler coil is turned up too far.

When attempting this hook-up, be careful to watch each connection in order to be certain that the right polarities are made.

Radio Laws and Regulations of the United States

THE owner of an amateur radio-transmitting station must obtain a station license before it can be operated if the signals radiated therefrom can be heard in another State; and, also, if such a station is of sufficient power as to cause interference with neighboring licensed stations in the receipt of signals from transmitting stations outside the State. These regulations cover the operation of radio telephone stations as well as radio telegraph stations.

Station licenses can be issued only to citizens of the United States, its territories, and dependencies.

Transmitting stations must be operated under the supervision of a person holding an Operator's License. The party in whose name the station is licensed is responsible for its activities.

Government licenses granted for amateur stations are divided into three classes as follows:

SPECIAL AMATEUR STATIONS known as the "Z" class of stations are usually permitted to transmit on wave lengths up to approximately 375 meters.

GENERAL AMATEUR STATIONS which are permitted to use a power input of 1 kilowatt and which cannot use a wave length in excess of 200 meters.

RESTRICTED AMATEUR STATIONS are those located within five nautical miles of Naval radio stations, and are restricted to 1/2 kilowatt input. These stations also cannot transmit on wave lengths in excess of 200 meters.

EXPERIMENTAL STATIONS, known as the "X" class, and school and university radio stations, known as the "Y" class, are usually allowed greater power and also allowed the use of longer wave lengths at the discretion of the Department of Commerce.

All stations are required to use the minimum amount of power necessary to carry on successful communication. This means that while an amateur station is permitted to use, when the circumstances require, an input of 1 kilowatt, this input should be reduced or other means provided for lowering the antenna energy when communicating with nearby stations, in which case full power is not required.

Prevent Tube Accidents

THE principles of construction and operation in the larger power-tubes are no different from those applying to the smaller ones. Many effects negligible in the smaller

tubes are magnified in the larger tubes, and certain precautions are necessary. Accidents to power tubes and their auxiliary apparatus occur during the period of development of circuits, testing, and adjustment rather than during operation.

The Radio Primer

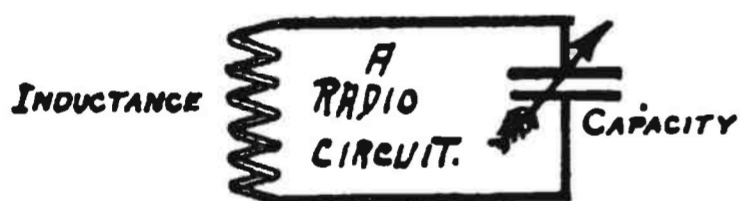
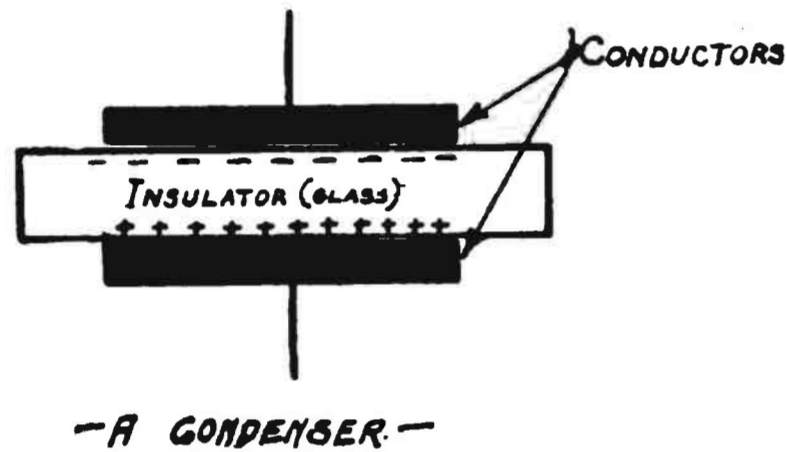
*For Thousands of Beginners Who
Are Coming into Radio Circles*

Weekly A B C of Radio Facts and Principles Fully and Tersely Explained

By Lynn Brooks

WHAT is capacity?

The condition of the earth is constant. This is because it has a limitless capacity. Capacity is an important factor in electrical work, and it is necessary that we have a thorough understanding of what it is. In order to thoroughly understand capacity let us take two metal balls, one twice as large as the other. Put twice as much electricity in the larger ball as in the smaller one. Now, if



Schematic diagram of a condenser and radio circuit. Note the insulator and the conductor with the negative and positive charges.

we connect the two balls by a wire there will be no change of electricity. There can be no difference of potential (voltage) between them, or there would be a transfer of electricity; that is, the two balls have the same potential and it will require twice as much electricity to bring the larger ball to this potential because the larger ball has twice as much capacity as the smaller ball.

* * *

What is the use of capacity?

Capacity is the ability of a body to hold an electric charge. If the body has a large capacity it will take a large amount of electricity to raise its voltage. If it has a small capacity it will take only a small amount of electricity to raise its voltage. Thus capacity deals with two things: First, quantity of electricity; second, voltage.

* * *

How is capacity measured?

Capacity is measured in farads. A body has a capacity of 1 farad if an ampere of current flowing into it for 1 second raises its potential 1 volt. This is such a large unit that it is divided into a million parts and each

one of these parts is called a microfarad.

* * *

How does capacity operate in a receiver?

Instruments that are built to give capacity are called condensers. Condensers are important in a receiving set. A beginner should fully understand capacity as tuning and other methods of employing receivers cannot be successfully accomplished without it.

* * *

How are the condensers made?

Condensers are made of plates or sheets of conducting material separated from each other by a non-conductor. Evidently the more and larger sheets used the greater capacity of the conductor. The closer together sheets are placed the greater the capacity, as the attraction of the opposite electricities is stronger at shorter distances. The capacity also depends on the kind of non-conductor used between the sheets, as the attraction of the opposite electricities is stronger through some kinds of non-conductors than through others.

* * *

What amount of electricity will a condenser hold?

The amount of electricity a condenser will hold depends not only on its capacity, but also on the voltage of the charging current, or charging instrument. There are various kinds of condensers made for various purposes. They are widely used. In using a condenser be careful not to apply a voltage greater than that for which it is built. If you do a spark will pass through the non-conductor between the plates and ruin the condenser.

* * *

What is a variable condenser used with?

A variable condenser is usually connected with an inductance—one of the elements that makes radio possible. The accompanying diagram gives the complete radio circuit of an inductance coil and a variable condenser. Capacity and inductance are the two main elements used in every radio transmitter and receiver. Without them it would be impossible to work.

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

Radio Hints

Useful Facts for the Beginner
Who Wants to Know

IN using the vacuum-tube receiver it often happens that the filament flickers or fails to light. In such a case it is a good principle to remove the tubes and clean the ends of the contacts. This is done by either a file or sandpaper. Sometimes the jacks are at fault. When this happens attention should be given the connections of the jack.

Before attempting to make changes on the jacks remove all plate-battery connections before making jack adjustments to prevent a short circuit, which may result in the burning out of the vacuum-tube filaments. Should both stages of amplification fail to produce, the trouble may be placed at the B batteries. Sometimes defective tubes cause a majority of other troubles. It is desirable to test the tubes in various combinations; that is, try them in each socket.

* * *

If you are interested in radio and want to receive broadcast concerts don't let lack of technical knowledge deter you. The most marked recent developments of radio have been in making available receiving sets which anybody can operate by following a few simple directions. Operating a complete receiving set, which can be installed in any home, is no more difficult than operating a phonograph.

* * *

The crystal is the very heart of a radio set. On it depends the entire operation. There are many minerals that may be used for the detector, but up to the present time galena is the best that can be obtained. Do not handle the mineral any more than is necessary, as a coating of oil forms on the surface of the mineral, making the signals weak. Sometimes it will cut down the sensitiveness of the crystal and make the detector inoperative.

* * *

When employing the detector-amplifier unit to a receiver it should be placed as close as possible to the receiver in order to avoid long connections. Always make certain that the battery leading from the storage battery and the B battery are connected to their proper terminals, and, also, that the polarities are not reversed.

* * *

A panel mounting does not allow one to experiment with his hook-up and to show his friends how the circuit actually works. But, to the contrary notwithstanding, a panel-mounted receiver is by far the most attractive in appearance and is often better scientifically if shielded from body effects.

Additional Committeemen Named for National Radio Week

IT has been a busy week at the headquarters of the Executive Committee of National Radio Week—December 23 to 30 inclusive—the offices of Major J. Andrew White, chairman, 326 Broadway, New York City.

Major White and his staff have been kept pretty well occupied answering the many telegrams and letters of inquiry that have begun to pour in from all parts of the country. The interest in this important radio event is increasing every day, and is spreading rapidly to all parts of the country.

William B. MacNeary, of "The Sunday Call," Newark, New Jersey, has accepted the position of chief of publicity.

Elmer E. Bucher, author of several important works on radio, and sales manager of the Radio Corporation of America, is to be chairman of the Committee on Dealers.

Because of the amount of work attending his regular duties, Kendall Banning, editor of "Popular Radio," found it impossible to take on the extra work required of a member of the Executive Committee. His resignation was reluctantly accepted, and Arthur H. Lynch, editor of "Radio Broadcasting," was appointed to fill the vacancy.

The following men, all important in the wide-spreading field of radio, have written to the Executive Committee, offering their services to make National Radio Week a genuine success from every angle:

Raymond F. Yates, radio editor, "The Mail," New York; Robert S. Wood, radio editor, "The World," New York; E. L. Bragdon, radio editor, "The Globe," New York; William H. Eaton, "Judge," New York; Pierre Boucheron, Radio Corporation of America; E. H. Rice, General Electric Company, Schenectady, New York.

Radioists of Sandusky, Ohio, are planning a program of special radio festivities for the big week.

Among the letters received during the week were the following:

Robert Curtiss, radio editor, "Guardian Magazine," Ashland, Ohio:

"I will do all I can for National Radio Week."

Arthur G. Shirt, Fall River, Mass., magazine writer and newspaper correspondent:

"Hooray for National Radio Week! I am preparing copy about it—its conception, its boosters, its aims—for the New England papers for which I

write. I will let that be my contribution toward making the week a success."

C. White, Cambridge, Mass., consulting engineer in radio and electricity, and one of the chief contributors to RADIO WORLD:

"I am greatly in favor of a National

Radio Week, and think that the subject of more vigorous coöperation on the part of radio manufacturers for active research and testing as outlined in my article in this issue of RADIO WORLD will certainly raise the trade to a higher plane, which is certainly desirable."

Nine Microphones Start First Complete Church Service by Radio to Waiting World

RADIO listeners and their friends in all parts of the United States, Canada, and even on the ocean liners crossing the Atlantic, were part of the congregation of St. Thomas' Episcopal Church, Fifth avenue and 53d street, New York City, on Sunday, November 5, when the entire service—ritual, sermon and singing—was broadcast by radio.

The singing of the choir and congregation, the sermon of Dr. Ernest M. Stires, the organ playing of Dr. T. Tertius Noble and every word and sound throughout the service was picked up by nine microphones placed in different parts of the church, carried by wire to Newark and there sent broadcast for thousands of miles in all directions. This was the first time a complete church service was sent over the world by radio. It is said that even the clinking of coins dropped in the collection plates was heard.

Commenting on this interesting and important radio event, "The Mail," New York, says editorially:

"The sermon preached in a Fifth avenue church was heard by radio in thirty States, besides Canada, Cuba and Mexico.

"This opens possibilities in the religious field similar to the service by the Associated Press and syndicates to the newspapers. The smallest congregation can hear sermons every Sunday from able and eloquent preachers, the music of the best organists and the songs of elaborate choirs. This particular service had the singing conducted by a choir of seventy-five male voices. So well was the sound transmitted that the slightest noise made by people going up the aisle and

taking their seats was heard by the radio receivers.

"In many villages there are now more churches than the community adequately supports. Denominations are struggling along with small congregations unable to pay their preachers adequate salaries. In the rural districts it is not uncommon for a preacher to have several congregations miles apart and alternate the services in their churches.

"With the radio any denomination can have the most elaborate service and costly sermons at slight expense. The home mission boards of the different denominations can arrange radio services. The congregations can gather in the church and maintain their existence without further contributions than enough to keep the church in repair and heated and put in the radio receiving sets.

"Suppose the biblical accounts of the adventures of Moses had stated that the religious services at Mount Sinai were heard in Egypt and Greece and Italy? People of little knowledge and less faith might have called that an impossible miracle."

Tube Suspension

THE life of radiotron power-tubes may be prolonged by mounting them in the proper position. Radiotrons No. 13248, type UV-202 and No. 13247, type UV-203 should be operated in a vertical position, whereas radiotron No. 13246, type UV-204, may be operated in either a vertical or horizontal position. If mounted horizontally, the plates should lie in a vertical plane, with the seal-off tip down.

FANS, AMATEURS, DEALERS, BROADCASTERS, MANUFACTURERS,
AND THE GENERAL PUBLIC

Are Looking Forward to

NATIONAL RADIO WEEK

DECEMBER 23 TO 30, INCLUSIVE

All Interested in Radio Should Help to Make This Event a Smashing Success.

If you want to know more about it address:

NATIONAL RADIO WEEK EXECUTIVE COMMITTEE

MAJOR J. ANDREW WHITE, Chairman

326 BROADWAY

NEW YORK

Radio Supplanting Land Lines in Northwest

By *Washington R. Service*

RADIO is slowly supplanting government wire lines in the far reaches of the Yukon. Much of the romance of the Far Northwest is passing with the reeling up of miles of wire stretched by men of the Signal Corps, and kept in operation, despite severe winter storms and intense cold, since long before the days of the gold rush.

The first radio station erected in any United States possession to handle commercial business was built in 1903 at St. Michaels, Alaska. Radio then reached to Nome, replacing many

cables and wires. Winter ice across Norton Sound was constantly carrying the hundred-mile cable away and its replacement was expensive, so the stations at St. Michaels and Nome were erected and are still in operation. Later on more stations were erected, chiefly in the interior, until fifteen spark stations were completed.

Arcs and Tubes Replace Spark Sets

During the past summer, all these stations were modernized by a Signal Corps field detachment under command of Captain C. H. Burkhead, who will remain at Fairbanks all winter to

carry on observations as to the efficiency of the newly installed radio equipment. All spark sets were replaced with arc sets, at important points and with tube transmitters at the smaller stations. To-day there is not an army "spark" in Alaska. The modern equipment, it is estimated, will save about 75 per cent of the old operation costs and improve the transmission materially.

Signal Corps radio operators are now working direct from Fairbanks to Nome, a distance of about 540 miles, by radio. The resultant improvement in radio communications has made possible the abandonment of about 200 miles of land wires which had been a tremendous effort and expense to keep in condition, requiring the services of a small army of Signal Corps men, especially in winter time. To-day the army uses a wire from Fairbanks to its cable station at Valdez, but the line from Fairbanks to Fort Egbert was abandoned and the wires west of Hot Springs and Nulato taken down, as well as many lines to the mining centers.

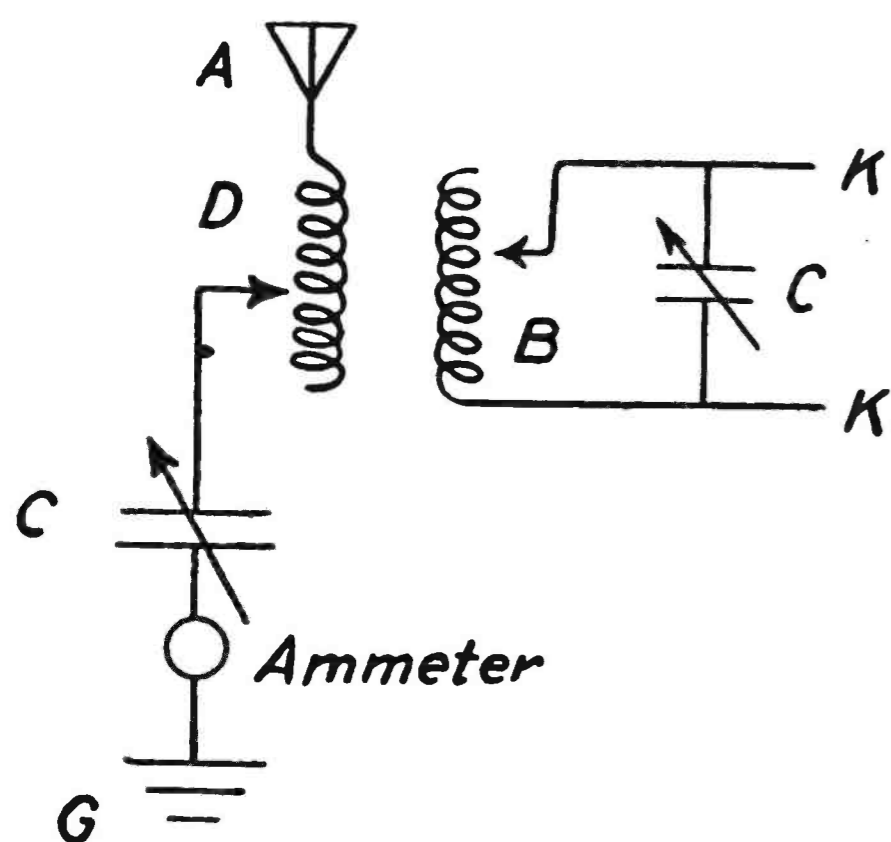
A 300-Mile Radio Control

To-day an operator at Valdez sends communications over 300 miles of wire lines to Fairbanks and thence by radio to Nome, about 540 miles. Actually he operates a radio arc at Fairbanks from his station 300 miles away, which is very "remote control."

In the event of a break in the Signal Corps cable which connects Alaska with the United States proper, the naval radio station at Cordova handles traffic to North Astoria, Oregon, completing the chain to the United States for the army.

Puzzling Problem of Tuning

By *Harold Day*



Schematic diagram of a simple circuit showing the tuning inductance and variable condenser.

TUNING is a puzzling matter for beginners. It is, however, very simple. It is stated that by varying the size of the coil B, and the condenser, the frequency of exchange of electrical energy between them—and, hence, the wave length—may be regulated. Study the circuit shown on this page.

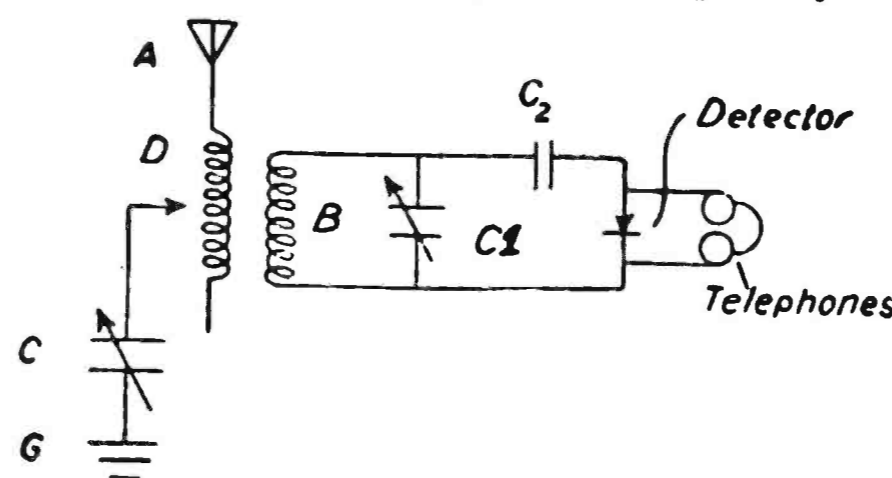
Assume that the wires, KK, are connected to a source of electrical energy, the frequency of which is varied by changing B and C. Vary C, leaving B fixed until a frequency of 1,000,000 cycles, or a wave length of 300 meters, is obtained. Then vary C and D, and it will be found that up to a certain point—and to that point only, the ammeter measuring the current gives a reading. This process is known as tuning and the point at which the ammeter gives reading is known as the

"resonant" point. All transmitting and receiving sets operate in the above manner. The difference in the sets being due to the methods used in varying B and C, and C and D.

Tuning applies to transmitting sets; the action being reversed; and then B and C are varied. High-frequency alternating current will be obtained from the wires KK, but the voltage and current will be in the order of millionths of a volt or ampere. A meter cannot be used. A special device, the detector, is employed, which, with telephone receivers, makes the currents audible.

Keep for Reference When Your Set Fails

IT should be noted that the scheme of connection in a receiving set is almost similar to that of a transmitting set with one exception: a detector and telephones have been added. The operation has already been explained in special articles published in RADIO WORLD. The various wave lengths are obtained by varying the frequency of



Schematic diagram showing complete crystal receiver. D and B are combined in loose coupler. This is so constructed as to permit of variations of D and B.

the circuits and the alternating current obtained from the distant transmitting station which is impressed on the detector.

The coils, D and B, are conveniently combined in the loose coupler. This instrument is so constructed as to permit of ready variation of D and B, and it also permits of the variation of the position of one coil with reference to the other. In the accompanying sketch a condenser, such as C or C₁, is shown.

These simple facts should be thoroughly understood by every amateur and fan. Keep this article and the accompanying diagram for reference.

