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52 Numbers

RADIO WORLD

Title Reg. U. S. Pat. Off.

ILLUSTRATED WEEKLY

TOBOGGANING WITH RADIO MUSIC BY CORNELL STUDENTS

(C. Wide World Photos)

The latest improvement in the way of outdoor sports is the innovation recently brought out on the toboggan slide at Beebe Lake, Ithaca, N. Y., the home of Cornell University. They have installed a complete radio receiving outfit with power amplifier and loud-speaker on one of the toboggan sleds, and never want for music while enjoying the outdoor sport. Another good point is the fact that the orchestra cannot get cold and stop playing. At night the slide is flooded with light by means of large automobile headlights, and it is then that the students have their fun.

Inventor Sues Radio Corporation for Alleged Infringement

The Radio Corporation of America, a $25,000,000 company, which has many stations at various points in this country, has been made defendant in a suit brought in the United States District Court in Brooklyn by Walton Harrison, a lawyer and inventor, of 1974 Madison avenue, New York City. Mr. Harrison alleges that the company has infringed upon patents obtained by him in 1914 on a multiple sending antenna device. His suit is for an accounting of moneys made from the use of the device. Large sums are involved. In his affidavits Mr. Harrison states that multiple antennae are of vital importance to large sending stations. He alleges that his letters patent incorporate the basic principles on which the multiple antenna used by the company are designed.

"The Laughing Lady" Broadcast

The first act of "The Laughing Lady," by Arthur Hopkins, was broadcast last week direct from the Longacre Theatre, New York City, with Ethel Barrymore starring. A description of the stage setting of this high English comedy was given by Bertha Brainard, who is known to radio audiences by her "Broadcasting Broadway" talks.

Publisher's Announcement on Page 7—This Issue

VOLUME TWO OF

RADIO WORLD

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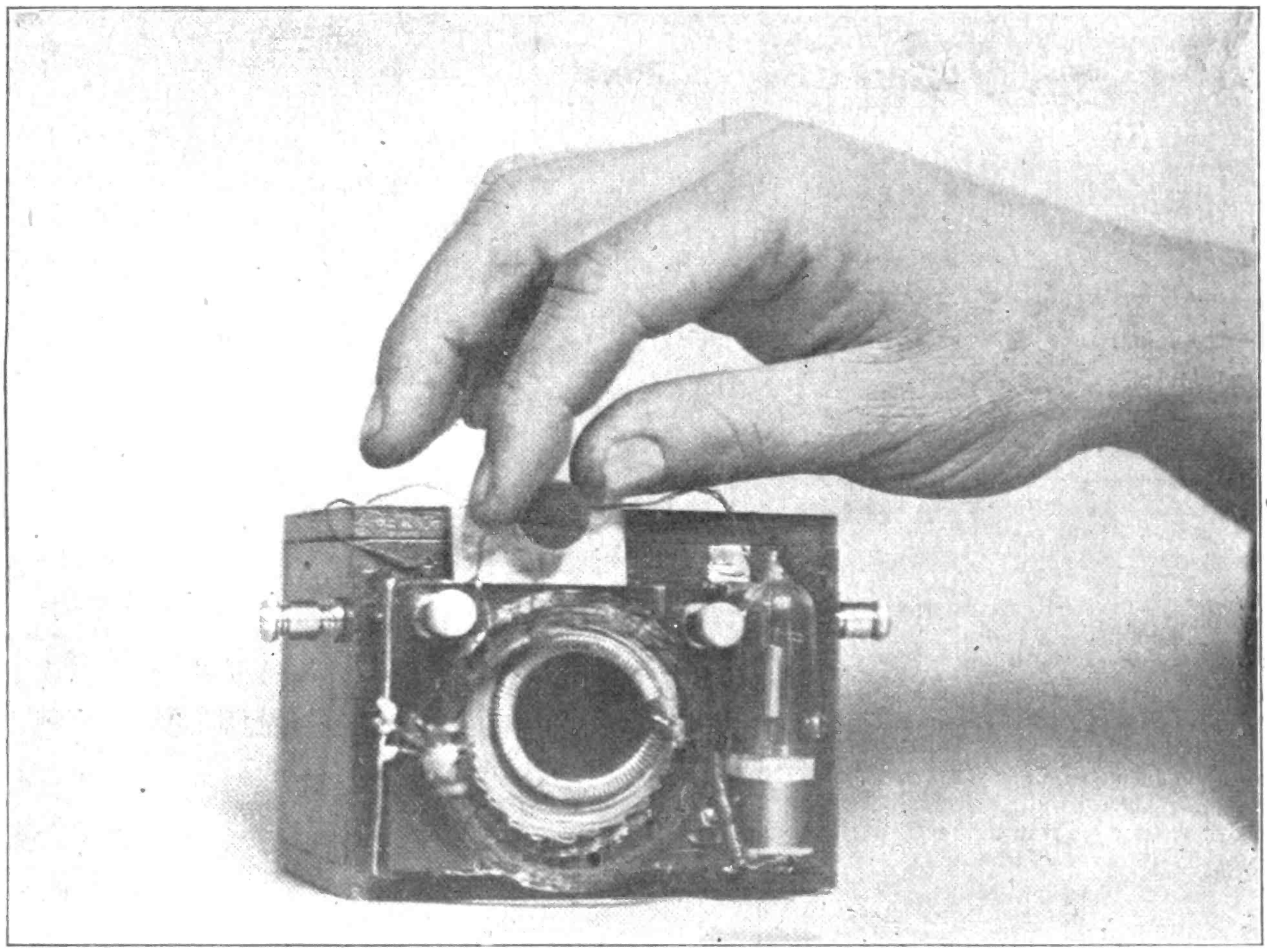
Takes Up Little Space, But Is Efficient Receiving Set