Cells May Be Varied by Changes in Connections

By Horace Beers

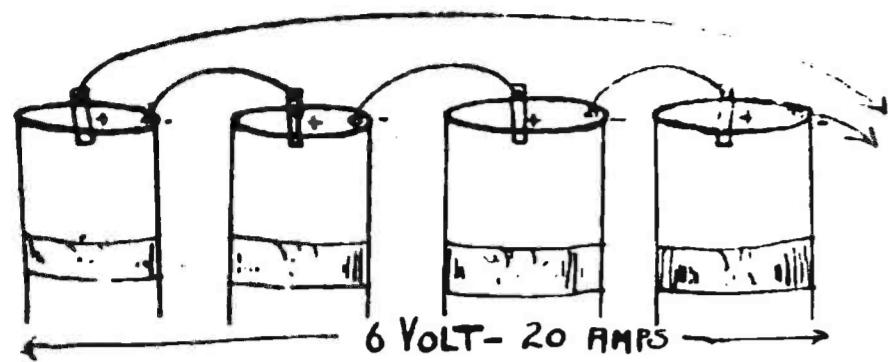


Figure 1. Method employed when connecting up dry cells in series. Drawn by Horace Beers.

A KNOWLEDGE of the methods of connecting up dry and storage batteries may prove useful where other sources of current are not available. Standard-size dry cells are used quite extensively for lighting vacuum tubes by amateurs who are not able or willing to hand out the sum of money necessary for a storage battery. The dry cell may be a fairly good substitute for the storage battery, but its use is not advised, except in emergencies, because these cells soon become exhausted and must be replaced by a new set of batteries. The cost of this continual replacement soon mounts up.

For the vacuum-tube B battery a number of flashlight batteries may be used as the plate potential for the vacuum tubes. Different uses of electricity require different values of voltage and amperage. An audio tube generally takes, approximately, one ampere of current to light at a pressure of six volts. The plate circuit requires a current that is measured in milliamperes, but at a pressure of twenty or more volts.

It must be remembered that a dry

cell has a voltage of $1\frac{1}{2}$ volts when new, and should show about 25 to 30 amperes. The storage cell, after being in use for a short time, registers about 2 volts, but their short-circuit ampere reading should never be considered, as it is ruinous to the cell in making the test. Such cells are rated in "ampere hours." This term may be taken literally, as an ampere hour means the flow of one ampere for a period of one hour. Usually about 8 amperes can be drawn, as a maximum amount, from a 60 ampere .hour storage battery.

For different uses cells may be connected in series, or parallel, or in combination of the two. When we connect in series we increase the voltage. When we connect in parallel we increase the amperage.

Suppose we have 4 dry cells and wish to operate some pieces of apparatus that require 6 volts without a large consumption of current. By connecting the cells in series the total voltage is the sum of the voltages of the individual cells. In this case the cells are $1\frac{1}{2}$ volts each; so 4 in series would give us 6 volts. By series we mean that the center post of one cell is connected to the side post of the other.

If a greater amount of current is needed we can connect our cells in what is known as series-parallel, as

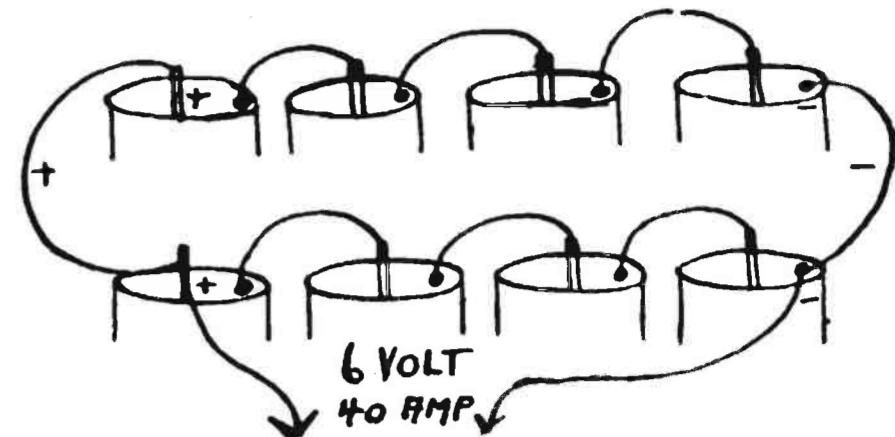


Figure 2. Method employed when connecting up two banks of dry cells in series parallel. Drawn by Horace Beers.

shown in Figure 2. This consists of connecting 2 series sets of four in parallel; that is, by connecting the 2 positives and, likewise, the 2 negative end-poles of the 2 series. Take the leads off as shown. This connection doubles the amperage, while the voltage remains the same. Further increase in amperage may be obtained by adding more banks of cells to the system.

This same rule applies to the storage battery; but, as the batteries register only 2 volts each—three when connected in series—it would give the necessary 6 volts.

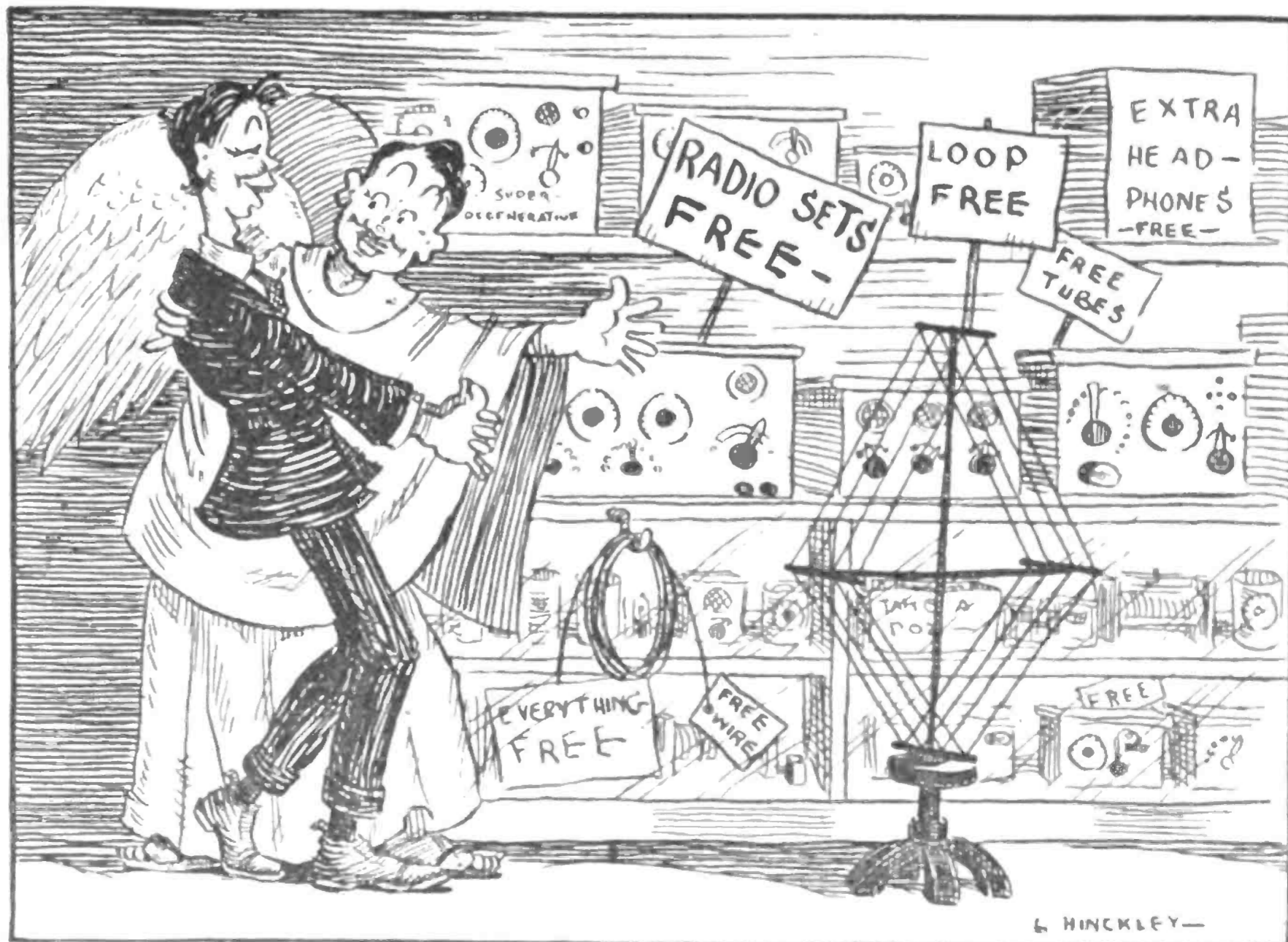
These simple facts regarding batteries should be remembered by every radioist dabbling with batteries. A storage battery having 3 cells would register 6 volts; one with 2 cells, 4 volts, and so on. Never connect or short circuit a cell. By this we mean, never place a wire or other piece of metal across the negative or positive of a cell. It will completely ruin it and you will be wondering why the battery will not produce current.

Erecting Aerial Masts

A SIMPLE way of raising aerial masts to any considerable height is to plant a short staff about one-third the length of the main mast, close to its base and raise the shorter mast by means of tackle. Guy ropes should be slung from the mast about two-thirds the way up, to permit guiding.

It is usual to make the aerial of more than two spans of wire, so that a greater conducting surface will be represented. For stations up to 1 kilowatt, size and aeriels should have at least 6 wires spaced not less than 2 feet apart or more than 3 feet.

It has been found that nothing is gained by placing the separate spans closer than 2 feet. For fairly large aeriels, 3 feet is very good spacing.



(Cartoon by Lawrence B. Hinckley)

A RADIO BUG'S IDEA OF PARADISE

Radio Angel: "Help yourself, son. If you don't find all you want this trip, come again!"

Radiograms

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

RADIO is playing an important part in the work of mapping Northwest Canada. By tuning in and getting time signals from a known distant point and comparing it with the time at a designated place the map-makers can easily ascertain distances and directions.

* * *

Scientists have discovered that the aurora has a decided effect upon radio. Apparatus affected by the aurora could receive, but not transmit, signals while the influence lasted.

* * *

SAM is the call of a new radio-compass station at Hallo on The Skagerrak, Sweden, which was opened for general service on November 1. The new station, which is operated through Goteborg, SAB, will determine the true bearing of vessels calling within 150 miles on a 600-meter wave length. The charge for a bearing is placed at five kronor, about \$1.34.

* * *

The Radio Corporation of America has announced a radio-letter service to London and Germany at a rate slightly higher than postage. The rate is six cents per word. Messages filed any day in the week up to Saturday marked "Radio-letter" are transmitted to London or Germany for delivery on the following Monday morning.

* * *

The United States Signal Corps at Washington, D. C., continues to save money through the transmission of official messages by radio instead of by land wires. In September a total of 239,826 words were handled, with a saving for the month of \$2,668 over the cost at commercial rates.

* * *

Radio wins a race! "Radio," ridden by L. McDermott, won the Latonia Cup at Louisville, Kentucky, with an added purse of \$7,500, over a distance of two miles and a quarter in 3:49 flat.

* * *

Recent modifications of the rigid laws governing the installation of radiotelephone and telegraph stations have made possible the installation of radio-broadcasting, according to Vice-Consul Edwin B. Montgomery, of Montevideo. Applications are now pending which, if granted, should mean the opening of a splendid market for radiotelephone receiving apparatus in Uruguay.

* * *

Fred Stone, president of the National Vaudeville Artists, was the guest of honor at a luncheon at the William Penn Hotel, Pittsburgh, given by prominent citizens. All the speeches made were sent out by radio. Among the speakers were: Harry Davis, Senator John P. Harris, president of the Theatre Managers' Association of Pittsburgh; Senator George Wharton Pepper, Senator David Aiken Reed and Mayor W. A. Magee.

* * *

Gambia, the British colony in West Africa, has installed radio telephone and telegraph stations at Bathurst and McCarthy Island, 176 miles apart. The new stations are in daily use, giving instantaneous communication between the two centers. The colony has no organized wire telegraph or telephone system, and the radio stations already have proven of great value.

* * *

Members of the United States Army, organized reserves and National Guard in San Francisco will have the opportunity to buy some of the 10,000 army receiving sets at \$7.50 each. These sets were declared surplus stock, and cost \$1,000,000. Buyers are limited to military men only.

* * *

The call letters for the station recently opened at Havana, Cuba, are PWX.

* * *

Great Britain has given the Wireless Society of Manchester permission to erect a special transmitting station for the purpose of attempting to bridge the Atlantic from the east to the west with one kilowatt of power. The extraordinary license issued for this station specifies that no more than this amount of power shall be used and that the apparatus shall utilize continuous waves. In Great Britain the restrictions which have always been maintained on amateur stations even specified what kind of aerial should be used, and placed limitations upon its size. In the license given to the Manchester society this rigid rule has also been modified, and permission granted for the erection of a more efficient type of aerial for the purpose in view.

* * *

The steamer "Matsonia," equipped with a 1,000-watt General Electric Company radio set, talked through its telephone every morning from September 12 until September 25, the day before she arrived in San Francisco from Honolulu, with the radio station

at Apia, Samoa. The last conversation was at 8:30 o'clock in the morning. At that time the "Matsonia" was 4,050 miles from Apia. On this voyage the "Matsonia" was in radiophone communication the entire trip with either the San Francisco office of the Radio Corporation of America, KTH, or the Hawaiian station, KHK. All the ship's radio work was done on a wave length of 550 meters.

* * *

Experiments are being made in Belgium for rapid reception of messages in script by a photographic process combined with radio.

* * *

Radio development in Czechoslovakia has not yet passed the stage of infancy, according to dispatches to the Department of Commerce from Consul Winans, Prague. He states, however, that the government has already taken an active interest in radio development, and in view of a more extensive and popular acceptance of this form of communication at home has sent a special commission of experts to study the progress made in other countries. Whether a sending station for radio messages will be established in Czechoslovakia will depend upon the findings of this commission. Even when finally introduced, however, the local industry cannot be expected to attain the state of development reached in the United States. It is stated by the Ministry of Posts and Telegraphs that all messages sent by radio will be subject to strict control by the Government; not every person will be permitted to own a receiving or sending apparatus. High duty will be assessed on radio outfits and supplies of foreign make, and each radio set, whether of domestic or foreign manufacture, will have to be registered at the Ministry of Posts and Telegraphs. Many local factories are said to be interested in the future of radio telephony and to be awaiting a favorable moment for producing the necessary requirements of the industry.

* * *

Over 5,000 words on the election results in New York and other parts of the East were sent to California by radio on election night, the wire service having been seriously interrupted by a sleet storm in the Rocky Mountains. The station of the Radio Corporation of America at Rocky Point, which is ordinarily used for sending radio messages to Europe, sent returns to the radio station at Bolinas, near San Francisco, which is ordinarily used only for communication with the Far East. Western returns also were received by radio from Bolinas.

* * *

Beginning November 26, the radio audiences will hear the first of a series of thirteen Sunday afternoon popular concerts by the City Symphony Orchestra, which will be broadcast by the Westinghouse-Radio Corporation station, WJZ, at Newark. These concerts will be held at the Manhattan Opera House, New York City, and will be conveyed to WJZ by a special Western Union wire. The programs will consist of gems from the lighter classics, together with shorter symphonic poems. Young soloists of real talent and distinction will be heard at each performance. The City Symphony Orchestra, which is maintained by the Musical Society of the City of New York, consists of 83 players carefully selected for their musical talent and symphonic experience. The conductor, Mr. Dirk Foch, a native of Holland and a composer of distinction, has had a successful career as a conductor of symphony concerts and opera in Amsterdam, The Hague, Stockholm, Gothenburg, and other European cities.

* * *

"Aida," Verdi's great opera, was broadcast from the Kingsbridge Armory, New York City, on Saturday evening, November 11. The performance—which marked a new era in radio and made history for this wonderful science—was given by artists and the orchestra of the Metropolitan Opera House, New York City, undoubtedly the greatest organization of its kind in the world. Sent out by the powerful station, WEA, it was heard over a range of a thousand miles.

Send Radio World Your
Best Suggestions for
National Radio Week

Radio and the Woman

By
Crystal D. Tector

AMONG the many letters that I have received since the movement for National Radio Week started but one contains a negative note. Now, I wouldn't mention it—at least, first of all the communications that have come to me—if I did not believe that every objection contains some possible suggestion for good. I once belonged to a club, and one of the members seemed to take particular pains objecting to everything—everything! She called herself the "natural born objector." We other women almost hated to start anything new, knowing that this particular member would never agree. We have all encountered such a person. But they seldom do as much harm as good—and it is generally good business to have one on a committee.

* * *

Well, the correspondent I started out to write about is a Miss Jane Drophié of Chicago. Her objection is summed up in one sentence which I cull from her letter: "Won't the men take all the glory of National Radio Week and won't they get on all the committees and have everything their own way?"

* * *

I imagine that Miss Drophié hasn't advanced much in up-to-date matters pertaining to women's place in the world—even if she does live in Chicago. My reply to her, and to any other woman who feels that we women are going to take a back seat during National Radio Week, is this: "If such a thing comes to pass, it will be the fault of the women and the women only! And I think that I am sufficiently acquainted with my sex to make the statement that we will have just as much to say as the men—and, whisper, perhaps a little more!"

* * *

Let me tell you a few of the preparations that the radio women of the charming suburban town—just a pleasant ride from New York—where Friend Husband and I have the dearest little home in all the world, are making for National Radio Week.

* * *

First we organized the Women's National Radio Week Executive Committee. We could have had fifty members, but at the first general meeting we all decided that a small workable committee with absolute powers would be the most satisfactory. So a committee of nine was decided on. The chairman of our first meeting appointed four, and the remaining five were chosen by ballot—that is, everyone at the meeting was asked to cast a ballot for her choice and the five polling the highest votes were declared elected.

* * *

This committee has the power to appoint subsidiary committees on publicity, dealers, shop-window decorations, entertainment, and any other phase of radio that may seem necessary. We consider that one of our most important committees is the Committee on Church Program and Entertainment, for no little interest in radio is centered in the churches in my town; and, this winter, we look to some wonderful evenings, as not a few of the churches have splendid sets. However, this particular committee will endeavor to have special radio nights and afternoons in as many churches as possible during National Radio Week—jolly entertainments and socials where people will meet and get acquainted, and, we all hope, become radio fans.

* * *

Another committee of importance will work among what we call "radio strangers." The members of this committee will visit those who have taken no interest in radio, and try to bring them to the church entertainments, the affairs at different homes, the radio stores where the general broadcasting may be heard, and to advise the most practical reading in order to learn radio. You may imagine that such a committee has a good deal to do; but from the reports I have received, our committee is doing wonders. I can safely say that, during the past ten days, we have made radio converts at the rate of a dozen a day. I do not mean people who promise to take an interest and then bid you a cheerless farewell; but people who have become so interested that they have not only thanked you but have asked you to come again.

* * *

We also find that one of our busiest committees is going to be the one that will advise shopmen how to decorate their windows and make their stores attractive. As we all know, the average radio dealer, or electrical merchant, is a pretty busy man in the first place, and, in the second, his wares do not make very attractive window and inside displays. Now here is where we women can do yoemen's service. I am certain

that as National Radio Week approaches few radio dealers will object if one or more polite, well-intentioned women approach them and ask if they may show Mr. Dealer or Mr. Shopkeeper how to present his goods in a way that will not only make them decorative but attractive to the prospective buyer.

* * *

Then, too, we women can do much to give the many social affairs that are bound to make National Radio Week sparkle the very oclat they will need. We will be of great service in getting up programs for the younger set—meetings and dances with radio as the foundation and the background. Why, already, I have had over a score of hidden requests for invitations to several affairs that I have announced—and I only wish that my home were larger—as large, indeed, as a barn or as the Pennsylvania railroad station in New York City—and I would just issue, right here, in the columns of RADIO WORLD, a general invitation to all to be present. "The more the merrier," say I.

* * *

I think that I have given my women readers a few hints here. One clever hustling woman in any town can easily start this movement going. It will be surprising how quickly it will take hold. For radio is new, and we Americans are ever on the alert for something new. It won't be long before the spirit of the thing will spread, and, I am bold enough to make the assertion, in any red-blooded American town, doing something for National Radio Week, or being on a National Radio Week committee, will be very much the vogue.

* * *

And, let me tell you in advance, there is to be some wonderful broadcasting this winter. We are to hear grand opera by the artists and the orchestras of the Metropolitan Opera House, New York, the very finest thing of its kind in all the world. We are to have the rendition of symphony orchestras that comprise the highest-paid musicians. We are to have the news of every great event. We are to hear eminent singers and instrumentalists—and we will have plays produced that, otherwise, we might never have a chance to see or hear. So, you see, radio is working for a wonderful future, and National Radio Week promises, more than anything else, to give us a glimpse of that future.

* * *

I can't help being so enthusiastic because I so fully believe in it. And I want to help you—all of you women who are interested in radio! And the editors of RADIO WORLD will help me to help you by devoting these columns to you every week.

Boys! This Tells You How to Use an Antenna with Your Kite

There are times when boys like to experiment with something more than the plain aerial. In the accompanying photograph, two of the younger radio enthusiasts are seen on the roof of their home in an attempt to raise a kite. It is their intention to utilize this kite by attaching a wire to it in order to experiment with altitudes higher than those of the average roof aerial. Their receiver is of the crystal type, and when the kite is aloft some thousand feet, unusual results may be obtained. This is an experiment to find out whether the height of an aerial has any more or less effect on the volume or distance of signals. Instead of flying the kite with a string, a light wire is used.

(C. Kadel & Herbert)

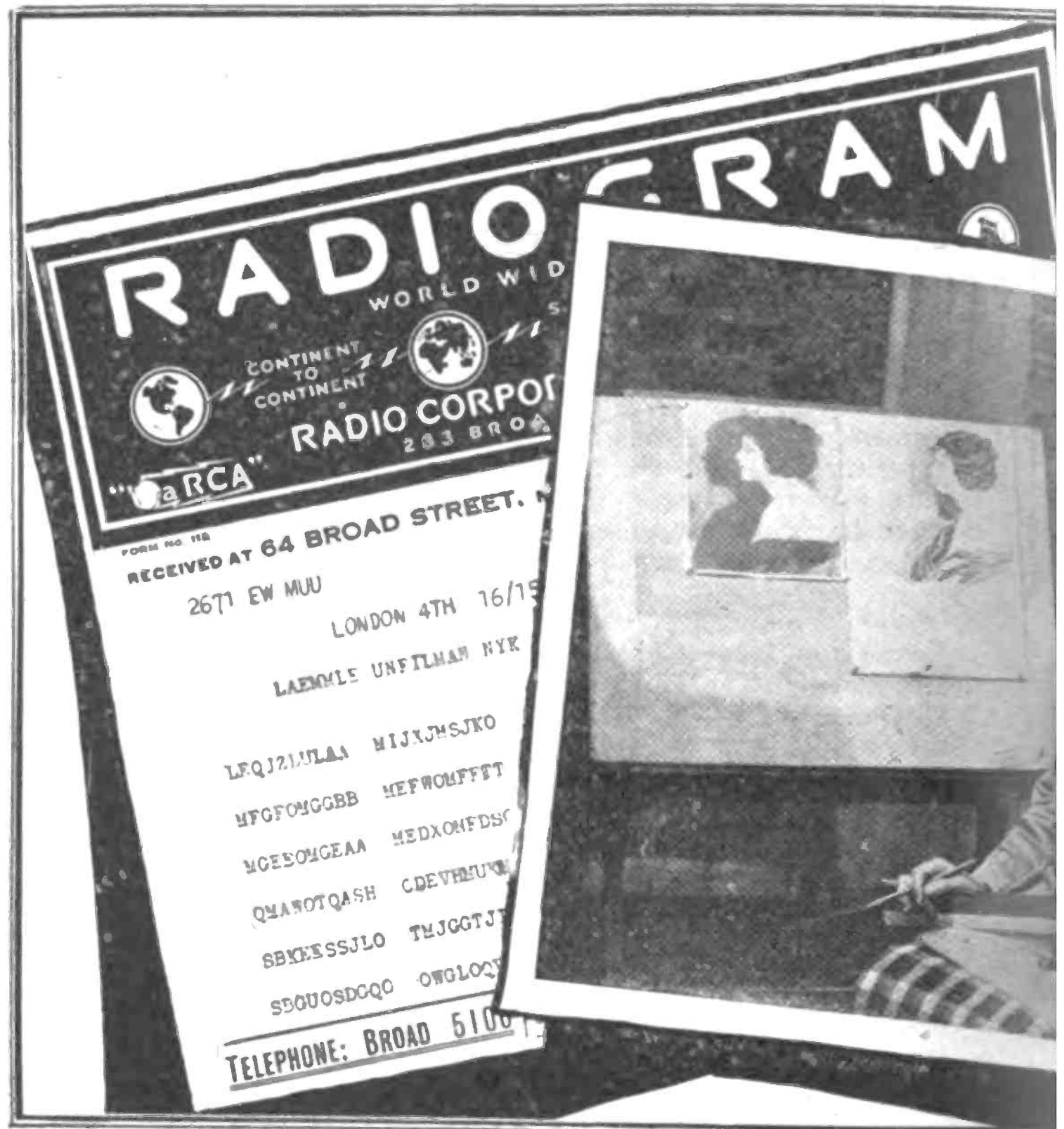


Another Busy Radio Week



(C. International News Reel)

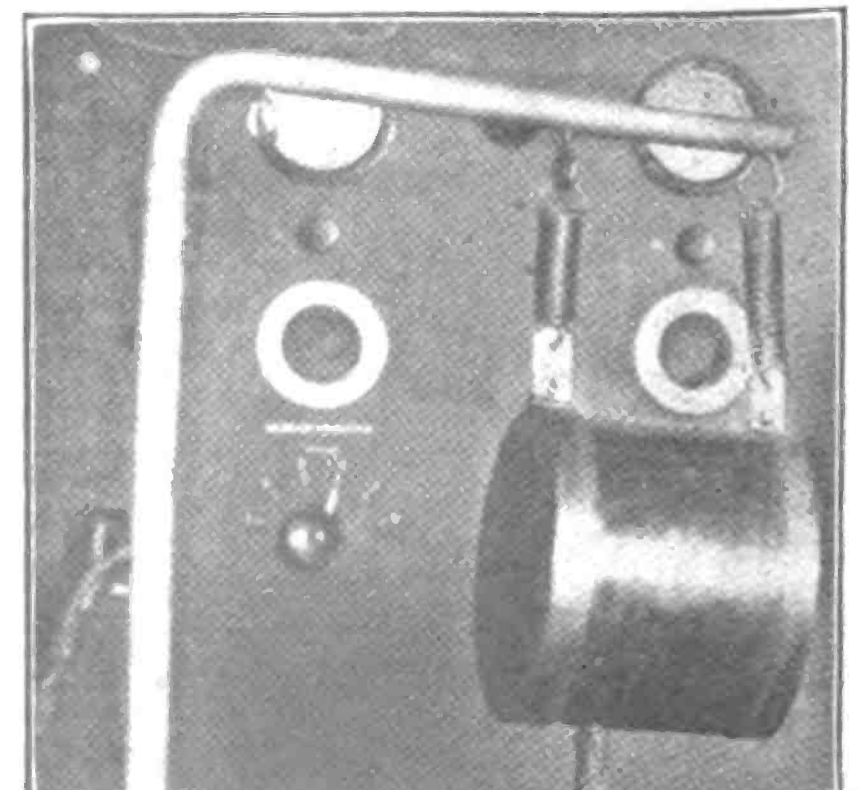
(Above) Every man his own aerial! This is a possibility, according to Collins Penz, a radio fan of Minneapolis, Minnesota. Mr. Penz has a small set in his home. One day, during a testing out while it was hooked up, he noticed that he could hear a broadcast concert while he kept his fingers on the slider of the tuning coil, as shown in the photograph; but when he removed his fingers, the music was not audible. His body served as a natural aerial. Mr. Penz made his coil by winding two coils of wire—one large and one small—around an ordinary megaphone. This gave him a primary and a secondary winding, making it a loose-coupler.



(Below) The pensive man in this photograph is Alfredo Zayas, President of the Republic of Cuba, in his private office just after talking into a microphone. It was the occasion of the broadcasting of the Cuban president's address to the American people, which proved that the span between the two republics may be covered by radio in the fraction of a second. Radio development in Cuba is having a great boom—particularly since the broadcasting of the World's Series baseball game was received there so clearly. Several new high-power stations are to be erected in Havana. General interest in radio matters is thoroughly active and amateurs are becoming more numerous every week. Cuba is a hearty market for American radio goods.



(C. International News Reel)



(C. Kadel & Herbert)

(Left) "close-up" of a speaker, most interesting instrument casting this cylindrical shaped speaker, directs is one sensitive mechanism to pick most

s Seen by the Camera Men

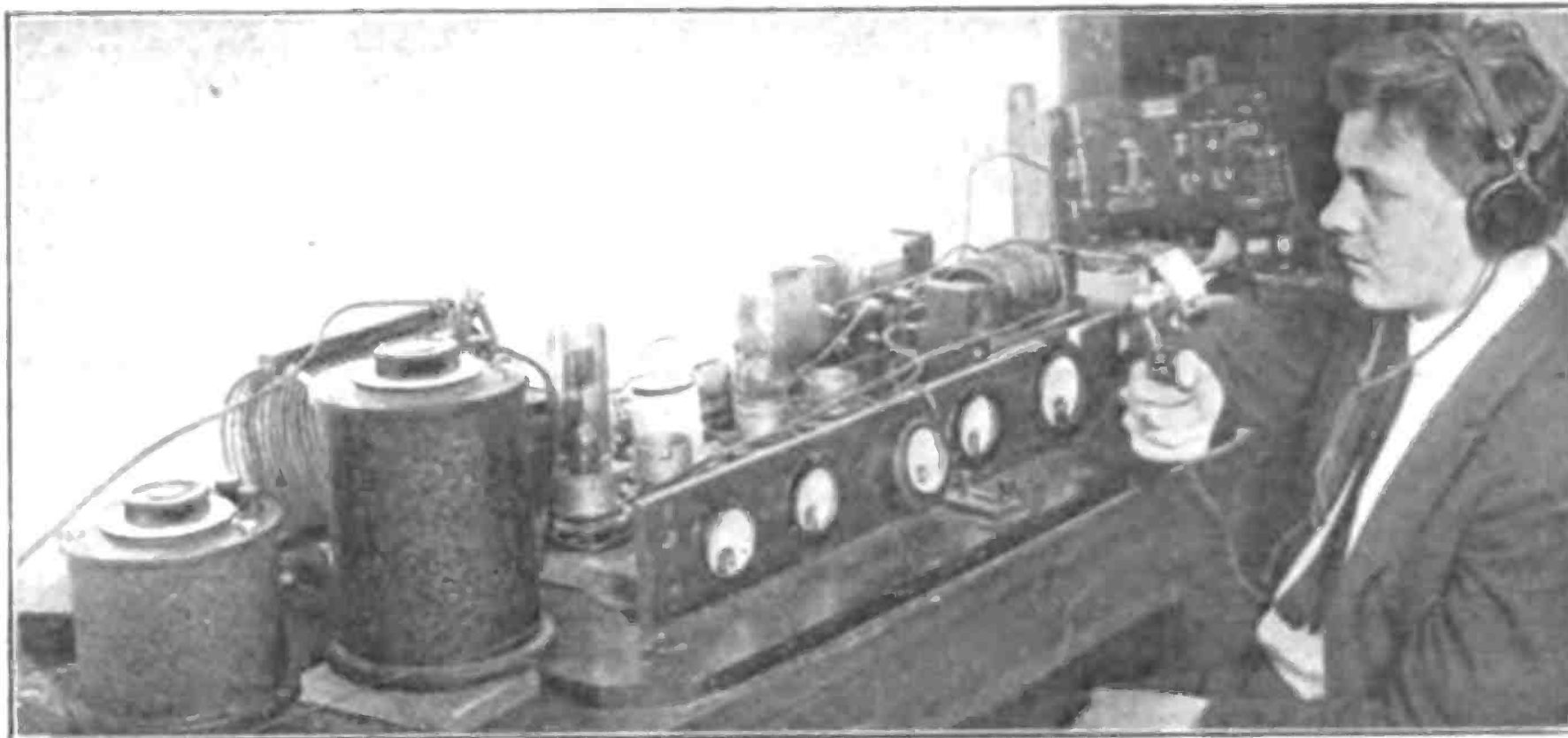


(Left) Miss Nellie D. Stevens is the first person to receive a photograph transmitted by Radio. Here is Miss Stevens decoding a "radio-photo" of Miss Virginia Vall, Universal Film star, which was sent from London to New York by radio. On the artist's drawing board are two portraits of Miss Virginia Vall. The picture on the left of the board is a copy of the portrait transmitted through the air; on the right is the result of Miss Stevens's decoding. She is now engaged in perfecting a method of transmitting finger-prints by radio, in the United States. To the left is a facsimile of a coded portrait as received by Carl Laemmle, president of the Universal Film Manufacturing Company. Sending photographs by radio is becoming a simple matter. It is possible to radio photographs over a great distance, one having been successfully sent from Italy to the United States.



(C. Wide World Photos)

(Left) The motorcycle is the latest thing to be radioized. And it works! Neil Cochran, of Oakland, California, is shown here tuning in on the radio station of "The Tribune" of that city. Mr. Cochran drove the radio-equipped motorcar which trapped the "bandit" in the recent "bandit chase" held in his State.



(C. Kadel & Herbert)

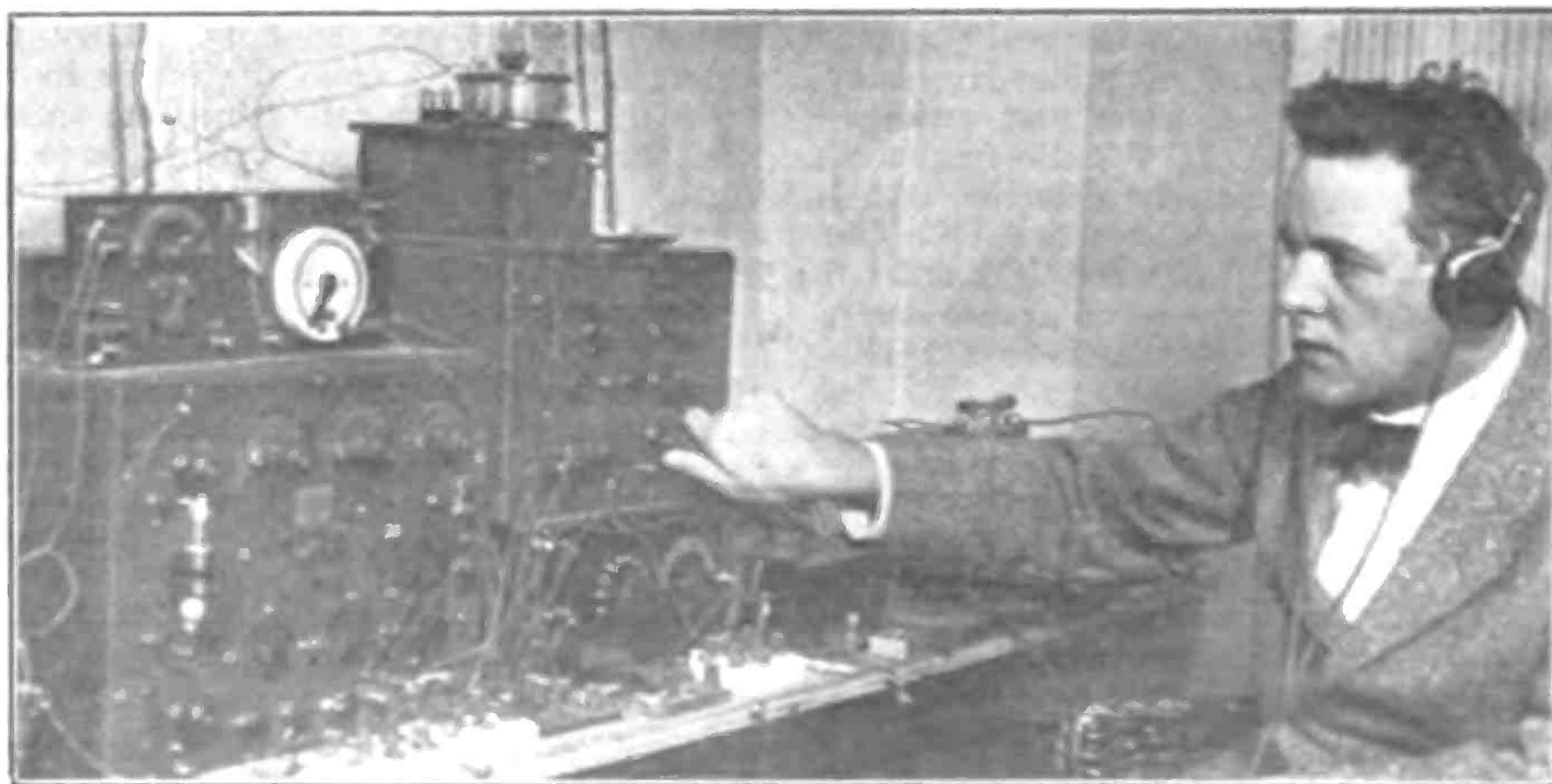
(Above) This picture shows a remarkable radio set made by boys. To be sure, they had the guidance of a capable instructor. This particular set is for long-distance reception. Radio World would be pleased to see photographs of sets made or assembled by other boys, and invites them to send in such pictures with a view of having them published for the benefit of other boys.

(Above) The football season has been considerably augmented by radio. Broadcasting the big games is very much in vogue. As in the case of the World's Series, these most interesting athletic events, so important to lovers of American sports, were received, play by play, in thousands of homes all over the country. The photograph illustrates the receiving and sending station at Fordham University, New York, designed primarily for the exchange of football scores and relay work between the various colleges. This station operates on 200 watts and uses from two to four U-V 285 tubes. Edward J. Hofela, one of the students of Fordham, is shown in the photograph broadcasting a football game taking place on the college grounds.



(C. Kadel & Herbert)

(Above) Mr. Sheu S. Man, a graduate of the Hong Kong University, testing out the static characteristics of vacuum tubes at Columbia University, New York. Not a few young Chinese have come to the United States to learn the mysteries of radio. Few users of radio realize how much work is involved in the manufacture of vacuum tubes.



(C. Central News Photo Service)

(Above) Arthur Alexander, the American tenor, announces that his avocation is radio. This successful young singer is one of the most ardent fans in the country and says that he wouldn't care if he were a radio operator aboard an ocean liner.

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Radio-Wire Tables

By Frederick J. Rumford, E.E., R.E.

No. 1—Enameled Magnet Wire

Showing the Number of Feet of Magnet Wire in a Pound and Fractions of a Pound

APPENDED is the first of a series of five tables which the radio amateur will find useful for many purposes. The succeeding tables—"Single Cotton-Covered Wire," "Double Cotton-Covered Wire," "Single Silk-Covered Wire" and "Double Silk-Covered Wire"—will be published in early numbers of RADIO WORLD.

No.	Diameter in mils.	Approximate turns per square inch	1/8 lb.	1/4 lb.	1/2 lb.	3/4 lb.	1 lb.
20	.0337	885	40	80	160	320	320
21	.0302	1,126	43	86	172	258	404
22	.0269	1,407	63	126	252	378	509
23	.0241	1,736	80	160	320	480	642
24	.0215	2,160	101	202	404	606	810
25	.0192	2,770	127	254	508	762	1,019
26	.0171	3,460	160	320	640	960	1,286
27	.0153	4,270	201	402	804	1,206	1,620
28	.0136	5,400	255	510	1,020	1,530	2,042
29	.0122	7,900	321	642	1,284	1,926	2,570
30	.0109	10,000	405	810	1,620	2,430	3,240
31	.0097	12,620	510	1,020	2,040	3,060	4,082
32	.0087	16,020	641	1,282	2,564	3,846	5,132
33	.0077	20,400	805	1,610	3,220	4,830	6,445
34	.0069	25,200	1,010	2,020	4,040	6,060	8,093
35	.0062	31,900	1,274	2,548	5,096	7,644	10,197
36	.0055	40,000	1,601	3,202	6,404	9,606	12,813
37	.0049	51,600	2,013	4,026	8,052	12,078	16,110
38	.0044	65,700	2,534	5,068	10,136	15,204	20,274
39	.0039	81,600	3,189	6,378	12,756	19,114	25,519
40	.0035	14,000	4,013	8,026	16,052	24,078	32,107

The figures for the 1/8-, 1/4-, 1/2- and 3/4-pound wires are a few fractions off, but not sufficient to cause any harm. The computations were made in this way in order to eliminate decimals.

Uncle Sam Turns Out Two New Amplifiers

One Is an Electron-Tube Amplifier Using 60-Cycle Alternating Current to Supply Power for Filaments and Plates. The Other a Radio-Frequency Device Using the Transformer Coupling Method

AN amplifier which has the advantages of low first-cost and cheapness of operation, besides doing away with the inconvenience of the storage battery and the B battery, was developed recently at the Bureau of Standards, Washington, D. C.

A crystal detector and 5 stages of amplification, 3 stages of radio-frequency amplification and 2 stages of audio-frequency amplification are used. The first arrangement tried consisted of 1 radio-frequency stage of amplification, tube detector, and 1 stage of audio-frequency amplification. The filaments of the 3 tubes were lighted by 6 volts supplied by a stepdown transformer, the primary of which was connected to 110-volt, 60-cycle power mains.

It has been found that either air-core, or iron-core, transformers may be used for coupling the output of one tube to the input of the next tube. The air-core transformer gives more amplification per stage, but is responsive to only a narrow band of frequencies owing to the low effective resistance of the windings. The iron-core type, while not giving as much per stage, allows amplification over a much broader band of frequencies.

A special type of air-core transformer which will respond to signals on wave lengths from 600 to 1,000 meters has also been developed. The coils of the transformer were wound in the form of a flat doughnut, the wire being wound in a manner similar to that of the open, or basket, type of coil winding. They are wound continuously from the inside to the outside. Two of the coils constitute an air-core transformer, one coil being connected in the plate circuit of one tube and the other being connected to the grid circuit of the succeeding tube. It is found that when the primary and secondary transformers are placed about 1/2 inch apart the transformer gives best amplification at 600 meters, and when the coils are placed close together the amplifier operates best at 1,000 meters. This is due to the increase of the capacity between the coils when placed adjacent. An amplifier has three stages of radio-frequency, two stages of audio-frequency amplification, and a detector tube.