By Louis S. Fielder

NUMEROUS and varied are the models of miniature sets which have been made by various amateurs, but one that is especially complete, even to containing its own A and B batteries, was recently exhibited at the Permanent Radio Fair, New York City, by Frederic W. Proctor, a New York amateur.

is only necessary to attach the antenna and ground in order to receive signals. The small block type B battery is used and flashlight cells are employed to heat the filament.

While most of the miniature sets recently exhibited were slightly smaller than the present model, they all lacked the necessary batteries, and the fact that this particular set is



(C. Photo News)

Ingenious tube receiving set built by Frederic W. Proctor, a New York amateur. It is a most complete regenerative receiver, embodying everything necessary to make it complete in itself.

The set is a regenerative receiver, using fixed inductances with a small variable condenser to vary the tuning. As can be seen by reference to the illustration herewith, a peanut tube detector is used, the filament resistance being varied by means of a clip that is moved around the rheostat which is located directly inside the main inductance coil. The two coils are wound in staggered form and are in direct inductive relation to each other.

The batteries are all located inside the small cabinet *which* makes this receiver complete in itself. It, therefore, absolutely complete even to that extent makes it stand in a class by itself.

As to receiving qualities, much can be said. Of course, as it is a tube detector set, and regenerative, is extremely sensitive and performs remarkably well, considering the fact that it is so extremely small and compact.

The builder of this set evidently had a very positive idea in mind before he constructed it, as the finished device shows careful planning of all details, such as the relation of the coils and also the best method of mounting.

A Dry Cell Tube Socket—Cheap

By Arthur G. Shirt

FOR one reason or another tube sockets are unpopular instruments for home construction. Yet they can be made by the amateur, and well made, too. This is important, especially when so many amateurs are replacing their six-volt V T's with 1½-volt WD-11's, and are finding that they must either buy an adapter or a new tube socket. The WD-11 will not fit the regulation size socket, although the De Forest dry cell tube will, having been designed for that purpose. In other respects, these tubes are practically the same.