Scientific Paper No. 449 of the Bureau of Standards, Department of Commerce, describes the construction of a new radio-frequency amplifier which uses the trans-

former coupling method. Radio-frequency amplification consists in the amplification of the received radio-frequency current before it is detected. By the use of radio-frequency amplification and a coil antenna a signal which is very feeble can be made loud enough to be heard throughout a large room.

Three methods are described by which the electron tubes may be coupled together so as to give radio-frequency amplification—resistance coupling, tuned-plate coupling, and transformer coupling—the latter having been found most satisfactory.

In order to operate well the radio-frequency amplifier should have a transformer designed so that it will have small capacities in the windings as well as between the windings, and in connecting the transformer in the amplifier circuit care must be taken to have all connecting leads as short as possible.

The alternating current was rectified by means of a gas-filled, two-element rectifier tube, called a "Tungar" tube; but it was found that the residual hum was greater than when the alternating current was not rectified.

When an electron tube is used as a detector there is impressed on both the plate and filament a 60-cycle alternating current voltage, which, although small, becomes objectionable when amplified by one or two stages of audio-frequency amplification. When, however, a crystal detector is used instead of an electron tube detector it has been found that the 60-cycle hum is practically eliminated and that the crystal gives as good rectification as the tube detector.

After much experimental work a circuit consisting of three stages of radio-frequency amplification, galena crystal detector, two stages of audio-frequency amplification, loud-speaking reproducer, and the necessary power transformer and rectification circuits were found which allowed the reception of music and telegraphic signals without too much interference from the humming noise just mentioned.

Mr. Miller's Circuit from Another Angle

EDITOR, RADIO WORLD: In reference to your request for information relative to the new circuit for experimentors in RADIO WORLD, No. 30, dated October 21, the writer notes that Mr. W. Miller, Southern Methodist University, Dallas, Texas, claims to have worked out this circuit. Possibly he did. However, the writer, also Mr. J. Fisher, of this city, have been using this circuit for about one year, not as Mr. Miller describes it, however, which in the writer's estimation, is a very cloudy method. In the place of the D-L 50-coil, a variometer should be used. This gives tuning over the entire wave length unless one is looking for Japanese or Chinese stations on the Atlantic Coast. In addition to this, a .00025 mfd., should be discarded for a variable condenser. Then by using one stage of audio frequency in connection with this circuit, one is able to tune in sharply and receive stations anywhere from 600 to 1,000 miles.—F. D. Tyndall, 836 Kingston avenue, Oakland, California.

RADIO GOODS AS GIFTS

Be sure to be represented in "Holiday Radio Gifts Number," out December 9, Copy for this issue accepted up to November 29, RADIO WORLD, 149 Broadway, New York.

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Help to Squelch QRM

Suggestion that "The Rochester Plan" Be Put in General Force to Prevent Conflict Between the Novice Listener and the Radio Amateur

AS a result of experience through the past year of broadcasting, we have a definite program to recommend for amateur consideration. There have been many unjustified complaints against amateur QRM; and, of course, where amateurs in cities have hogged the air all evening there have been justifiable complaints. Most of us have realized, says Kenneth B. Warner, editor of "QST," November, that broadcasting was capable of becoming a powerful force for good in our country, of tremendous social, economic and educational value, and have known that meant the passing of the old days when we could pound brass from supper-time on and the ushering in of a new era when the air had to be shared. As we have pointed out previously, many of us have gone so far in the business of sharing that we have almost been afraid to operate at any time, and amateur radio has suffered for the lack of a definite plan. On the other hand there are uniformed novice listeners who object to amateur transmission at any hour of night, and again the need for a recognized scheme has been shown. This we now offer.

Broadcasting is admittedly an institution of the early evening hours. That is the time that quiet air should prevail, when the greatest good can be done for the greatest number. When should we open up our stations for transmission? Our board has considered that question and has decided upon 10.30 p. m. as the proper time. We're regretfully obliged to conclude, fellows, that the time is here when we should voluntarily keep our transmitters silent during the early evening hours if their operation interferes with listening. This means that in all congested communities amateur stations should be quiet between the hours of 7 p. m. and 10.30 p. m. This is no new thing for most of us—we've been doing it already—but it makes it a recognized principle of amateur work.

We urge our members and clubs to get together with the listening-in element in their community and have an understanding on the subject. Acceptance of this plan on the part of the amateurs means that they recognize the rights of the listeners to hear their concerts undisturbed, and that they will keep quiet between these hours. Acceptance of this plan by the novice listeners means that they recognize the rights of us amateurs to transmit and carry on our useful work and that they will not complain against the "meaningless buzzes" when the lid goes off at 10.30. This plan was proposed at a meeting of all radio people in Rochester, recently, and was adopted as a solution of the local difficulty. We may well call it "the Rochester Plan."

Whenever a community gets together and agrees upon such a plan, we feel that it should become as law and that the mere possession of a transmitting license should not entitle an amateur to go contrary to the sentiment of all his fellows. It is our view that such operation, unless justified by an emergency or official tests, would constitute deliberate and malicious interference within the meaning of the federal radio law, and we believe the Department of Commerce will agree with us. On the other hand, in localities where this plan is adopted and quiet air is maintained between 7 and 10.30 p. m., we will expect amateur transmission to proceed without complaint after 10.30, and the A.R.R.L. will protect with every

resource at its command the right of any of its members to so transmit if unjustly accused while legally operating in such a community.

Now we have a working plan. Let us adopt it, fellow amateurs. This puts an important duty of self-policing on the shoulders of our affiliated clubs and we are depending upon them to handle the job. When this plan is adopted it must be respected, religiously, and this means that unlicensed and improperly adjusted stations must be hunted down and turned in. In bygone days such a station bothered no one but its neighborhood amateurs, and if they could put up with it there was no harm done; but today such a station will bring discredit upon all of amateur radio and must not be permitted to exist. We would suggest that clubs establish committees to help local amateurs and render assistance when needed to get a station properly adjusted, but if the operator persists in operating illegally after being warned he should be turned in to the inspector without mercy—we have too much at stake. Other folks are watching us too; and while we think about it, we want to tip off everybody to get their station and operator licenses renewed promptly upon expiration.

What about local work, which used to occur in the early hours of the evening? Honestly, we don't know, and it will be up to the amateurs of each club to decide for themselves how they will divide their hours. The time after 10.30 is going to be very precious and, solely because it is not as important as DX work, we are afraid local work will have to be got over with by the time 7 o'clock rolls around. Low-powered battery-operated CW sets of course can be used for local work all evening long and not cause a particle of QRM for the broadcasting fan next door, but most of the lads who do local work have a far different kind of equipment!

Our transmitters must improve. There will be too many of us with traffic to move at 10.30 and too many listeners with dumb-bell tuners for us to continue much longer with the cycle-consuming spark of pre-war days. For the very efficiency of our traffic moving the selfish spark will have to yield to the valve set. We hasten to say, though, that there are selfish CW sets too, and we are just as much agin a bum CW without rectifiers and filters as we are against the ordinary spark, and for exactly the same reason—it takes up too big a place in the air, its wave is too broad. We cannot be pushed into an adoption of CW versus spark against our will, but left to our own devices we believe it is evident to any thinking amateur that the quiet efficiency of the little bottles is just the thing we need—filtered DC, CW transmitters.

Now let's get busy on our self-imposed 10.30 lid. Remember that the League does not feel that it can back a member who runs loco in a congested locality and smears a whole county with QRM from the minute his supper is down, but that it will safe-guard the interests of its law-abiding members in communities where the Rochester Plan is adopted and respected.

One thing more. Noise this about a bit. Let it be known that we amateurs have decided among ourselves to preserve some quiet hours, out of consideration for the broadcast listeners. Spread a little honest propaganda in your local newspapers.

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Latest Radio Patents

Dr. Alfred N. Goldsmith Invents Device to Improve Tone Transmission

No. 1,432,456. Patented, October 17, 1922. Patentees: Alfred Norton Goldsmith, New York, N. Y.

DR. ALFRED N. GOLDSMITH, secretary of the Institute of Radio Engineers and chief of radio activities at the College of the City of New York, has been granted letters patent on an apparatus to improve the tone transmission from a sustained wave-generator.

Since sustained wave-transmitters produce signals consisting of constant-amplitude radio-frequency current, such signals are inaudible, or practically so in a receiving system having the usual rectifying detector, such as a crystal or vacuum tube. Notwithstanding this fact, transmitters on ship board which may be called upon for distress signals, are compelled by law to be capable of radiating a signal wave of such character that it is possible of reception and detection in a simple detector of a receiving set.

It is accordingly highly desirable, and even necessary, to provide a method of controlling and modifying the sustained wave-radiation of an arc, alternator, oscillating vacuum tube, or other sustained wave-transmitter so

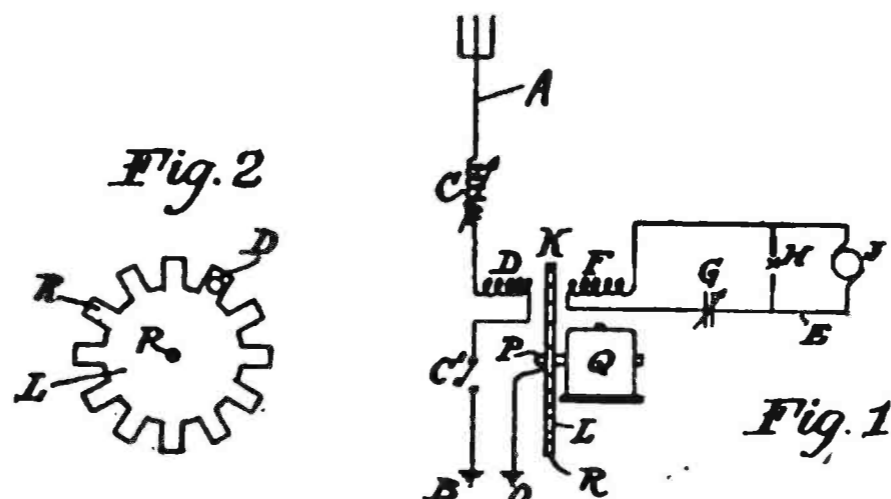


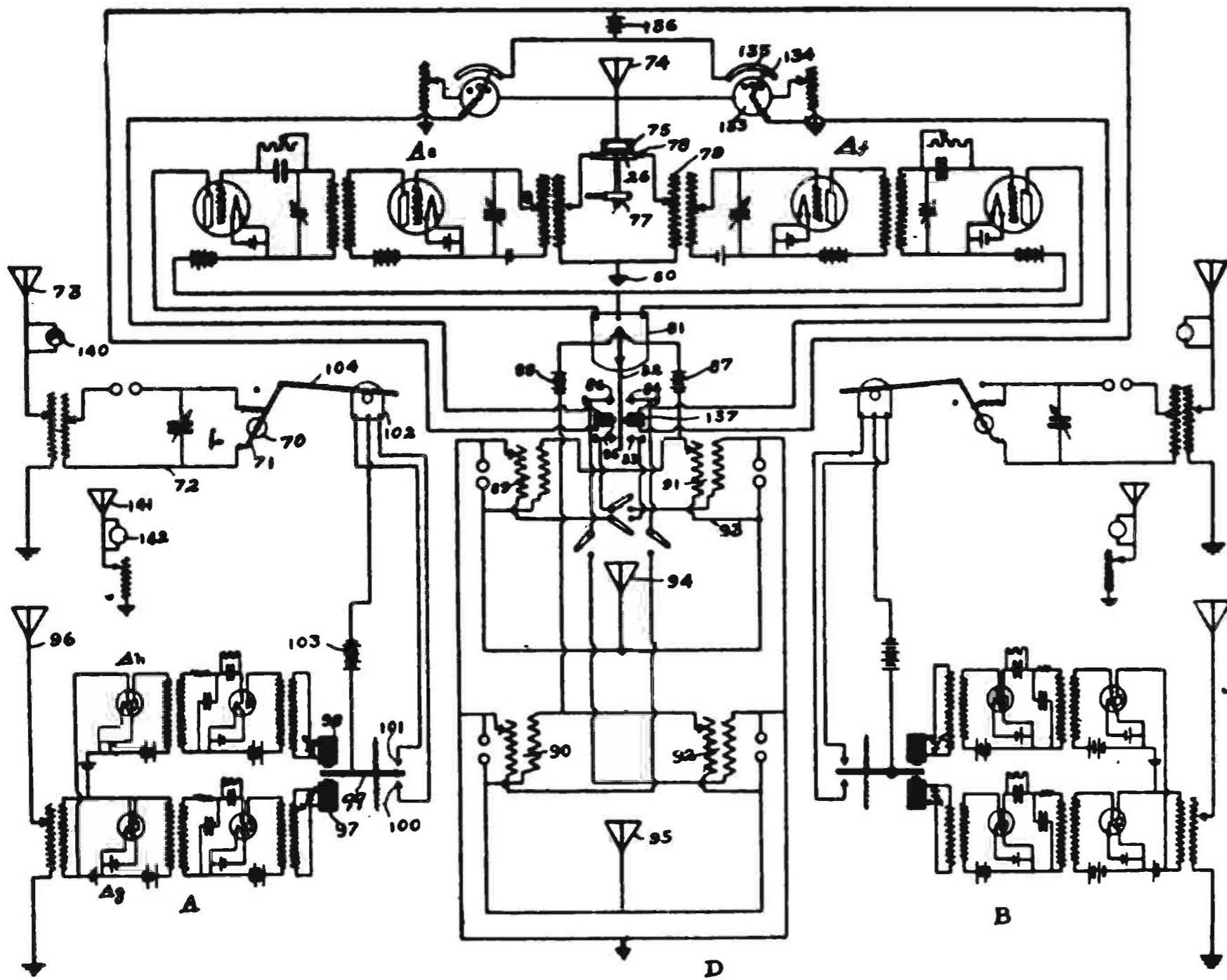
Figure 1 is a diagrammatic representation of circuits and apparatus for carrying out the invention of Dr. Alfred N. Goldsmith. Figure 2 is a detail side view of the rotator of the modulator.

that periodically modulated radiation is capable of being produced; that is, the amplitude of the radiation should be periodically varied at audio-frequency.

This method of modulation may be advantageously applied to apparatus for transmitting from a sustained wave generator, is the belief of Dr. Goldsmith.

* * *

Will Locate Moving Bodies by Radio



Wiring diagram showing the arrangements of the circuits of Mr. Connors's invention at two transmitting stations and a control station.

No. 1,433,070. Patented, October 24, 1922. Patentee: Walter W. Connors, Elizabeth, New Jersey

THE invention of Walter W. Connors is an apparatus for determining the actual location and actual movement of bodies. It will find, also, the actual location of a transmitting or a receiving station. The

tained and represented in miniature. The location and movement of anything movable equipped with a receiving station may be indicated.

The distance of a receiving station from a transmitting station, as well as its geographical location, may be ascertained by

on a map, or chart carried by a moving body, the movements of that body and give its location at any time.

This is one of the most important radio inventions of the day.

* * *

Spark-Gap Improvement

No. 1,428,856. Patented, September 12, 1922. Patentee: Leslie O. Parker, Swissville, Pennsylvania.

MY invention," says Mr. Parker in his patent papers, "relates to wireless apparatus and, particularly, to that class of apparatus which employs two relatively movable electrodes, one of which is stationary and the other a rotatable toothed disk, the teeth of the latter moving past the tip of the stationary electrode to make and break a circuit across a gap located between.

"In order that the make and break shall occur at the peak of the voltage

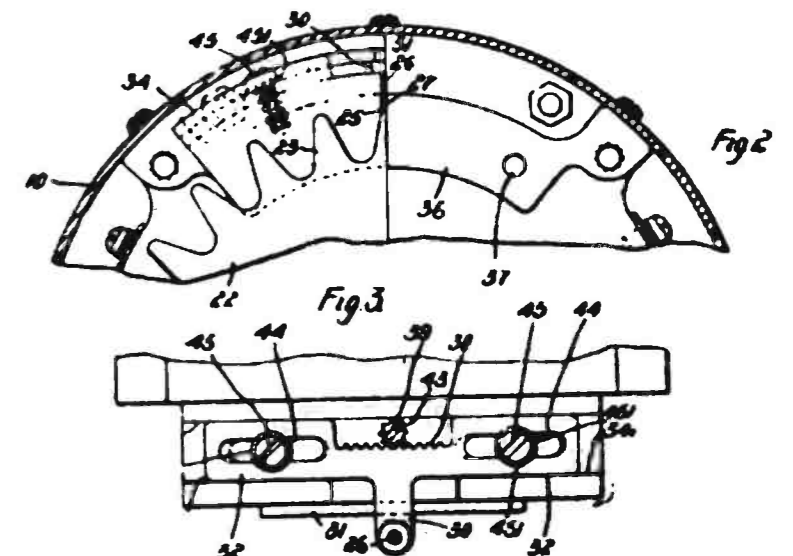
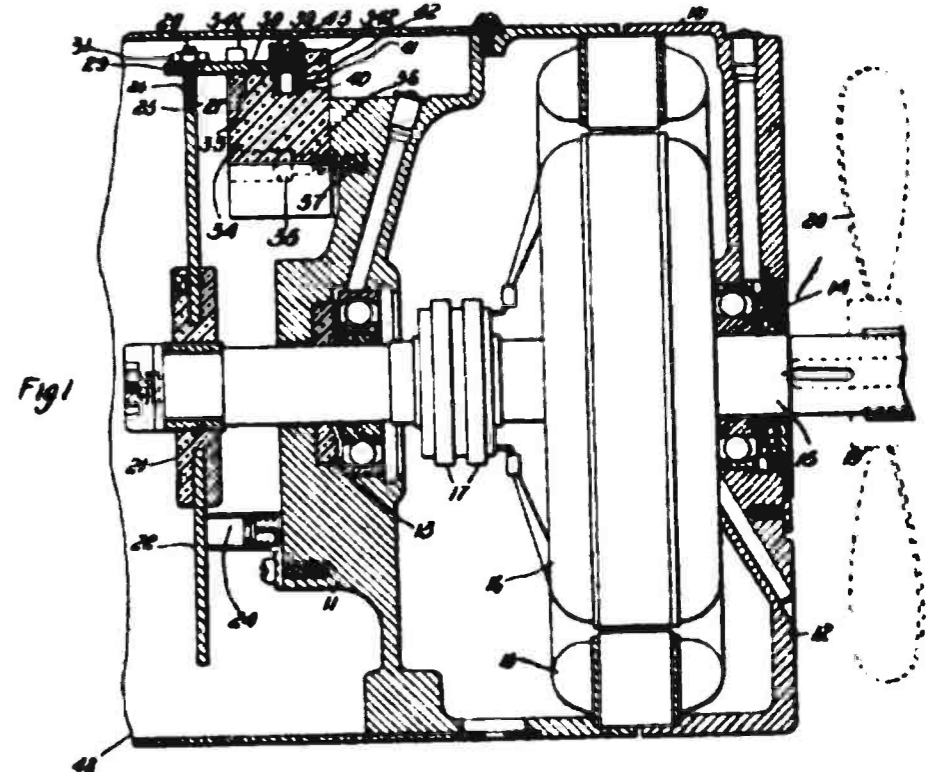


Figure 1 is a longitudinal sectional view of a high-frequency wireless generator equipped with a spark-gap structure embodying this invention, and Figure 2 is detailed view of parts of the generator and the mounting for the stationary electrode.

wave, it is necessary that the electrodes shall be relatively adjustable to permit them to be correctly positioned with relation to each other. This adjustment is usually effected by moving the normally stationary electrode circumferentially of the rotatable electrode.

"My invention is to provide a spark-gap structure in which the normally stationary electrode shall be supported by, and insulated from, the end bracket of an alternator in a simple and inexpensive manner, and so arranged that it is readily adjustable on its support and accessible for inspection and repairs.

East Harlem Radio Club Elects Officers

THE Radio Club of East Harlem, New York City, organized September 20, 1922, has elected the following officers: Harold Itzel, president; John N. Itzel, secretary, and John D. McEvily, treasurer. The club meets every Wednesday at the Federation Settlement, 127 East 106th Street, New York City, at 8 o'clock. Any radio fan who desires to become affiliated with this organization may do so by writing to the Radio Club of East Harlem, Harold Itzel, president, 175 East 111th Street, New York City, for particulars.

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Radio to Decrease News Costs
 Far East and Pacific Island Tolls Now Too Costly for Commercial Relations

THE scheduled agenda of the Commercial Congress of the Pan-Pacific Union, opened with consideration of "Trans-Pacific Communication," introduced by a comprehensive report by V. S. McClatchy, publisher of the Sacramento "Bee," regarding cable and radio service and suggestions for improvements. Particular attention was paid to news communication as foundation for knowledge and understanding necessary for promotion of peace and enduring commercial relations among the nations of the Pacific.

There are two cables across the Pacific—one from San Francisco to Shanghai via Hawaii, Guam and Manila (Cavite); the other from Vancouver to Hong Kong via Australia, both controlled by British interests. One carries news from Canada to Australia for 5 cents per word; the other, from San Francisco to Manila for 27 cents per word.

The British government encourages news interchange with its dominions by forcing the cable companies to give a low rate for the service; for instance, 7½ pence from London to Melbourne. The United States has sought to secure similar results by using its Navy radio for transmitting news between San Francisco and Manila for 6 cents per word; between San Francisco and Honolulu for 3 cents.

The report declared that radio rather than cable must be looked to for the immediate future for increased transmission facilities on the Pacific.