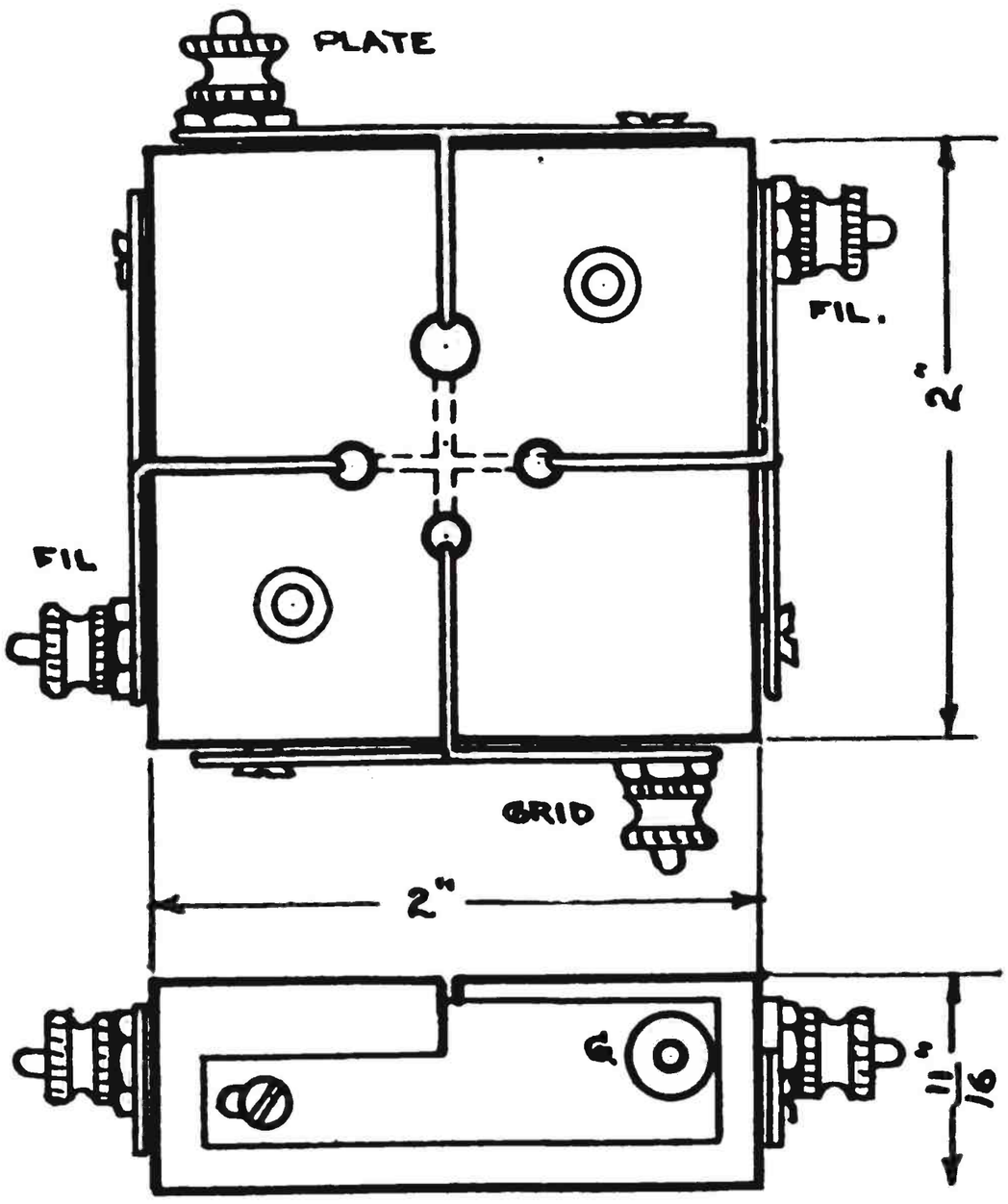


Fig. 1. Assembly of a WD-11 socket as explained in the accompanying text. The exact dimensions are given and should be strictly followed. A neat and practical socket will result.

To aid those who want to construct a socket for their WD-11's these plans are submitted. When finished, the socket will be neat and efficient. The contact fingers will make sure contact, and the bulb will be held as steady and upright as in any socket on the market.

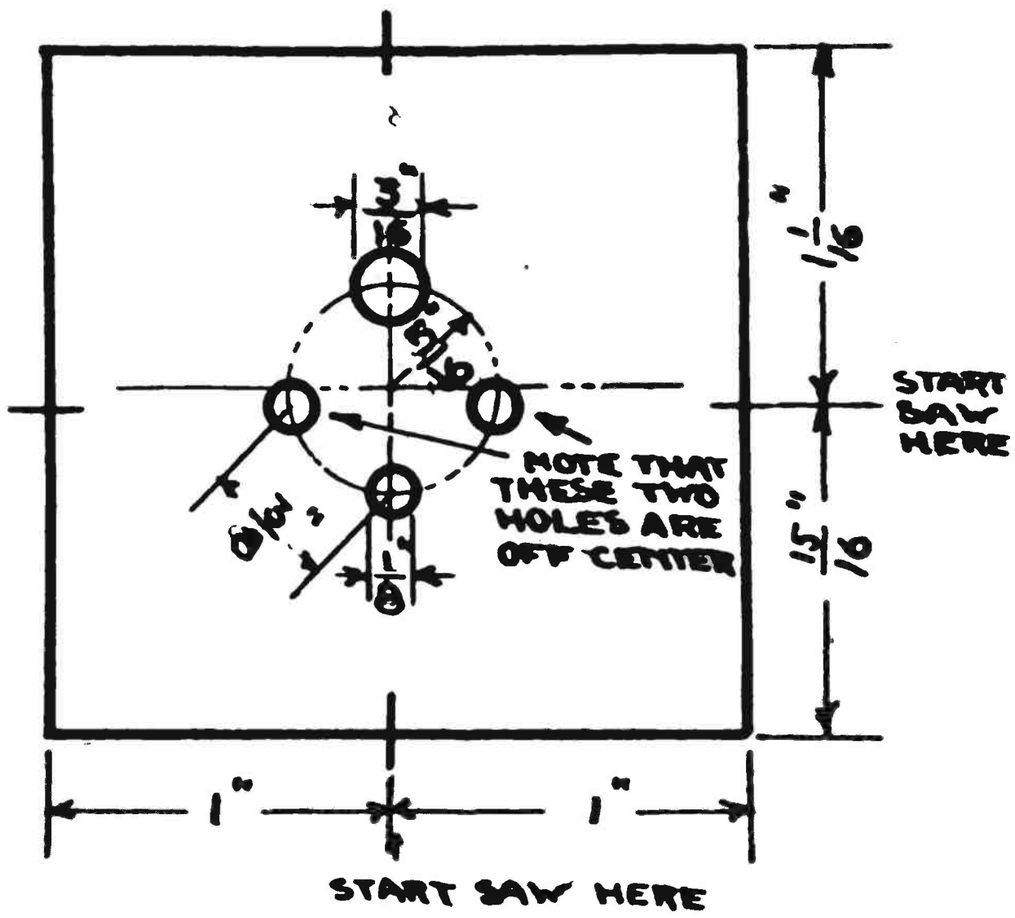
Fig. 1 shows the assembled instrument to be a square block of some insulating material, preferably hard rubber or bakelite, drilled with four holes suitably placed to receive the lugs of the tube. From each side of the block or base, a saw cut goes into one of the holes, so that each hole can be reached from the outside by a groove. This groove or saw cut should be about ¼ of an inch deep. Four contact springs are cut out of spring brass and the upper half of each is bent in so that it will run in this groove and protrude into the hole about 1/16 inch. Binding posts are provided as shown, carefully marked for the grid, plate and filament terminals (as shown in Fig. 1) and then the socket is connected up for use.

Perhaps the most troublesome item in the making of this tube socket will be in finding a square block of hard rubber suitable for the base. This problem may be solved by taking four or fire pieces of panel thickness and gluing or bolting them together so that they form one piece. In bolting, be careful to place the bolts so that they will not interfere with either the contact fingers or the binding posts.

The proper size for the base is 2 inches by 2 inches by not less than ⅝ inch thick. It may be thicker if convenient, but owing to the length of the lugs on the WD-11 tube, the base may be no thinner than the size indicated.

Any one who has examined a dry cell tube has probably noticed that the lugs coming from the bottom are not evenly placed and that one lug is larger than the other three. Because of this unevenness, the holes must be laid out and drilled with the utmost precision. To amateurs who have dividers and rule the job may be easy enough, but even then look carefully to the detailed dimensions of Fig. 2. For the convenince of those who have no designing tools, a template for the holes is given full size in Fig. 3. Merely lay this template down on the base, prick or punch the center-holes, and then drill as required.

Another word of caution: Drill straight up and down! If you don't the tube will not seat itself on the base as it should, but will refuse to go all the way down.