It was pointed out that a request from China would secure the use of the United States radio station at Peking for news interchange with the United States through relay at Manila, pending the time when the Federal Telegraph Company of California will have considered its great station at Shanghai for direct communication with California; that Japan can now use her stations in cooperation with the United States Navy station at Honolulu for news intercourse with Uncle Sam without violating her exclusive contract with the Radio Corporation of America as to commercial messages between the two countries; that in this way news rates with China and Japan could be reduced at once from 32 and 27 cents per word, respectively, to a maximum of 9 cents; that Australia can reach Honolulu now by cable to Suva and wireless through Tutuila, and later by wireless direct through her proposed great station; that the Dutch East Indies and French Indo-China have already contracts with the United States navy for radio communication for commercial messages with the United States through Manila, and that the Navy Department will cooperate in establishing a low news rate with these countries.

Reducing Antenna Resistance

IT is the antenna charging-current at the transmitter that produces the signals at the receiver, and in order to get a large antenna current with tube sets, resistance of antenna systems must be reduced to a minimum. In addition to the usual metallic earth plate a counterpoise, consisting of a number of wires spread on the ground underneath the antenna, will materially reduce the total antenna-resistance. The antenna should be constructed and supported so that its electrical period will not vary through swinging. As will be seen, most of the tube circuits shown in this bulletin use the antenna as the capacity element of the oscillating system.

Subscribe for RADIO WORLD. \$6.00 a year, \$3.00 six months, \$1.50 three months.

PATENT
 Your Radio Ideas.
 Call or Write
FREE ADVICE
 ASK MANUFACTURERS PATENT CO.
 FOR 520 FIFTH AVE NEW YORK

INCREASE YOUR CRYSTAL RANGE
 BY USING A "PT" ULTRA-SENSITIVE CONTACT IN YOUR CRYSTAL DETECTOR
 1. It adjusts in a second.
 2. Secures more sensitive results.
 3. Is almost impossible to jar out.
 Price twenty-five cents silver.
"PT" CRYSTAL CONTACT CO.
 Box 1641 BOSTON 8, MASS.

Those Broken and Burned-Out
Vacuum Tubes Can Be Repaired
 and Guaranteed Tool
 If your dealer does not know, send direct to us.
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 Tubes returned P.P., C.O.D.



HOMCHARGE
 YOUR RADIO BATTERY
 for a Nickel



ENJOYABLE Radio Concerts and Maximum Receiving Range are obtained only when your battery is fully charged. The **RADIO HOMCHARGER DE LIDL** charges your "A" or "B" battery over night. Silent and clean in operation—requires no watching—may be used right in your living room.
 Connects to any lamp socket. Self-polarizing—fully automatic—cannot overcharge or injure the battery.
 Entirely enclosed—approved by Underwriters. Unconditionally GUARANTEED. Lasts a lifetime.
 Beautifully finished in Mahogany and Gold—the most efficient and handsome rectifier ever produced. Bulletin 637 proves it—send for your copy today—IT'S FREE. Sold by all good dealers or shipped prepaid for \$18.50, complete.
 Dealers—Jobbers: The HOMCHARGER Merchandising Plan offers the best proposition in the entire radio field—send for details.
THE AUTOMATIC ELECTRICAL DEVICES CO.
 185 West Third Street Cincinnati, Ohio
 Over 50,000 HOMCHARGERS in Use

NOVO "B" BATTERIES FOR RADIO
 28½-45 & 105 VOLTS
NOISELESS DEPENDABLE GUARANTEED
ASK YOUR DEALER
NOVO MANUFACTURING CO.
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Advertising Rates, Display, \$5.00 per inch, \$150.00 per page

Radio Merchandising

Classified Quick-Action Advertising, 5 cents per word

Telephone Bryant 4796



Let Radio World Test Your Goods

A Chemical Liquid

Manufactured by Krystal-Kleer Co., 2378 Third Avenue, New York City

KRYSTAL-KLEER is a recent chemical discovery used in cleaning crystals when they become covered with oil from handling. It is a combination of chemicals and is very powerful, acting immediately when applied to surface of the crystal. It also makes it sensitive to the slightest touch of the catswhisker. All else needed is an ordinary nail-file. File the surface of the crystal a little, then with a drop of this chemical on a small piece of absorbent cotton, rub the surface thirty seconds.

Completely Connected

Manufactured by W. J. Radio & Mfg. Co., 3020 Fourth Avenue, South Minneapolis, Minn.

A SHORT-WAVE coupler completely connected. Tested out and found to give wonderful results on the broadcast wave-lengths in conjunction with vacuum tubes. All one has to do is mount and connect in circuit. There are no taps to solder; no extra switch at side; no electrical connection to any shaft. Compact and rotor always in center of field. Primary is wound with green silk wire. Of good construction and neat design.

Heard at the Radio Counter

A Conversation Between Customer and Radio Clerk

(Part V)

"CAN you tell me if I may use radio frequency with my set?"

"What type set have you?"

"I have a two-stage regenerative set of the audio-frequency type."

"Not very well. When using radio-frequency, it must be understood that you will have to remodel your whole set. I would advise you to keep the regenerative set you have on hand and start in building a radio-frequency receiver."

"Do you think a radio-frequency receiver is better than an audio-frequency regenerative receiver?"

"For the radiophone broadcast listener, I would suggest building a radio-frequency receiver, for these reasons: In the first place, radio-frequency transformers are made to cover a wave-length range from three hundred to five hundred meters, limiting the power amplification between those wave lengths. Secondly, a loop aerial must be used with this type receiver, due to the high power of amplification which would allow the remarkable advantage of eliminating interference not possible with the outdoor aerial."

"Well, that sounds good. Better get me started on this receiver right away!"

"Very well. Here is your diagram and make-up of the set; also, three radio-frequency amplifying transformers, three tubes, and three sockets."

(To be continued)

Sidbenel Enlarges Plant

THE Sidbenel Radio Equipment Manufacturing Company, Inc., New York and New Jersey, manufacturers of the famous Sidbenel A and B Battery, which proved so successful that they are compelled to increase their production facilities and enlarge their plant in order to catch up with the demand for their batteries and various other products.

This firm has acquired the services of Sidney Isaacson, a prominent battery engineer. He has been appointed general sales manager for Greater New York, with offices at 1663 Jerome Avenue, Bronx, New York City.

New Firms and Corporations

(The firms and corporations mentioned in these columns can be reached by communicating with the attorneys, whose addresses are given whenever possible.)

Automotive & Radio Manufacturing Corp., Wilmington, \$1,000,000. (Corporation Trust Co. of America.)

H. W. Wolcott & Co., Buffalo, electrical and auto works, \$30,000; H. W. Wolcott, A. G. Wickman. (Attorney, G. G. Smith, Buffalo.)

Multiple Battery Sales Corp., Manhattan, \$10,000; J. F. Russell, Jr., N. D. Sturges, J. W. Smith. (Attorneys, Lowther & Smith, 35 Nassau St., New York, N. Y.)

Rieger Research Corp., Manhattan, physics, electrical and chemical research, \$20,000; J. T. MacEvoy, F. L. Judd, H. S. Michaels. (Attorney, F. Klein, 277 Broadway, New York, N. Y.)

Radio Advertising Co., advertising, \$60,000; Philadelphia, Pa. (Corporation Guarantee and Trust Co.)

Weinig-Urban Electric Co., Buffalo, \$10,000; R. G. Urban, R. P. Bagley, F. Truscott, Jr. (Attorneys, Messrs. Angrot, Buffalo.)

Sturges Battery Corp., Wilmington, electric machinery, \$3,000,000. (Corporation Trust Co. of America.)

Burrows Electric Co., Buffalo, \$15,000; E. S. Burrows, F. A. Gannah. (Attorney, C. J. Kennedy, Buffalo.)

Recording Instrument Corp., Roselle, N. J., manufacture speed and distance instruments, \$700,000; Horace H. Smith, New York; Anthony F. Wallbillich, Newark; Martin Czaring, Roselle, N. J.

North Park Electric Shop, Buffalo, \$6,000; H. J. Terschliesen, R. W. H. Campbell, H. C. Schuhr. (Attorneys, Sullivan, Bagley & Wechter, Buffalo.)

American Radio Products Corp., Wilmington, \$250,000. (Delaware Registration Trust Co.)

Change of Name

Triangle Radio Equipment Co. has changed its name to Educational Radio Corporation, New York.

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.

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. Colwell & Korbell, Fisk Building, New York City, directors of publicity.

INTERNATIONAL RADIO SHOW, Madison Square Garden, New York City, November 20 to 25, inclusive. E. C. Buchignani, director of publicity.

SOUTHEASTERN RADIO EXPOSITION, Auditorium Armory, Atlanta, Georgia, December 4 to 9, inclusive. Co-operative Radio Sales Assn., 296 Peachtree St.

SECOND DISTRICT RADIO CONVENTION, Hotel Pennsylvania, New York City, March 1, 2, and 3, 1923.

GREAT ADVERTISING MEDIUM
RADIO WORLD's special issue, "Holiday Radio Gifts Number," issued on December 9. Copy received up to November 29.
RADIO WORLD, 1493 Broadway, New York.

What One Advertiser Writes About Radio World Results

CHAS. FRESHMAN COMPANY

Incorporated
97 Beekman Street
New York City

November 7th, 1922.

Radio World,
1493 Broadway, New York, N. Y.

Gentlemen:—We wish to thank you for your successful effort in getting additional advertising copy on our Variable Grid Leak and Micon Condenser in your publication to appear in the issue of Saturday, November 11th, 1922.

The reason that we sent you the copy at such a late date was that it has been our policy to advertise only one of our various products in each magazine, and we had an advertisement running on our Noiseless Tested Micon Condenser for your coming issue.

The results that we obtained from our first advertisement of the Variable Grid Leak and Micon Condenser combined were so great that we did not want to miss the opportunity of having it re-appear in the current issue.

It might interest you to know that outside of the general publicity that our Variable Grid Leak and Micon Condenser combined received from the first advertisement in your publication that we have received hundreds of direct orders from individuals and payments enclosed mentioning the fact that they saw the advertisement in RADIO WORLD. These inquiries came from all sections of the country.

We wish to congratulate you on the exceptional distribution of your publication.

Yours very truly,

CHAS. FRESHMAN COMPANY, INC.

(Signed) Myron Goldsoll
Vice-President in Charge of Sales

MG:JJ

"Decrease" in Broadcasting Not Bothering Department of Commerce

THE question whether or not broadcasting will die out may be bothering some people, but not the United States Department of Commerce. During October, 56 stations were licensed to broadcast, and 22 dropped out. This indicates that the industry is increasing by about 24 stations a month.

On November 3, there were 553 broadcasting stations operating, 19 of them on 400 meters under Class B, and the balance on the old 360-meter wave. During the week ending November 4, eleven new stations were licensed to broadcast.

With the cessation of the Corinth Radio Supply Company's station WHAU, Mississippi comes off the broadcasting map, there now being no broadcasting station in that State. It is the only State, today, without a station. States with single stations are Delaware, Wyoming, New Hampshire, and Vermont—all others having two or more. California is still in the lead. The new broadcasting stations licensed and those discontinued follow:

Supplemental List of Limited Commercial Stations on 360 Meters

- KFFE—Eastern Oregon Radio Co., Pendleton, Oregon, 100 watt.
 WMAZ—Mercer University, Macon, Georgia, 750 watt.
 WPAF—Peterson's Radio Co., Council Bluffs, Iowa, 10 watt.
 WSAS—State of Nebraska, Lincoln, 250 watt.
 WNAS—Texas Radio Corporation and Austin Statesman, Austin, Texas, 100 watt.
 WRAR—Thomas, Jacob Carl, David City, Nebraska, 20 watt.
 KFCF—Moore, Frank A., Walla Walla, Washington, 50 watt.
 KYO—Electric Shop, Honolulu, Territory Hawaii, 40 watt.
 WPAB—Pennsylvania State College, 1 watt.
 WWAC—Sanger Bros., Waco, Texas, 50 watt.

New Class B Station on 400 Meters

- WBZ—Westinghouse Electric & Manufacturing Company, Springfield, Massachusetts, 600 watt.

List of 22 Broadcasting Stations Deleted During the Month of October

- WGAV—B. H. Radio Co., Savannah, Georgia.
 WHAJ—"Daily Telegraph" and E. K. Kitts, Bluefield, West Virginia.
 WHAU—Corinth Radio Supply Co., Corinth, Mississippi.
 WDAT—Delta Electric Co., Worcester, Massachusetts.
 WHU—The Wm. B. Duck Co., Toledo, Ohio.
 WJT—Electric Equipment Co., Erie, Pennsylvania.
 KQT—Electric Power & Appliance Co., Yakima, Washington.
 WPL—Fergus Electric Co., Zanesville, Ohio.
 WLAB—Grossman, George F., Carrollton, Missouri.
 WDAD—Harrison, Wm. Louis, Central Kansas Radio Supply, Lindsborg, Kansas.
 KYG—Willard P. Hawley, Jr., Portland, Oregon.
 WHAX—Holyoke St. Ry. Co., Holyoke, Massachusetts.
 WWT—McCarthy Bros. & Ford, Buffalo, New York.
 WIAP—Radio Development Corp., Springfield, Massachusetts.

WBAM—I. B. Rennysen, New Orleans, La.

WHQ—Times Union, Inc., Rochester, New York.

KFBF—F. H. Smith, Butte, Montana.

WCAN—Southeastern Radio Telephone, West Forsyth St., Jacksonville, Florida.

KOE—"Spokane Chronicle," Spokane, Washington.

WIAL—Standard Radio Service Co., Norwood, Ohio.

WDAB—H. C. Summer & Son, Portsmouth, Ohio.

WBZA—Times Despatch Publishing Co., Richmond, Virginia.

Entrants for the "Receiving Record"

EDITOR RADIO WORLD:—I am a reader of RADIO WORLD and am deeply interested in radio. I have noticed from time to time, different articles on reception of broadcasting stations and articles by some one who claims records for receiving.

I am now driving at the article in RADIO WORLD, No. 31, dated October 28, where Mr. J. A. Merklein claims a record and says that on October 16, 1922, he happened to tune out WJZ and get WDAP of Chicago, and WSB of Atlanta, Georgia, on detector tube and 110 volts and two variometers.

I am not claiming any record, as there

are others who may have done better; but I have him snowed in. Kindly ask him to take notice that I use only the detector tube and one coil 4 inches in diameter and 2 inches wide, two variable condensers and only 69 volts.

The following are stations heard clearly any night they are on and the weather clear: WOC, Davenport, Iowa; WSB, Atlanta; WDAP, Chicago; WWJ, Detroit; WLK, Indianapolis; KDKA, Pittsburgh; WGY, Schenectady, New York; WGI, Medford Hillside, Massachusetts; WBAD, Minneapolis, Minn.; WOZ, Richmond, Ind.; WIP, Philadelphia; 4CL, Commerce, Georgia; WJAR, Providence, Rhode Island; WOO, Philadelphia; WGR, Buffalo.

This does not include stations in and around New York City. And also, these stations have been verified. And cold weather has not set in yet for good results.

I am also able to tune out the stations around New York and Newark, if not wanted. That is, if I want WJZ I can tune out WEAJ or the opposite, or both, and get WOR.—Walter George McKinley, 47 West 37th Street, Bayonne, New Jersey.

* * *

EDITOR, RADIO WORLD:—We do not claim to beat the receiving record of Mr. Merklein, but think that we are getting excellent results with the outfit we are using: 4-wire L-type aerial, 40 feet long, 25 feet high. 3-coil tuner with two condensers. Receive, Boston, Springfield, Detroit, St. Louis, Davenport, Pittsburgh, and Atlanta—all on the detector alone. Using 3-tube set, we receive Atlanta loud enough to be heard all over the room with Baldwin phones. Chicago, KYW, we are unable to receive with less than three tubes.—Emmett L. Miller, Chappaqua, New York.

Remember "This Is a Radio Christmas"

and that millions of dollars will be spent during the holiday time for radio gifts.

Why not get your share of this business by advertising in the issue of RADIO WORLD of December 9, which will be a

HOLIDAY RADIO GIFT NUMBER?

Thru this medium you can reach thousands of readers, who are not only interested in radio themselves, and want new equipment, but who also will give presents to others whom they wish to make radio fans.

ADVERTISING RATES:

Regular advertising rates in force for RADIO WORLD'S HOLIDAY RADIO GIFT NUMBER, as follows:

\$150 a page, \$5 an inch. Discount, 10% four times, 15% thirteen times.

Forms close Wednesday. Published following Wednesday.

Classified ads. five cents a word.

Take advantage not only of RADIO WORLD'S circulation, but also its cash-thru-the-mail pulling power.

Be represented in RADIO WORLD'S Holiday Radio Gift Number, and reach the many thousands who actually want your goods and are ready and willing to pay for them.

Preferred Positions Must Be Booked Immediately.

Copy for run-of-paper positions will be received up to November 29.

RADIO WORLD, 1493 Broadway, New York

VARIOCOUPERS

READY FOR WIRING

Genuine Bakelite Tube, 4 in. x 3 in., Rotor Ball; All Necessary Brass Hardware, Base Brackets, etc.

\$1.50 Complete Set—10c. extra for postage.

ARROW WIRE & RADIO COMPANY
163 7th Ave. New York City, N. Y.**VARIOMETERS**

READY FOR WIRING

3 Mahogany Stators, 4 1/4 in. x 1 1/4 in.; Mahogany Rotor Ball; All Necessary Brass Hardware and a Winding Form included.

\$1.50 Complete Set—10c. extra for postage.

ARROW WIRE & RADIO COMPANY
163 7th Ave. New York City, N. Y.**R-C CABINETS**

Mahogany Phonograph Quality Finish. No Drilling of panels for attaching required. Hinged top.

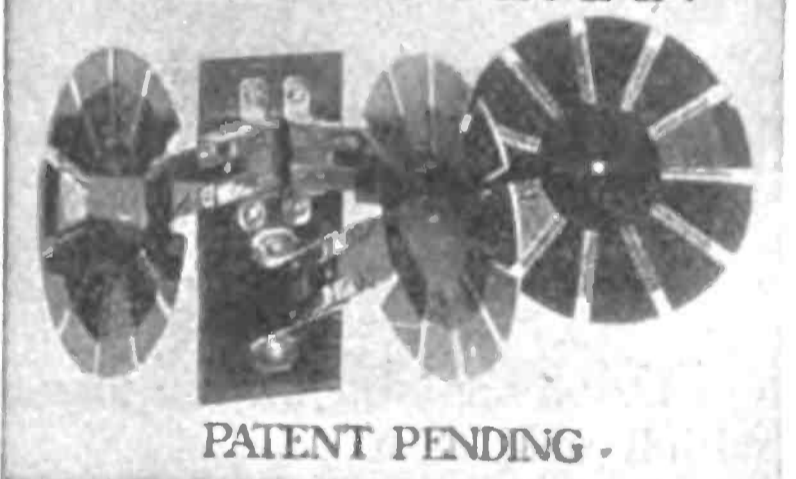
RETAIL PRICES

7x6	\$2.50	7x14	\$3.00
7x10	\$2.75	7x18	\$3.00
		7x21	\$4.00

If your dealer cannot supply you, order direct.

THE R-C MILLSExecutive Offices, 30 E. 23d St., New York, N. Y.
(Mention RADIO WORLD)**'BECO'****RADIO FREQUENCY SET**

175 to 500 Meters

2 Radio Frequency
2 Audio Frequency and Detector
All on 3 Tubes.**Bissell Engineering Company**
161-167 W. 64th STREET, NEW YORK**THE GOODMAN**

PATENT PENDING

The Niftiest Short Wave Tuner on the Market
Only \$6.00 & PP on 1 lb. Send for pamphlet.**L. W. GOODMAN**
DREXEL HILL, PA.

Major _____, Halifax, N. S., writes: Delighted. Received Schenectady clearly on one tube first time I tried the GOODMAN. Would have saved money by buying sooner.

3000 Ohm Sets \$3.98PLUS 20 CTS. POSTAGE AND PACKING
Satisfaction Guaranteed or Money Back.

We mail phones the day your order arrives. Every pair tested, matched and guaranteed as sensitive as \$8 to \$10 Sets. Circular Free.

Tower Mfg. Company

113 STATION ST BROOKLINE, MASS.

For more information, write for \$6.00. Sub. De-
partments, Radio World, 1493 Broadway,**Answers to Readers**

WILL you furnish me with directions to make a loose coupler for the following receiving sets: Two audio-frequency transformers, 3 6-ohm rheostats for filaments, .0005 mfd., variable condenser, grid condenser and leak, lightning arrester, one pair of 3,000-ohm phones. I have 2 tubes, 8 inches long. The diameter of primary is 4 inches and the diameter of the secondary is 3 inches. How many turns to a tap are necessary on the secondary coil?—Morris Siegel, Tacoma, Wash.

For the primary, wind 110 turns on the 4-inch coil, using No. 26 double-cotton covered wire. Use 10 taps of 10 turns each, and 10 taps of 1 turn each. For the secondary, wind on the 3-inch coil, 100 turns of No. 30 double cotton-covered wire, tapped with 10 taps of 10 turns each. Use your .0005 variable condenser across the secondary coil. These coils should give you a tuning range up to 1,000 meters.