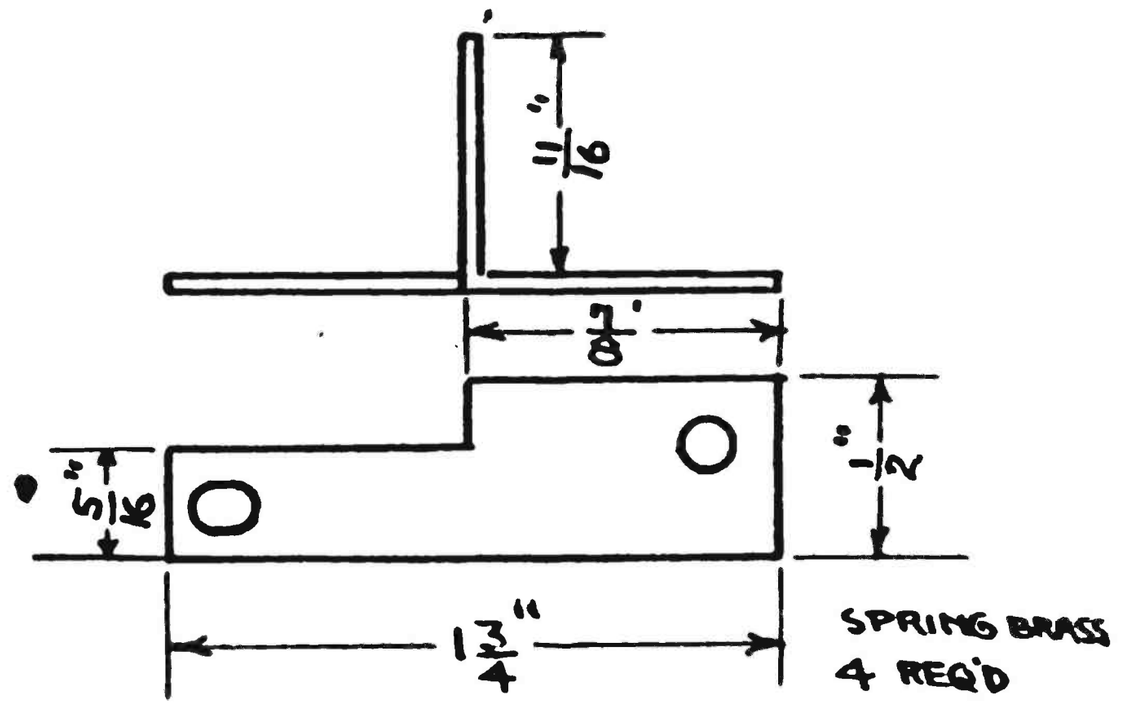


Fig. 2. Detail sketch for drilling the hard rubber plate and construction of the spring. The ends of the spring should be rounded with a file, to permit easy insertion of the tube. Sizes of holes are very important and should be made exactly as shown.

The saw cuts are easy. Saw straight across the top of the base, passing through the centers of two holes at once. Use a hack saw in preference to a wood saw. The groove should be cut about ¼ inch deep.

Cut the contact springs out of fairly heavy spring brass

(Continued on next page)

An Improved Single Circuit for Nite Owls

By F. N. Hollingsworth

A YOUNG amateur of Newfields N. H., Russell Sheehy by name, has copied 162 stations in 38 different states with his set, which is well located, with little or no local interference, besides Cuba, Canada, and Porto Rico, using one tube.

While fundamentally the hook-up is of the common or garden variety of single circuit using a variocoupler, it has several refinements which have given him the remarkable results mentioned. It has added a three-plate vernier condenser shunted across the rotor winding, which gives a change in classification. He uses a potentiometer for grid control, as well as one for plate control. The stator is wound on a four-inch bakelite tube and has 35 turns of No. 24 D. C. C. magnet wire, without tape. For the tickler he has the same number of turns, with the same size wire, wound on a 3½-inch diameter support. This tickler rotates on one end of the rotor tube.

Following the diagram given herewith, the antenna condenser, C1, is the usual .0005 vernier variable. C2 is .0005 for a UV-200 tube and C3 is .005. C4 is a three-plate vernier. High grade condensers must be used in any set, and the one shown in the diagram is no exception.

Potentiometer R2 is of the 200-ohm type and R3 is one of 400 ohms. R4 is the usual 6-ohm vernier rheostat, the former being used for controlling the kind and amount of potential on the grid and the latter for providing accurate adjustments of voltage as required of UV-200 and detector tubes. Grid leak R1 will vary between one-half and two megohms, depending upon the tube in use.

Tuning is quite simple in this circuit, the carrier wave being picked up by adjustment of the condenser, C1, which should be a vernier type for correct results. Then the condenser C4 (a three-plate vernier) should be varied until signals have cleared out. The operator can do this by variations in coupling between stator and rotor until he finds the best combination. Movement of the rheostat handle R2 will serve to vary volume and quality of signals received. R3 will make the detector tube more sensitive

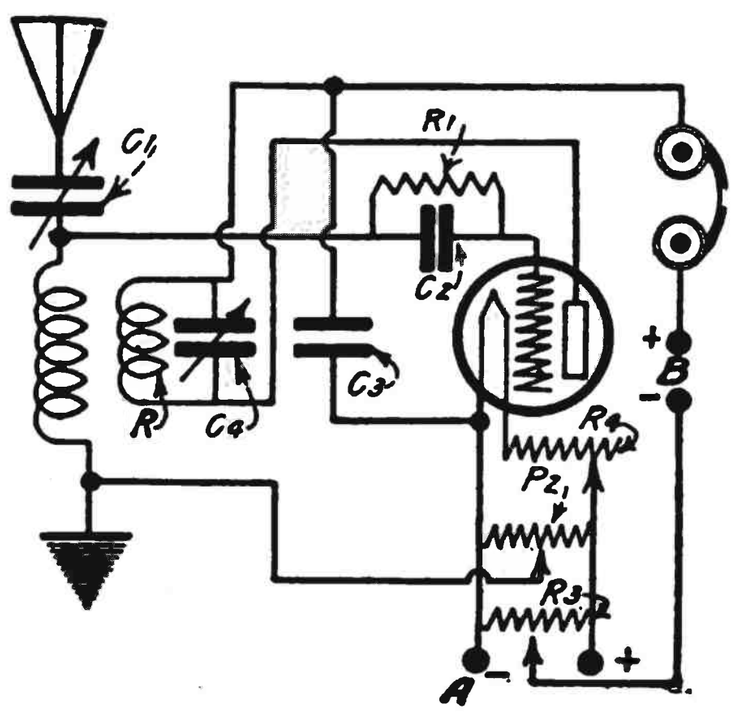


Diagram of circuit described by Mr. Hollingsworth. The two potentiometers give stability to the circuit and make tuning-out of nearby stations easier.

at its correct value, which is easily found by adjusting the knob R4. The filament rheostat should have a vernier adjustment for best results.

While those who may set up this particular circuit may not be able to duplicate exactly the results of the originator, owing to difference in location, condition of atmosphere, interference, etc., they will be able to get satisfactory results if they use care in connecting up and in adjusting afterward. Careful adjustment is one of the biggest factors in securing satisfactory reception in any set. The owner of this set has totaled over 112,000 miles, using the radio "golf" method of computation.

(*Continued from preceding page*)

and provide four 1¾ inches by ½ inch in size. Cut as shown in Fig. 2 and bend the fingers at right angles. Drill for the binding posts and also put a slot in the other end for the tension screw. These contact springs go on flat against the sides of the base with the fingers going in the grooves to the tube holes. The binding posts hold them rigid at one end, while tension screws are placed in the slots at the other end.

Now when the tube is pushed in the socket, the lugs will press outward on the contact fingers, which will resist the pressure according to how springy the brass is and how

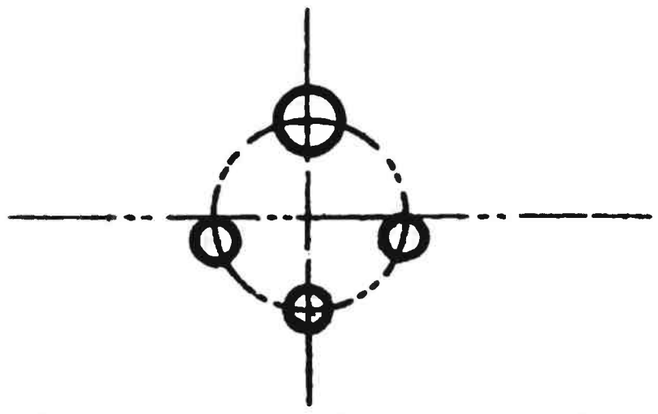


Fig. 3. Template for drilling holes in base of tube socket. If you cut this out and paste it on the hard rubber there need be no fear of going wrong, as it is exactly right and will save measuring.

tightly the tension screws are set up. Practice with a socket of this design has shown that the tension screws need never be tight.

Now comes the most important part of the job, namely, to mark the binding posts so that the proper connections can be made. The extra-large lug on the WD-11 is the plate terminal, so the binding post which connects with the 3/16-inch hole should be marked PLATE. The lug opposite is the grid, so mark that binding post GRID. The other two, of course, are the filament terminals, which should be marked, too, in order to avoid mistakes.

"American Interests May Rule World Radio"—Admiral Ziegermeier, Chief of Naval Communications

By Carl H. Butman

THE Radio Corporation of America and the U. S. Naval Radio Chain may eventually control the radio of the world. This is the opinion of Rear-Admiral H. J. Ziegermeier, Chief of Naval Communications. The impression that the Naval Communication Service might be trying to compete with or control commercial radio traffic is entirely erroneous. The Navy strives to maintain efficient and uninterrupted communication between all units of the U. S. Fleet, and to that end maintains many land stations. From its stations on both sea and land commercial messages are handled when other facilities are not available.

Instead of competing with commercial stations, the navy charges a little more for handling traffic, except in the Pacific, and has closed a number of stations recently where other facilities existed. Close co-operation between the naval and American commercial radio interests have existed for several years.

In this connection, Admiral Ziegermeier recently stated that it was due to representations of naval officers that the Radio Corporation of America was organized in October, 1919, to take over commercial stations and traffic handled by the navy during the World War. Admiral Ziegermeier reviewed briefly the activities of the commercial companies in this country, and among them named the Radio Corporation of America, the Tropical Radio Company, Federal Telegraph Company, and Independent Wireless Company.