I have just finished building a standard short-wave regenerative set, using a vario-coupler of some 60 turns on a primary 4 inches in diameter; and 50 turns on a 3-inch secondary. I am using No. 24 wire on the secondary and No. 22 wire on the primary. My aerial is of the outdoor type, 20 feet long with a 15-foot lead-in consisting of 5 wires. This gives a 100-foot length. There are times when I hear code, but I seldom hear broadcasting. Possibly this is because my aerial runs over a tin roof. What is my approximate wave length? Why can't I hear the broadcasting stations.—Paul Roelser, Baldwin, Pennsylvania.

The inductance of your coupler primary is, approximately, 450 microhenries; and of the secondary, 220 microhenries. To just what wave lengths the primary will tune, is merely guess work. Your antenna, undoubtedly is very poor. Doubling the wire back and forth makes the inductance low, neither can the capacity be very large. The best way is to run the aerial, in one stretch, about 100 feet and keep it clear from the tin roof. Then you may tune to 600 meters. We recommend a .0005 variable condenser across the secondary. With this, you should be able to hear broadcasting.

Let me know the wave length I can tune up to with the following equipment: Vario-coupler, crystal detector, primary with 13 taps of 10 turns each on a 4-inch tube, 23-plate condenser shunted across secondary. My aerial is 150 feet long, 8 feet above the roof of a 4-story house. The lead-in is 10 feet. The fixed condenser is shunted across phones?—Michael McCarthy, New York City.

With such a receiver, you should be able to tune up to approximately 800 meters.

I have just completed a crystal set but can hear nothing in the way of music—only noise. My antenna is of seven-strand copper wire, about 80 feet long. The lead-in is of No. 14 copper, as short as possible. My ground is bell wire and is run over the kitchen floor connecting with the water pipe. Is this O. K.? Is the ground connection the right size of wire?—Francis Molaka, Rome, New York.

There is nothing wrong with your hook-up. It is another case of poor location for reception with a crystal set. Probably you are too far from any of the broadcasting sta-

tions. Improvements on your set might help you. Go over all your connections. According to the Fire Underwriters' rulings, your ground lead must be, at least, No. 14 copper wire. The length of your lead-in should be made shorter.

Is there a broadcasting station in Porto Rico?—Hans Mulinos, Tampa Florida.

We know of one station, WGAD, operated by the Spanish-American Radio School.

Can I use honeycomb coils to load up my aerial circuit to receive Fort Wood? Where should these coils be placed?—Anxious.

You can load up to this wave length, which is 1,450 meters, by inserting a honeycomb coil in the aerial circuit. If you are using a vario-coupler, you will also have to load up the secondary coil. This is, of course, for the plain type receiving set. It cannot be done with your type receiver, as yours is of the variometer make.

I have a two-stage amplifier with a regenerative set. I hear music and speeches at a distance of 50 to 75 feet on clear nights. I

(Continued on following page)

"WEB" CRYSTALSBest Crystal Yet. Single Mountings of Galena, Silicon & Iron Pyrites
Sold under a replacement guarantee; at all dealers or by mail direct on receipt of
PRICE, 25cDistributed by
WALTER E. BATHGATE
ROOM 42, 8 CHURCH ST., NEW YORK CITY
Manufacturers, Jobbers, Dealers write for prices.**Triple Mounted SHAMROCK CRYSTALS**Triple mounting of the three crystals—Galena, Silicon and Iron Pyrites.
Sold under a replacement guarantee; at all dealers or by mail direct on receipt of
PRICE, 50cDistributed by
WALTER E. BATHGATE
ROOM 42, 8 CHURCH ST., NEW YORK CITY
Manufacturers, Jobbers, Dealers write for prices.**RHEOSTATS—SOCKETS
POTENTIOMETERS
SWITCH LEVERS****ROYHELE MFG. COMPANY**
Mfrs. of quality products
169 Mercer Street New York City
Write for prices—Representatives wanted**PHANTOM-CIRCUIT**BUILD YOUR OWN. This marvel of mystery, using no aerial, no loop, no ground, brings in music instead of static showers. We consistently hear concerts on Magnavox, from stations 550 miles distant, audible 100 feet from horn. The simplicity of this set will surprise you. No radio frequency. Complete instructions with photo of circuit sent prepaid for 60c.
VESCO RADIO SHOP, Box W-704, Vanville, Calif.**That Armstrong Circuit**

So much interest has been displayed in the special article, "TESTED INVENTION OF MAJOR ARMSTRONG AMPLIFIES SET 100,000 TIMES," by John Kent, that appeared in RADIO WORLD No. 18, dated June 24, 1932, the publisher decided to put aside a number of copies for those who were not able to get this issue when published. Copies will be sent, postpaid, on receipt of 15c. or send in your subscription, \$6.00, for one year (63 issues), \$3.00 six months, or \$1.50 three months, and subscription will be started with the issue containing the article about Major Armstrong's Amplifier.—RADIO WORLD, 1493 Broadway

RADIO WORLD IN THE PUBLIC LIBRARIES

Many public libraries throughout the country are sending in their subscription orders for RADIO WORLD.

Librarians evidently have made up their minds that the visitors to their libraries are anxious to read articles about and see pictures of the latest developments in radio when they are news.

If your library has not placed RADIO WORLD on file, tell your local librarian how interesting and important is this once-every-seven-day radio paper.

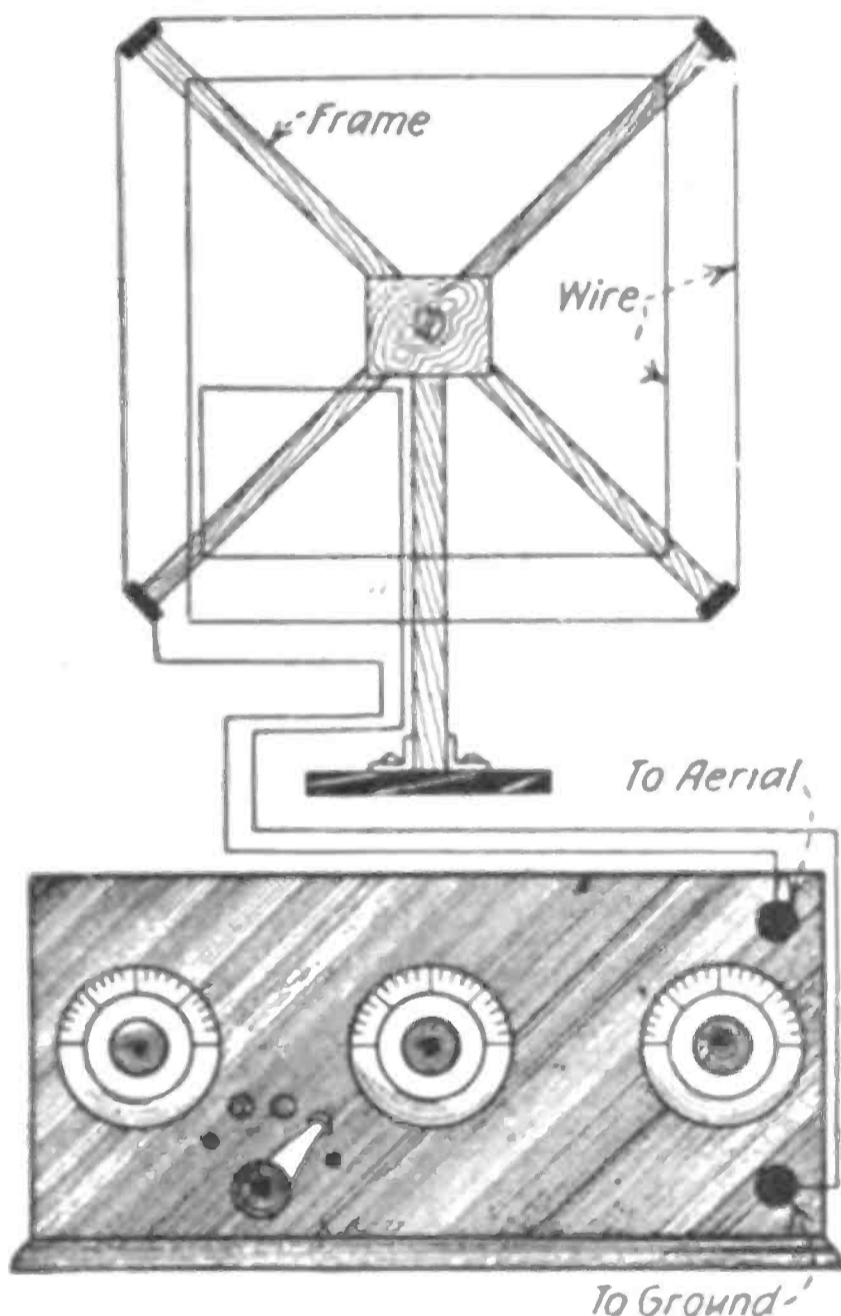
Address: RADIO WORLD, 1493 Broadway, New York, N. Y.

Answers to Readers
(Continued from preceding page)

wish to add a third step. I have heard that a power tube (U-V 202) will increase the volume of sound better than with an ordinary U-V 201 amplifying tube. Which would you advise? Which is the lowest voltage necessary to operate the plate of the U-V 202 tube? Will an Acme transformer be suitable? Will Western Electric phones stand the strain of the diaphragm? What are the advantages of using a power tube in the last step?—George Siebert, East Orange, New Jersey.

The power tube would give you greater amplification than would the ordinary U-V 201, as it allows much more current to flow through the plate circuit. The 202 tubes operate best with a plate voltage of 350 volts. By lowering this voltage, the results are lowered considerably. The transformer you mention is all right. The phone may not be strained, but why waste such power in a pair of phones when a loud-speaker will give you just as much volume?

In my circuit of a "super," how should the loop aerial be connected to the set? Is there any special connections from the loop? How can it be used?—George Moerling, Glens Falls, N. Y.



Design to show windings, also connections from loop, as requested by Mr. George Moerling.

The accompanying illustration shows how the connections are placed on the set you describe, utilizing the loop aerial.

Where is the broadcasting station with call letters OKYX.—Fred Edwards, Lostine, Oregon.

There is no such call letter assigned to any station as yet.

In making up the Armstrong superregenerative receiver, I have experienced a "peanut whistle." This sometimes develops into a sound like a hiss or a water fall. My tickler coil, or ball, is 4 inches in diameter wound with No. 24 enamel wire and has about 90 turns. The filter condenser is not affected; neither is the potentiometer which feeds the coupler.—Vincent Galloway, Omaha, Nebraska.

The "peanut whistle" you describe is the correct whistle to obtain. It should not be very strong, but it proves that your oscillating tube is O K; or as we say "She notes." The connections are correct. We suggest that you get the switches on the primary of the vario-coupler at the exact adjustment for 360 meters, otherwise you will get nothing but the whistle. If there is a very great

difference even the whistle will be blotted out. The final tuning will be done by means of the loop condenser and the feed-back coil, which, of course, is the rotor of your vario-coupler. Try changing the connections around on the rotor. It may be that the winding of the secondary is opposed to that of the primary.

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 broadcasted within 30 miles.

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

GUARANTEED, TESTED CRYSTALS
Galena and 20c.
Radiocite..

Radi-O-Plate Panels. All sizes cut to order.
Holloway Electric Supply Co., Inc.
226 Third Avenue New York City

VARIO COUPLERS



GEM
\$1.25
List

We also make 6 other styles
That List \$2.50 up
Jobbers—Dealers—Agents

Write for Discounts

Jewell Radio Sales Co.
90 West St. New York City
Phone Rector 1886



I Want a Radio Worker In Each
Community To Work For Me

My work fits in nicely for those men and women who have spare hours or full time at home and wish to earn from \$5.00 to \$40.00 weekly, depending on time you devote to it. It is not radio work, but I believe anyone energetic enough to interest themselves in Radio will make an excellent "TANGLEY BRANCH MANAGER," to operate a branch for us in their home. Pleasant, easy work, no canvassing, immediate profits. No experience or special talents necessary. We furnish complete outfit, train you for the work, and assist you in building up a business you will be proud of. Don't wait until another grasps this offer, write today for literature, and make your spare hours earn.

TANGLEY CO., 187 Main, Muscatine, Iowa

No Experience Necessary Full or Spare Time at Home

"TUNING IN"

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

"POST SOLDERING IRON"

(The Iron with the Platinum Heating Unit). Removable Soldering Tip



1/2 Actual Size
LIST \$6.00

Designed especially to cover every requirement for delicate work. The smallest practical, efficient instrument on the market. Attaches to any socket. Universal current. Fully guaranteed. From your dealer, jobber or write

POST ELECTRIC COMPANY

30 EAST 42ND STREET, Div. 500

NEW YORK

FILL OUT AND MAIL NOW

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RADIO WORLD

RADIO WORLD

1493 Broadway, New York City.

Please send me RADIO WORLD for months, for which

Please find enclosed \$

SUBSCRIPTION RATES:

Single Copy\$.15
Three Months1.50
Six Months3.00
One Year (12 Issues)..... 6.00
Add \$1.00 a Year for Foreign and Canadian Postage.

During the Month of December

22½ Volt "B" Battery

FREE

with \$15.00 purchases

SPECIAL XMAS CRYSTAL SETS

Complete with phone, newest type.....\$12.50
 Complete with head set, Volta make..... 15.00
 Federal, with head set..... 17.50
 Aeriophone, with head set..... 12.00
 You are going to be well pleased with any of the above sets, they are all tested before leaving our place, Aerial when buying set....2.50

SPECIAL XMAS TUBE SETS

Complete with head set and tube, Volta make\$27.00
 Westinghouse R. C. with tubes.....100.00
 Aeriophone, three tube set, and loud speaker, with tubes 75.00

SPECIAL XMAS KEY AND BUZZER SETS

You will be well pleased with what we offer for\$0.00
 You are sure to like the Blinker type, with bulb 1.25

PHONOGRAPH ATTACHMENTS

For single phone, fits any Phonograph or phone\$0.75
 For Double Phone, fits any Phone or Phonograph 2.00
 For just one phone to attach on Horn (state what make phone) 1.50

COMPLETE RADIO SETS

in Upright Phonograph Cabinet

Beautiful mahogany cabinet encloses the Tuner—3 stage Amplifier, Storage Battery—"B" Batteries, G. E. Battery Charger, loud talker, 4 vacuum tubes. All accessories required for installing the outfit are supplied. These outfits, when shipped within 20 miles of New York City, are installed free of charge. With one year service guarantee.

Above Prices Are Good Until Christmas

TRIPLE COIL MOUNTINGS

Complete with Flexible Leads \$2.50

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Western Electric, brand new in sealed boxes. \$0.00
 Federal, 2200 ohm, brand new in original boxes 5.00
 Seibt, imported set, adjustable..... 8.00
 Kellogg, lightest head set made and perfect throughout 8.00

LOUD SPEAKERS

MAGNAOX, type R3.....\$33.00
 King Amplitone, were \$12.00..... 7.50
 STANDARD OR ARKAY 2.50

DUO LATERAL COILS

DL-25, 35 and 50.....\$0.35
 DL-75, 100 and 200..... .50
 DL-25085
 DL-1250 1.35
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DL COIL PLUGS

Complete with strap \$0.50

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 Call at our store. We shall be very glad to show manufacturers. Get the what you want at Manufacturer's quote prices.

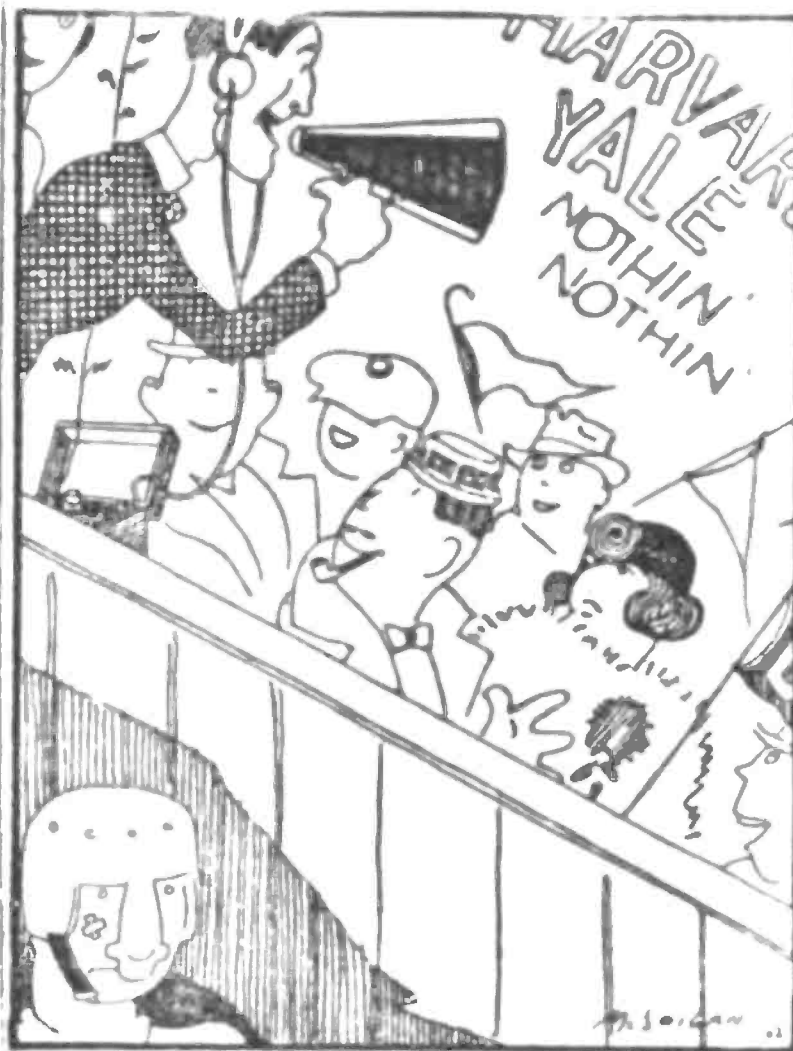
ALLIED RADIO COMPANY, INC.

Dept. D, 445 SEVENTH AVENUE, NEW YORK CITY, Fitzroy 3731

Broadcast Bill's Radiolays

By William E. Douglass

FOOTBALL never used to make much of a hit with me; I liked baseball an' shinny, but what I could never see wuz why those fellows had to go out on the field to fight. Why couldn't they put the gloves on, then stand up an' do it right? But last year when I bought this set an' started in to listen to football games sent play by play I saw what I'd been missin'. Now I can tell you every game them college fellers play—you never ketch me very far from my set Saturday. The "Demons" here in Brussels Sprouts are playin' every week; we've trimmed the "Canton Warriors" an' the team from Quivver Creek. The "Tigers" down at Goose Grease Creek were all we had to fear until we played 'em Saturday, the big game of the year. On Fri-



day night I strung some wires right near the home town bleachers to use as an antenna an' pick up the football features as they were bein' broadcasted by Station XYZ, an' that way keep the crowd informed on games they couldn't see. The game between the "Tigers" and the "Demons" wuz the one to tell which team, this year, would be the county champion. So you see it meant a lot for Brussels Sprouts to win an' keep on bein' Champions like we have always been.

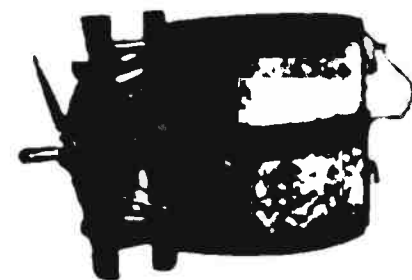
Before our game had started I tuned in a sending station to show 'em how my set would work when gettin' information. An' then our boys come on the field, the game wuz 'bout to start so I left Min to mind the set because you know my part whenever there's a big game is to lead 'em in the cheers. I guess that's why our team has never lost in all these years. I led a snake dance on the field between the halves while Min wuz gettin' all t college scores as fast as they come. She give a kid a dollar so's to telegraph that station to broadcast out our football scores all over this here nation an' t 'em we were winnin'—had the "Tigers" the run. Well, sure enuf, they did 'fore the second half begun.

(Copyright, 1922, Westinghouse Electric & Manufacturing Company)

5 Instruction Books of the RADIO READING COURSE \$1.97

Learn how to design, construct, install, operate and maintain all kinds of radio apparatus. No tedious study. A complete radio education. Course edited and approved by Prof. J. H. Mersereau. Up-to-date, accurate, complete. SEND NO MONEY. Just send your name and address and pay postman only \$1.97 and you own this five-book Radio Library. Write today, Dept. RW4.

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A Completely

connected coupler. Simply mount and connect in circuit. No taps to solder, no extra switch at side, no electrical connection to any shaft. Compact and rotor always in center of field. 90 turns No. 22 green silk wire on primary.

Postpaid
 Complete with indicator arm..... \$6.50
 Same coupler with rotor toward one end without special connections..... \$3.50
 Knockdown coupler with printed winding directions, complete, less wire..... \$1.50

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3020 Fourth Ave., So. MINNEAPOLIS MINN.

Do Your Buying At PERMANENT RADIO FAIR

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Buyers — Dealers — Radio Department Managers, Demonstrations of Any of the Products of the Exhibitors. Only Products of Representative Manufacturers Are on Display.

Nearly 100 Manufacturers
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THE ATLANTIC & PACIFIC ACME OF PERFECTION RADIO COMPANY

Electrical engineer specializing in radio work just as the turbine engineer is a mechanical engineer specializing on turbines. Radio engineering requires a very high-grade of school training. To be a success—and being a success means more than just getting away with it—the radio engineer must be able to tackle any kind of a radio engineering job, from the making of a simple receiver, scientifically designed, to the complete laying out of a high-power arc, spark, or vacuum tube, trans-oceanic or continental transmitter. Not only must he be an electrical engineer of high calibre, but he must be of a high type of individual intellectually. Many of the so-called radio engineers are out of jobs for the reason that they are unable to make an approach good enough to land them a job or because they are unable to write an ordinary business letter in ordinary English.

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WORLD, 1493 Broadway, N. Y. C.

RADIO WORLD

TELEPHONE, BRYANT 4798
 PUBLISHED EVERY WEDNESDAY (Dated
 SATURDAY OF SAME WEEK)
 FROM PUBLICATION OFFICE,
 1498 BROADWAY, NEW YORK, N. Y.
 BY HENNESSY RADIO PUBLICATIONS
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 FRED S. CLARK, Secretary

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 1498 Broadway, New York

ASSOCIATE EDITORS:
 Robert Mackay Fred. Chas. Ehlert

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

The New Wireless

I BOUGHT a brand new wireless for the
 kid,

And started in to rig it up with vim;
 I stretched the copper wire two hundred
 feet,

And bought receivers made to listen in!
 I got a tuner and a finder thing,
 And read a lot about galena point;
 I jabbed the needle and I whirled the knob,
 But couldn't get the outfit into joint!

Then twice I got new batteries and worked,
 And once I caught a faint KDKA;
 It sounded like an SOS from Mars,
 And seemed to be a million miles away!
 I bought a new galena point and monkeyed
 With wires and grounders fastened to a
 pipe;

I got a two-way switch to stop the light-
 ning,
 But couldn't get the thing to work just
 right!

I got a longer wire stretched for receiving,
 And painted the arm-piece with paraffine;
 I got some lead and soldered on the ground
 wire,

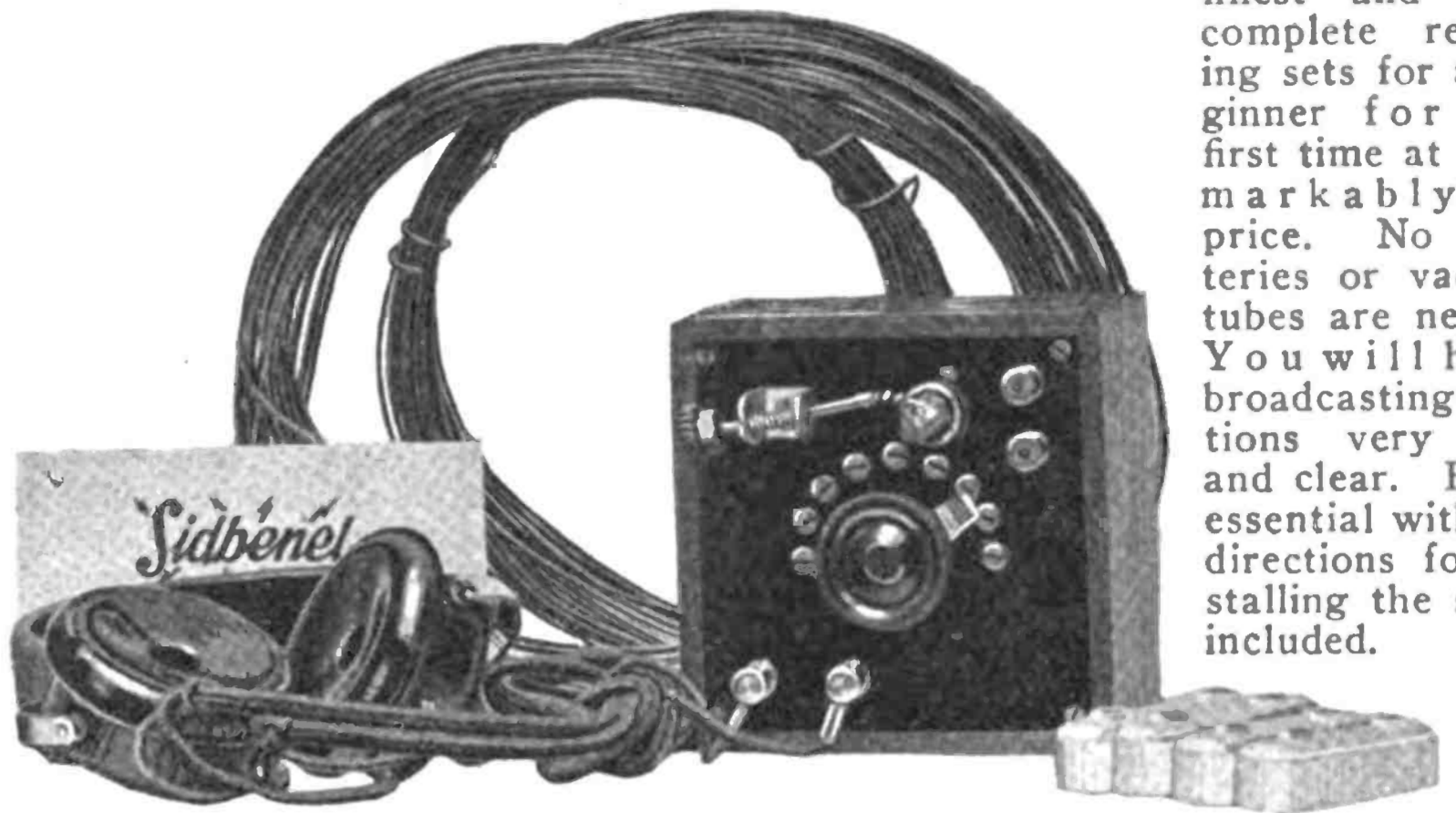
And licked up wireless dope complete
 and clean!
 And every night at eight we worked and
 listened—

The kid would laugh and I would fume
 and fret;

I hate to call myself a wretched quitter,
 But I haven't got that wireless working
 yet!

\$25.00 Radio Set for \$8.25

FOR TWO WEEKS ONLY



The famous Sid-
 benel Company
 offers one of the
 finest and most
 complete receiv-
 ing sets for a be-
 ginner for the
 first time at a re-
 markably low
 price. No bat-
 teries or vacuum
 tubes are needed.
 You will hear
 broadcasting sta-
 tions very loud
 and clear. Every
 essential with full
 directions for in-
 stallating the set is
 included.

SPECIFICATIONS

Aerial wire—150 feet hard drawn pure cop-
 per.

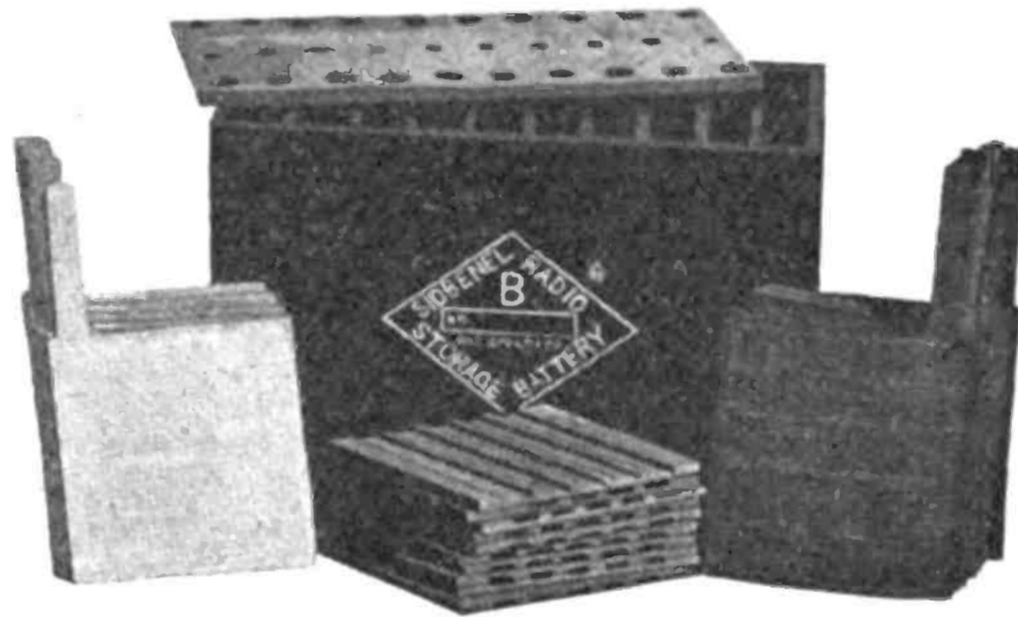
Insulators—four porcelain.

Detector—supersensitive galena.

Cabinet—mahogany finish with hard rubber
 panel, nickel plated switch points, large
 switch lever, and binding post.

Receivers—leather head band, special cord,
 and one supersensitive phone.

Special two weeks only. Price com-
 plete \$8.25. Same set with double
 phones \$11.50.



22 to 500 Volt "B" Batteries

Lasts Five Years Recharged From Any Lamp Socket

The Sidbenel is a Storage "B" Battery
 that will last five years of constant use
 without replacing parts.

It will give continuous service for at
 least six months before it becomes necessary
 for recharging. It can then be recharged in
 a few hours to its original capacity, all
 ready for another six months' use.

A Sidbenel Storage "B" is something every
 radioist needs. Think of the money saved
 by not using dry "B" batteries, which are
 of no use after they once become discharged.

The Sidbenel pays for itself in six months.
 It is so ruggedly constructed that rough
 usage will not harm it. The container is one
 which is of genuine hard rubber, molded
 into ten compartments. Size 2 1/4" by 3" by
 4 1/2". Every inch of Sidbenel "B" is con-
 structed under our own patents. The plates
 are especially treated with a newly dis-
 covered chemical that eliminates howling and

screeching so commonly found in any other
 "B" battery.

The Sidbenel "B" is shipped to you partly
 assembled—all you need to do is connect the
 plates together, and this takes but ten min-
 utes and is most simple, as instructions are
 furnished with each battery.

Guarantee:—A two-year written guarantee
 is given with each Sidbenel Storage "B"
 Battery. This is your complete protection.

For recharging we furnish a rectifier for
 AC which costs \$0.25 extra. DC current re-
 quires none. Complete with directions:

One Unit, 23 volts.....	\$ 3.25
Two Units, 44 volts.....	7.50
Five Units, 115 volts.....	17.50
Eleven Units, 250 volts.....	36.50
Twenty-two Units, 500 volts.....	69.00

Send for free catalogue on parts, and com-
 plete sets, and prices for repairing vacuum
 tubes.

just why the broadcasting should prove
 efficient in this particular spot.

It may be the fault of this antenna, or
 it may be the location of the persons who
 plain," said Mr. Harkness. "There is a
 ry—radio is so new it is difficult to speak
 certainty about any phase of it—that
 antenna amid steel frame buildings does
 work so well as in the open.

MASTER BALDWIN PHONES

AN IMPROVEMENT ON WHAT WAS CONSIDERED THE BEST

Those who know, in the radio world, have always used the Baldwin Phone. It has been ever-present
 where exacting work was to be done. It was conceded to be eight times more sensitive than any other
 known phone.

Not satisfied with even such a meritorious article as this, the manufacturers have now produced the Master
 Baldwin Phone. A 40% improvement in refinement and workmanship. Going still further, they have
 designed the Clarophone, the most marvellous speaker yet produced. Prices:

Singles, \$9.00 Headset, \$16.00 Clarophone Loud Speaker, \$22.50

THE MOST SENSATIONAL

radio development since the Vacuum Tube. After years of experiment and proof, this genuine fixed Radio
 detector is now available to amateur and professional operators. Its introduction marks the third GREAT
 step in the progress of Radio—first the crystal then the vacuum tube and now the wonderful Phonophone.
 Price, \$2.50, sent postpaid.

Direct or at your dealers.

CLARK & TILSON

SPECIAL OFFER

For a limited time only
 Paragon RA-10....\$65 Grebe CR-5.....\$78
 Paragon DA-255 Grebe RORK..... 65
 Prices F.O.B. Red Bank, N. J.

A. V. GREGORY

42 Broad Street Red Bank, N. J.

Quality, Design + Workmanship +
 Material = **RELIABILITY**



Simple to Use

Just plug in at any 110 v. A. C. lamp socket—attach clips to battery—turn on current and you have your own charging plant.

A compact portable Recharging unit that will fully charge a 100 AH battery overnight for 5c. to 10c.

At your dealers or write

King Electric Mfg. Co., Inc.

1681 Fillmore Avenue Buffalo, N. Y.

FRS

ALL MOLDED
 UNIVERSAL COMBINATIONS

5 Units in 3

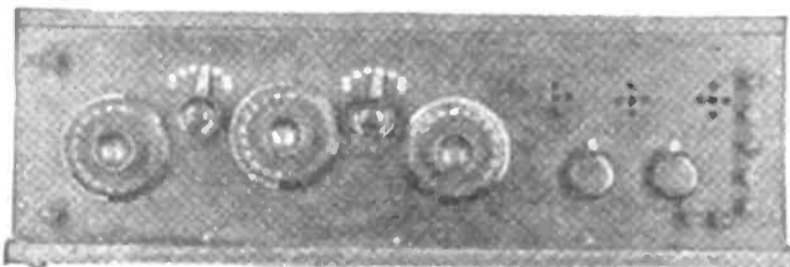
- F. R. S. Molded Variometers..... \$6.00
- F. R. S. Molded Variocouplers..... \$5.00
- F. R. S. Molded Bank Windings... \$5.00

Bank Windings are interchangeable for direct mounting on either Variometer or Variocoupler.

Universal—Accurate—Interchangeable

A Complete

Two-Stage Long Range Receiver



Set includes two Federal Transformers, Condenser, two-molded variometers, molded variocoupler, three V. T. sockets, filament rheostats, dials. Read 'Em binding posts, switch points; in attractive cabinet and drilled panel: complete, ready to hook up. **\$40**

F. R. S. Radio Corporation
 409-D East Fort St. Detroit, Mich.

The Plot Thickens!

Another Radioist Picks Up Phone Call and Seeks Aid in Solving Mystery

EDITOR, RADIO WORLD:—I am using a detector and tuner made from the blue prints furnished by the Experimenters' Information Service of your city, and have secured wonderful results. Using only one step of amplification I have been able to hear a 'phone station (10 watts), WBAA, a distance of about 475 miles. I have heard 'phone stations in 27 different States and Canada; but there is one thing on which I would like information: Almost every night, between the hours of 10 and 12, I am able to hear telephone conversation between the exchanges of Muskogee, Oklahoma, and Little Rock, Arkansas. The nearest is over a hundred miles distant.

I can hear the operator put her party up and also hear them ring, several times each evening. There is only one point in tuning where I am able to hear this. The first time that this was picked up, I thought it was a broadcasting station, but heard central say, "Number 455 is busy." Every night, for several days, I listened to find out where it was coming from as the telephone company here did not ring this number. Later, I could hear the girl say, "This is the Muskogee operator."

Can you offer an answer to this? I am sending a copy of this letter to the Bell Telephone Company and the Western Electric Company. I would like to know if there is anyone else who has picked up distant telephone talk—not radio.—Howard Fowler, Rogers, Arkansas.

Prize Freak Set

Denver Lad Uses Clothes Line for Aerial and Corncob Pipe for Receiver

ORVILLE GARDINER, seventeen-year-old Denver lad, seems to have developed a freak radio receiving-set that deserves the blue ribbon.

"It consists of a small two-cent corncob pipe, with 40 turns of No. 27 cotton-covered wire wound around the stem. He uses a small pencil-clip for a slider, and has scraped bare the wire where the sliding touches.

He drilled a small hole in the side of the pipe bowl, put a drop of metal in, then inserted a chip of galena, and fastened a piece of copper wire by means of a brad half an inch down from the galena for the catwhisker.

All it cost was two cents for the pipe—the

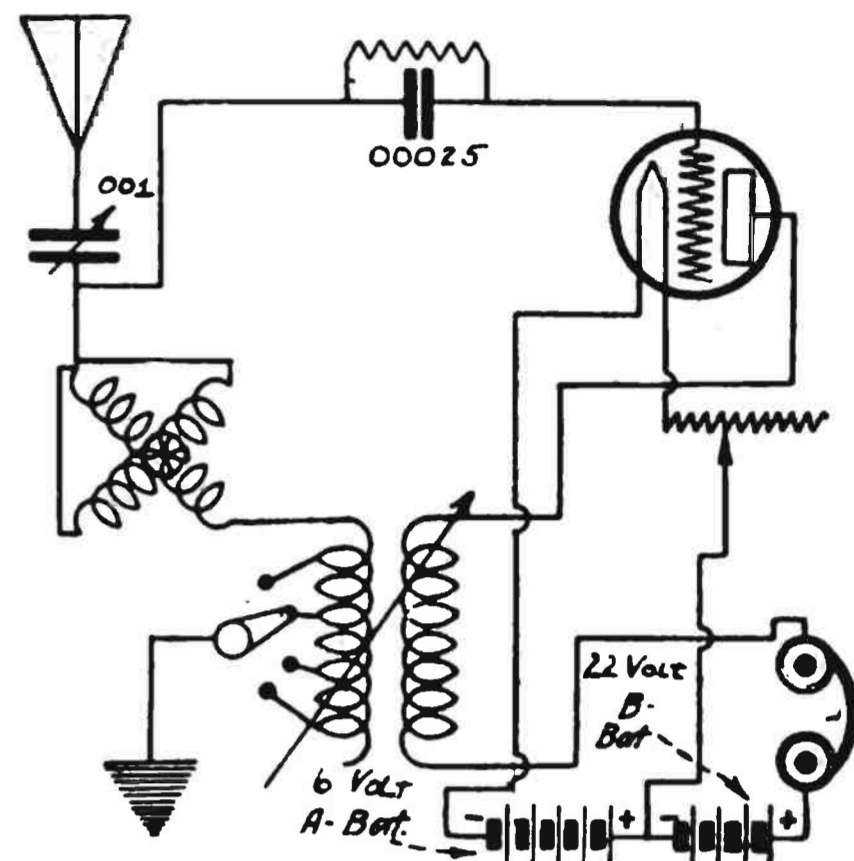
rest of the set was made from pieces lying around the house.

Using a clothesline for an aerial, he received Denver stations with his corncob set.

* * *

His Home-Made Circuit Brings in Wide Range

EDITOR, RADIO WORLD: I have a radio receiver that I constructed. I am using a hook-up that is original, so far as I am able to ascertain. With this hook-up, using a variometer and varicoupler that I made myself—I picked up, in one night, fifteen different sta-



One-tube hook-up as described by Mr. Wallis in his letter.

tions. I have heard Schenectady, WGY; Denver, Havana, Cuba, Minneapolis, WEAY, WDAP, WOR, WEA, 9XO, KSD, WOC, WMAK, and others—about forty in all.

These stations were heard on one tube only. When I use two stages, I cannot wear my phones with comfort. Using the phones without a loud-speaker, music, at times, can be heard all over the house, on two steps. I am using a radiation U-V 200 with 22 volts on the plate. My set is mounted on old battery-jars cut up into sheets. This makes a good panel. Accompanying this is the diagram for the detector. I would be glad to give further information to any one wishing to try out this diagram.—Joe L. Wallis, East street, Talladega, Alabama.

To Be a Radio Engineer

NOW the real designer of radio apparatus is the radio engineer, says Arthur R. Nilson, educational director, East Side Y. M. C. A., New York City, in "The Globe." He is an electrical engineer specializing on radio work just as the turbine engineer is a mechanical engineer specializing on turbines. Radio engineering requires a very high-grade of school training. To be a success—and being a success means more than just getting away with it—the radio engineer must be able to tackle any kind of a radio engineering job, from the making of a simple receiver, scientifically designed, to the complete laying out of a high-power arc, spark, or vacuum tube, trans-oceanic or continental transmitter. Not only must he be an electrical engineer of high calibre, but he must be of a high type of individual intellectually. Many of the so-called radio engineers are out of jobs for the reason that they are unable to make an approach good enough to land them a job or because they are unable to write an ordinary business letter in ordinary English.

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Hard Rubber Composition PANELS

Conform to Navy Specifications

Manufacturers: Tell us what you want and we will quote prices.

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That has a wave-length of 150 to 1000 meters.
Dealers and Jobbers Write to

LINCOLN RADIO CORP.

Manufacturers

116 West 69th Street New York, N. Y.

Law Storage Battery

Constant voltage, large amperage. Will run two months without recharging.

Attractive Dealers' Discounts

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WILLIAM LAW COMPANY

Aborn and Sabin Streets, Providence, R. I.

INSU-LITE

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1/8" —.01 per sq. in.

3/16" —.015 per sq. in.

1/4" —.02 per sq. in.

DEALERS: Write for discount.

General Merchandise Co.

140 Market Street, Newark, N. J.

Do You Like Clear Tone—Sharp and Distinct? If so try

MARSH'S

Vernier Variable Condenser

AT LAST

Made in Three Styles. Dial Knob and Screws Complete. Fully Guaranteed.

27-Plate@ \$5.50

23-Plate@ \$4.75

11-Plate@ \$4.25

Mail orders promptly filled.

F. P. Marsh, 145 Nicoll St.

NEW HAVEN, CONN.

GENUINE

Nathaniel Baldwin

Phones

\$16.00 a Pair

Do not confuse these with Master Baldwin Phones.