"Of these the Radio Corporation of America have the largest facilities," he said. "They have direct connection to England, Sweden, Norway, Germany and France. They are building a station in Poland which will soon be in operation, and the Buenos Ayres station will be in commission this summer. This company has valuable franchises in South America. In the Pacific it has the Honolulu station for its Japanese connection. A company has been formed by the Radio Corporation and the Federal Telegraph Company for operation in China. China has granted the necessary rights to erect and operate four stations and this work is now under way.

"This company, with its connections and the naval radio chain, bids fair to control the radio of the world, as England now controls the cables," Admiral Ziegermeier claims.

"The Federal Telegraph Company," he said, "operated a point-to-point service on the Pacific Coast at Los Angeles, San Francisco, Portland and Seattle, and also handled some ship-to-shore work. Through its affiliation with the Radio Corporation of America, it will eventually have connections in China." The Admiral explained that, although the Federal Company has the necessary grant from the Chinese Government, there have been some delays in getting started, due to the desire of two other nations to block American interests. His latest information, he said, was that these obstacles had been overcome, and that the construction of the stations would begin immediately.

Admiral Zeigermeier said the Tropical Radio Company was connected with the United Fruit Company and had stations in Central America, where it was extending its facilities. He stated that the Tropical Company has stations in Boston, New Orleans, and Miami, and is anxious to locate a station in Panama. The Independent Wireless Company handles mostly ship-to-shore traffic, he added.

The Navy and Pacific Traffic

In October, 1922, the Admiral said he attended the Pan-Pacific Commercial Conference at Honolulu, where there were present 110 delegates representing 16 countries. One of the most important subjects considered by the conference, Admiral Ziegermeier said, was "Communications," especially with reference to expanding the already existing government radio stations to the extension of press service. If other countries on the Pacific would be willing to receive our press at a corresponding low rate, all difficulties would be removed, he explained.

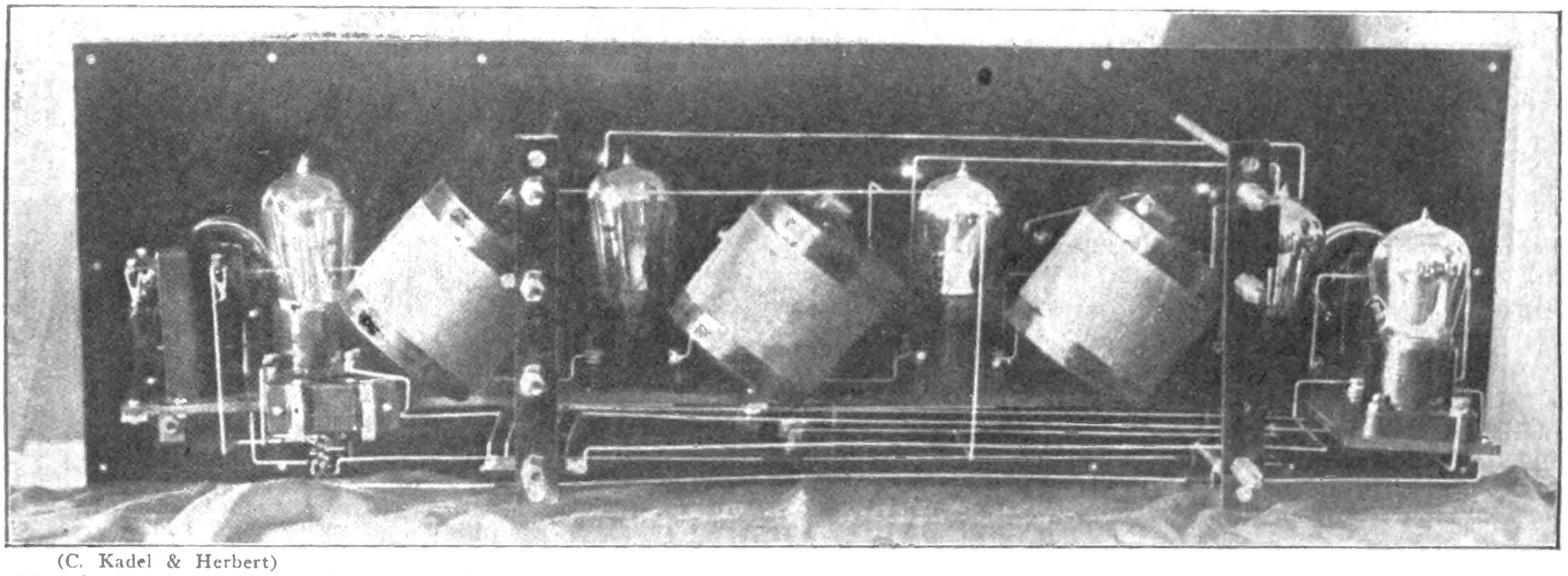
He said that a resolution adopted by the conference on the subject of communications urged that the governments of the countries use their radio facilities in cooperation with each other or with other agencies, to provide means of intercommunication for the public, wherever such services could not be obtained through private agencies, the chief objects being to secure the transmission of commercial messages at the usual commercial rates and the transmission of news messages promptly and at the low rates.