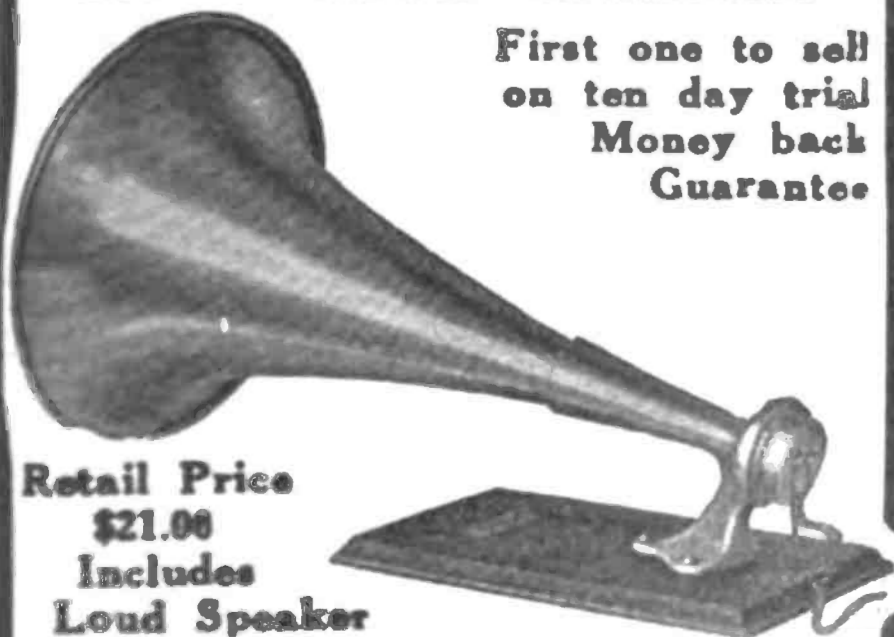
ELECTRIC SERVICE ENGINEERING CO.

105 W. 47th Street

N. Y. City

GITHENS TRUTONE RADIO HORN—LOUD SPEAKER

First one to sell on ten day trial Money back Guarantee



Retail Price \$21.00

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 MFG. CO.

Radio Amplifiers for the Deaf

THE amplification of sound by means of the triode vacuum tube has now passed on from its application to wired and wireless telephony to a means of aiding those of deficient hearing, writes Roswell H. Johnson in Science. Its effectiveness is so great that it promises to be to the partially deaf as great a boon as glasses to those optically defective. The use of the amplifier is sure to expand rapidly in this field, although it will be somewhat impeded by its expense.

The purpose of this, however, is to call attention to the application or applicability of a sound magnifier in various fields of scientific work and industry:

1. For detecting distant underground operations as in mine rescue or military work.
 2. Detecting the approach of a boat, train or automobile before it comes in sight.
 3. Detecting the approach of a storm.
 4. As a parallel instrument of the binocular prism glasses of the ornithologist, to detect bird songs too far to be heard distinctly or at all. It is particularly useful in detecting the higher notes that do not carry far and in observing nocturnal migration.
 5. To aid the hunter in detecting sounds of distant game.
 6. In conversation from vessel to vessel or station to station at shouting distance and a little further.
 7. In directing men aboard or on shore.
 8. To extend the possibilities of the dictograph in detecting evidence of crime.
 9. To make possible addressing larger audiences and distant audiences.
 10. To make it possible for some women with weak voices to nevertheless speak to large audiences.
 11. In accoustical research for the study of subliminal sounds.
 12. The detecting of subliminal sounds from animals not now known to make sounds.
 13. To make more audible the whispers or weak sounds of the sick or injured.
 14. To make communication by weak or injured less fatiguing.
- That commercial equipment of good efficiency is now readily available may not be known to some of those who might make good use of the apparatus.

Claim Flaw in World's Biggest Broadcaster

THERE have been a number of complaints that the world's biggest broadcasting station, WBAY, operated by the American Telephone and Telegraph Company, 24 Walker street, New York City, could not be distinctly heard in the northern part of the city. W. E. Harkness, manager of the station, told a reporter for "The World," New York, that it is impossible to tell just why the broadcasting should prove deficient in this particular spot.

"It may be the fault of this antenna, or it may be the location of the persons who complain," said Mr. Harkness. "There is a theory—radio is so new it is difficult to speak with certainty about any phase of it—that an antenna amid steel frame buildings does not work so well as in the open.

"However, whatever the fault may be, it is a small matter. The plant itself, under the roof of the Walker street building, is a complete success. Recently we have been experimenting with remote control by microphoning to the West street station. This is done without loss of time, clarity, volume or anything else.

"We are still using the antenna on the Walker street building roof at times. Last Friday, we broadcast through it with good results. However, the roof structure is a small part of the plant itself. The actual broadcasting is done under the roof. We could easily put up another antenna, or remove it to some other roof. What difference

V-A-C-U-U-M-T-U-B-E-R-E-P-A-I-R-I-N-G
V
A
C
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Repairing all detectors and amplifiers using a single tungsten filament such as the following listed tubes, Marconi, Massena, DeForest, A. P. Electro Ray, Radiotron UV-200, UV-201, Cunningham C-200, C-201.

Detectors and Amplifiers repaired for \$3.50.

The repaired tubes, we warrant, will give you the same absolute satisfaction that you would expect to receive from new tubes.

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WHETHER you require two binding posts, a simple crystal set, or one of the standard tube sets with amplifier and loud speaker, you may obtain it at the right price at any radio shop displaying the Sorsinc Sign. There is a skilled radio man on hand to advise you, too.

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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 10 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.)

VERY INTERESTING printed matter on detectors and crystals. Sent on request. Midland Electric Mfg. Co., Indianapolis, Ind.

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

BROADCASTING MAP of the United States appeared in RADIO WORLD No. 8. Sent on receipt of 15c coin or stamps, or start your subscription from that number (\$6.00 for 52 issues). RADIO WORLD, 1493 Broadway, New York.

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

HELP WANTED—MALE

EARN \$110 to \$250 Monthly, expenses paid, as Railway Traffic Inspector. Position guaranteed after 3 months' spare time study or money refunded. Excellent opportunities. Write for Free Booklet G-151. Stand. Business Training Inst., Buffalo, N. Y.

ISSUES OF RADIO WORLD from April 1 to Oct. 7 (27 numbers) for 15c a copy, or the whole lot for \$3.15. Or send us \$6.00 for one year and start with the first number. RADIO WORLD, 1493 Broadway, New York.

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Dept. E, 874 Columbus Ave., New York City

\$3.50 23-Plate Var. Condensers, .0005.....	\$1.75
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6.50 U. V. 1714 Radio Freq. Tr. (Radio Corp.)	5.50
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Send Money Order, but do not add postage for mailing. Pkg. will come Parcel Post Collect.

RADIO HOSPITAL. Radio sets repaired by practical radiotrician, and experimentations under customer's supervision. Mail orders filled **MELCO RADIO**, 37-A Bedford Street, New York City.

PATENTS—Send for form "Evidence of Conception" to be signed and witnessed. Form, fee Schedule, information, free. Lancaster and Allwine, Patent Attorneys, 259 Ouray Bldg., Washington, D. C.

NEWS AND GOSSIP OF THE STAGE—Send 10c. for specimen copy of **NEW YORK STAR**, the great illustrated theatrical weekly. \$4.00 year, \$2.00 six months, \$1.00 three months. New York Star Co., 1493 Broadway, N. Y.

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FRENCH TUBES, genuine (no bootleg with French name), most sensitive and economic. (Good for detectors, amplifiers, and especially for radio frequency. Will work very good on two dry cells.) Price \$3.25. **ATLANTIC & PACIFIC RADIO CO.**, 131 W. 37th St., near Bway., New York.

ASTONISHING results Rokay Regenerative Hook-up without use of Variometers—variocouplers, switches, taps, etc. **ONE SINGLE CONDENSER CONTROL ONLY.** The coming receiver. Simpler than a non-regenerative—better than any regenerative we have tested. Hook-up. \$1.00. Money Orders only. Saves you \$10.00 in building your own. With properly wound coils. \$3.50 post paid. Complete receiver parts on wood base with Vacuum Tube, \$8.00. Head set and "B" Battery, \$21.35. Express paid. Rokay Electric Co., Ingomar, Ohio.

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MEN WANTED for detective work. Experience unnecessary. Write for details explaining guaranteed position. J. GANOR, former Gov't Detective, St. Louis, Mo.

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WE NEED RADIO WORLD, dated April 22 and August 5. If you have copies you don't require, mail to this office and current issues will be sent you for them. RADIO WORLD, 1493 Broadway, New York.

INTERESTED IN JOURNALISM? The Star Reporter is for Journalists. 50c annually. 5c sample. Box 55, Times Square Station, New York.

Exchange jolly interesting letters through our Club! Stamp appreciated. Betty Lee, Inc., 4254 Broadway, New York City.

BROADCASTING MAP

of the United States appeared in RADIO WORLD No. 8. Sent on receipt of 15c. coin or stamps; or start your subscription from that number (\$6.00 for 52 issues).

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RADIO MAN, eleven years' experience in all sides of the game, capable of constructing, installing, operating broadcasting station of any power, desires permanent connection. Go anywhere. What can you offer? Evans, Momus Pier 48, N. R., N. Y. C.

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.

September Electrical Exports Showed Upward Trend

PRELIMINARY figures of the Department of Commerce showing United States exports of electrical goods for September reflect the improved conditions which are noticeable throughout the

industry, the total, \$5,238,753 worth, being an increase over the preceding month in the amount of \$487,583. The month's total also compares favorably with that for September, 1921.

Important shipments of power transformers and power switchboards were made during September, the totals, \$499,755 and \$365,348 worth, respectively, exceeding by substantial amounts the heavy export shipments of these classes for August. Motors and motor driven devices also increased over the preceding month, and in general an average improvement of about 10 per cent. is seen in the September electrical export figures.

Foreign Radio Factories at Work

GERMAN manufacturers and industrialists have not overlooked the great market created in this country by popular radio broadcasting, says Lloyd Jacquet in "The Mail," New York. Accordingly, they have put their engineers to work and have started their factories and begun placing a complete line of radio apparatus for foreign consumption, with the old time "Made in Germany" label.

In fact, the German manufacturers have been able to undersell any other competitor because of the cheapness of labor and of raw products in Germany today. This competition so alarmed English firms, who foresaw the danger of a flood-

in Germany, that a law was passed in Britain prohibiting radio amateurs from using instruments and apparatus of other than British manufacture. The regulations went still further and provided that no license would be issued for receiving or sending if even one unit in the installation were of foreign manufacture. This example was closely followed by France, although that country followed a more liberal policy and only recommended the purchase of apparatus of home manufacture for purely patriotic reasons.

It would be interesting, however, to compare the product of German ingenuity and engineering skill with our own American products. For many years that country has been ahead, so far as works of precision are concerned.

The Difference

A RADIO transmitter consists of apparatus which can generate alternating current at very high frequencies (from 20,000 to several million cycles per second) in a conductor which, at the transmitting station, is called the transmitting antenna. A radio receiver consists essentially of an antenna which is cut by the field propagated by the radio transmitter, and of detecting an amplifying apparatus whereby the minute currents generated in receiving antenna are detected and made audible.

Subscribe for RADIO WORLD. \$6.00 a

"Suneco" Tube Adapter

Eliminates

the
Storage Battery

Price \$1.50 Each

Sun Equipment Company

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Write to-day for our price list

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BOYS AND GIRLS EARN XMAS MONEY

Write for 50 sets AMERICAN CHRISTMAS SEALS. Sell for 10c. a set. When sold, send us \$3 and keep \$2. Neubecker Bros., 961 E. 23d St., Dept. 64, Brooklyn, N. Y.

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Let me remagnetize it. Guaranteed, in one day good as new. **\$1.50** Per Set

I rewind for higher ohmage. All radio telephone repairing at moderate prices. Mail orders attended to. Dealers write.

ROYS, 101 West 42nd St., N. Y.

PRICES SMASHED

Each sale has created new friends and customers with the result that we now announce drastic reductions in our quality lines. All goods prepaid. Send card for complete price list. You'll be surprised. You'll tell your friends. A sample saving follows:

COMPLETE REGENERATIVE VACUUM TUBE SET	Our Price	Others
Panel—Bakelite—7"x12" drilled.	\$1.65	\$2.40
Cabinet of 3-ply wood to fit panel.	1.50	2.50
Two dials—each 35c.	.70	1.40
Sixteen switch points with nut.		
Each 1c.	.16	.48
Four switch stops with nut.		
Each 1c.	.04	.12
Eight binding posts. Nickel plated @ 3c.	.24	.48
Two switch levers @ 25c.	.50	.90
1 filament rheostat. Highest grade.	.65	1.10
1 vario coupler. Fourteen taps.	2.25	4.00
1 28 plate variable condenser.	1.95	3.50
1 tube socket—Moulded.	.45	.85
1 grid condenser and leak.	.10	.25
1 phone condenser.	.10	.25
1 tube socket support.	.15	.25
12 feet spaghetti tubing @ 4c.	.48	.84
15 feet tinned copper connecting wire.	.30	.45
Blueprints showing details to assemble.	.10	.25
	\$11.32	\$20.02

Other articles taken at random from our late price list are—

Detector tubes—Cunningham—NOT rebuilt.	\$3.95	\$5.00
Crystal detector of closed type.	.60	1.00
Transformer—Audio frequency.	2.95	4.50
Double slide tuner—knocked down.		
Coil wound.	2.50
Loose coupler—knocked down. Coils wound.	3.75
Loose coupler—assembled.	7.50	12.50
Variometer—Hardwood stators 4 1/2". Assembled.	2.25	4.00
Frost Fone—2000 ohms.	3.95	5.00
Kellogg—2400 ohms.	8.75	12.00
Western Electric 2200 ohms.	9.25	12.00
Blueprints giving detail of 2 step amplifier.	.10	.25
Two step amplifier—knocked down. Panel drilled.	12.95	23.50
Two step amplifier assembled. In cabinet.	18.95	35.00
Vacuum tube set in cabinet 7"x12". Wired.	17.95	35.00

Send for list today or order direct from above. Goods sold subject to return for rebate or exchange. **YOU MUST BE PLEASED.**

Radio Parts Manufacturing Co.
15 Park Place West Detroit, Mich.

Union College to Invade New Radio Field

THE Union College radio station, WRL, Troy, N. Y., will make an earnest endeavor to become a pioneer in a new field. It is the intention of the club to become the first amateur station able to carry on regular communication across the Atlantic. In preparation for the work, which will be started in December, the organization is now completing a new apparatus. There will be two G-E tubes of 250 watts each, with the current supplied by a 240-cycle alternator. Since the circuit has no filters, but is self-rectifying, the tone will be the same as a 240-cycle modulated C-W equipment. With the completion of the changes, there will be four or five experienced operators ready to make the tests. Long-distance continuous-wave transmission is the new field in radio work. It is the field which will be explored by the college radiomen in the tests they will make under the auspices of the American Radio Relay League.

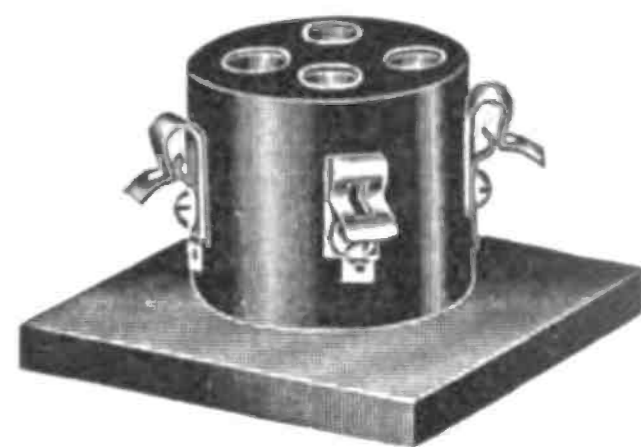
Union is famed as the introducer of the wireless baby-carriage two years ago. That novelty received a world-wide broadcast, through motion pictures. The station is remembered also as one of the first in the country to broadcast entertainments. As that field of endeavor is supplied with powerful stations employing factory-built installations, not only far-reaching but expensive in original cost and maintenance, the college radioist will return to experimental work.

Beating the Record!

EDITOR, Radio World: While some of your readers pat themselves on the back and brag about their so-called long-distance records for radiophone-broadcast reception, we would like to give them some real long-distance records to shoot at.

With a 70-foot aerial and a Westinghouse RC set we have received clearly and distinctly the following stations, all strong enough to put on a Magnavox: WBAR, Fort Worth, Texas; CFAC, Calgary, Canada; KFCB, Phoenix, Arizona; WDAF, Kansas City, Missouri; WWJ, Detroit, Michigan; St. Louis, Missouri, and Chicago.

We have a reliable range here of 1,500 miles and have no trouble in picking up any station of any power on the Coast and as far east as Denver. We have a very good location and a good aerial, so, of course, that has a good deal to do with it.—E. S. Morrison, Ashland, Oregon.



The Newest Product On the Market

Our WD-11 Tube Socket. Made of first grade Formica. Can also be used with French Tubes.

75c. each

We also carry the new Spider Web inductances designed Specially for Rheinhartz Tuner.

Price \$2.50 each

V. T. Sockets made with a Formica base German silver shell. Phosphor Bronze contacts formerly retailed for \$1.75. Now

50c. each

We also offer a limited number of Porcelain base Rheostats, former price \$1.50, made by a well-known manufacturer, for

50c. each

Also Variometers completely assembled.

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FORMICA

The Popular Radio Insulation. Cut, Grained, Drilled and Engraved according to your Specifications.

\$2.00 a pound

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TRADE MARK

Do not be deceived by our low prices. SPIROLAS are not cheap instruments made to sell at a low price. They are rather a remarkable development made possible by the invention of the SPIRAL tone chamber (patent pending), which not only allows us to market a cabinet instrument of the highest grade in every respect at an almost sensational price, but gives many exclusive advantages over the common cabinet type speaker, which is nothing but an ordinary horn enclosed in a cabinet—great compactness for a full-sized tone chamber and a really complete elimination of metallic, "horn" noises. SPIROLAS are especially recommended to music lovers who can appreciate an absolutely pure, natural tone.

We make a complete line—of equally high-class construction throughout, with fine hand-rubbed finishes. ALL SPIROLAS ARE SOLD UNDER ABSOLUTE MONEYBACK GUARANTEE—ten days to see and try them for yourself.

SPIROLA CONCERT—Complete with special, powerful built-in unit and cord ready to hook up in place of phones, beautiful mahogany or oak finish, bronzed throat. **\$12.50**

SPIROLA DELUXE—New, improved duplex type for use with your headset, two complete speakers in one, eliminating the usual interference between phones, same finish as above. **\$4.85**

Satin black finish, nickel plated fittings, otherwise same as DELUXE. **\$3.85**

We also make the DELUXE and black finish types for use with a single loud speaker unit. In ordering state whether for use with headset or unit. At dealers or postpaid (C. O. D. if preferred).

LOUD SPEAKERS

L. H. DONNELL MFG. CO.

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Part of an Efficient Tube Set*

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**Variable Grid Leak and
Micon Condenser (combined)**



Price
Only
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Complete

A Positive Necessity

The Freshman Variable Grid Leak enables a variation in an unbroken range from zero to 5 megohms, and all intermediate points. The Condenser embodied in this wonderful device is the famous Micon—constant fixed capacity of .00025 m.f.

*Improves Your Set
Wonderfully by*

- CLARIFYING SIGNALS
- LOWERING FILAMENT CURRENT
- ELIMINATING HISSING
- INCREASING BATTERY LIFE

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No Antenna or Aerial Needed



- Forms perfect receiving aerial.
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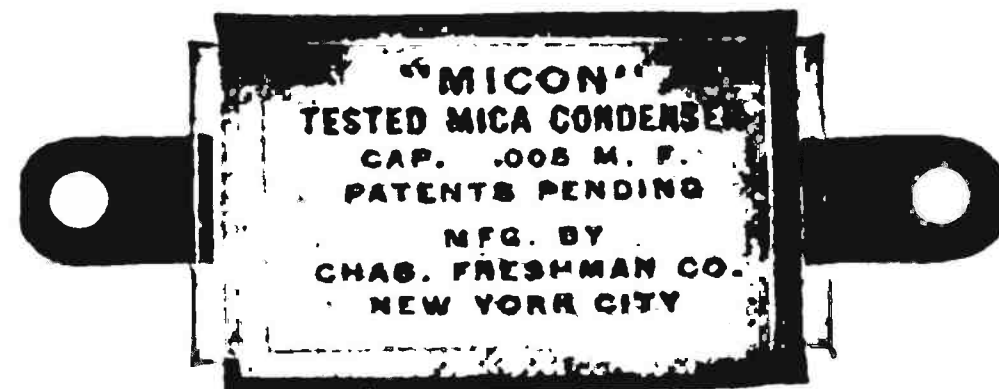
Price \$2.00

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Assure Absolute Noiselessness
Clarity of Tone
Accuracy
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Micon Condensers are especially adapted for use with Radio - Frequency, Super - Regenerative and other circuits, where an accurate fixed condenser is required.

Size	Price
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.0005	.35
.001	.40
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.01	1.50

For protection against damage to the filament and the consequential short life of filaments, Micon Condensers are invaluable.

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