In outlining the navy's service to the public, he said that the navy may use its radio stations for press and commercial traffic under certain restrictions. Generally speaking, he said, the navy handled commercial messages at any of its stations at rates not less than those charged by commercial companies for like messages and for like service. This service ceases, however, when the navy is notified by the Secretary of Commerce that a commercial company is able to fulfil the requirements. It was thus shown that the Naval Communication Service is never a competitor with commercial companies.

In the Pacific, however, the navy is permitted, by law, to handle press to practically any locality at any rate, provided only that one end of the transaction is connected with American interests to the extent at least of being any newspaper published in the United States or a newspaper published by its citizens. This authority on both press and commercial traffic, it was pointed out, expires June 30, 1925.

To-day, practically all news service in the Pacific is handled by the Naval Communication Service, the commercial rates being prohibitive for any satisfactory service. The Associated Press sends on an average daily about 1,000 words from San Francisco to Honolulu, and about 800 words to Manila. This service is said to be most satisfactory to the press, and Admiral Ziegermeier said he had heard many complimentary expressions about it. The commercial companies have as much as they can do without handling press messages, he added. The navy press rate to Honolulu is three cents a word and six cents a word to Manila. To explain the situation, it was shown that the commercial radio rate from San Francisco to Japan is 72 cents a word; for press, 27 cents a word (subject to delay) and $2.16 a word for "urgent." The cable rates between similar points are 96 cents, 32 cents and $2.88, respectively. As privately owned radio stations are not permitted to operate in the Philippines, the U. S. Navy must be depended upon for all radio communication with these islands, he said.

Receiver Operates Under New Principle Invention of Professor



(C. Kadel & Herbert)

The new Hazeltine circuit receiver. Five tubes are used and the circuit is incapable of regeneration or oscillating, which is the cause of much interference in the present-day receivers, especially where many are located in a small district, such as New York.

ONE of the most recent improvement in the field of receiving instruments was recently made by Professor L. A. Hazeltine, of Stevens Institute, Hoboken, N. J. The receiver embodies an entirely new principle in reception and cannot radiate energy. This radiation of energy is one of the great drawbacks of the heterodyne and regenerative sets of today. Due to this fact, and also that it is an extremely powerful receiver capable of receiving marvelous distances, a popular future is predicted for it by its inventor.

In a test of the receiver a few feet of bare wire was thrown across the floor, serving as an antenna, and reception of long distance was possible.

As can be seen by the illustration it embodies five tubes, in connection with three couplers or inductances, and in this form is different from the regular sets.

As many people know, England forbids the use of regenerative circuits, because of their habit of re-radiating signals and thereby causing disturbance to sets in the vicinity. It was proved that a regenerative set embodying three tubes with sufficient plate current to operate it efficiently, could cause, through re-radiating signals, disturbance in receivers over a quarter of a mile away. This is especially noticeable in the more crowded districts such as New York, when there are many people listening in. The different sets can actually be used as small distance transmitters, and the writer has actually carried on conversation over a distance of over 650 feet air-line with a party having another regenerative set.

This will be absolutely prevented by the use of the new Hazeltine circuit, which, as said before, is incapable of re-radiation, and is at the same time a sensitive and flexible long distance receiver. As it does not need an outside antenna to operate efficiently, especially where local work up to 100 miles is desired, it will solve a lot of the problems that are so prevalent today in connection with the question, "Where can I put my antenna?"

How to Bank-Wind a Coil

By Arthur S. Gordon

AS far as telling at a glance how bank-winding is done, the average commercial bank-wound coil is a deep mystery. Wires tuck under each other and then disappear entirely. Any attempt short of wrecking a coil fails to uncover the method of construction, and so the radio amateur who thought he could figure it out by looking at the coil, leaves the radio store vowing that as far as he is concerned, the secret of how to wind coils in two, three or four layers will remain untold.

The idea of intensified inductance is familiar to all. The ordinary single layer coil, which is easiest to wind and therefore the most popular, is ideal for short wave lengths, but for long wave lengths the size of the coil becomes prohibitive. Coils eight or nine inches in diameter and standing four and five feet high are no longer in favor with radio amateurs, although a few of these monstrosities formerly graced the shack of the long-wave radio enthusiast. Gradually, new forms of winding were employed which

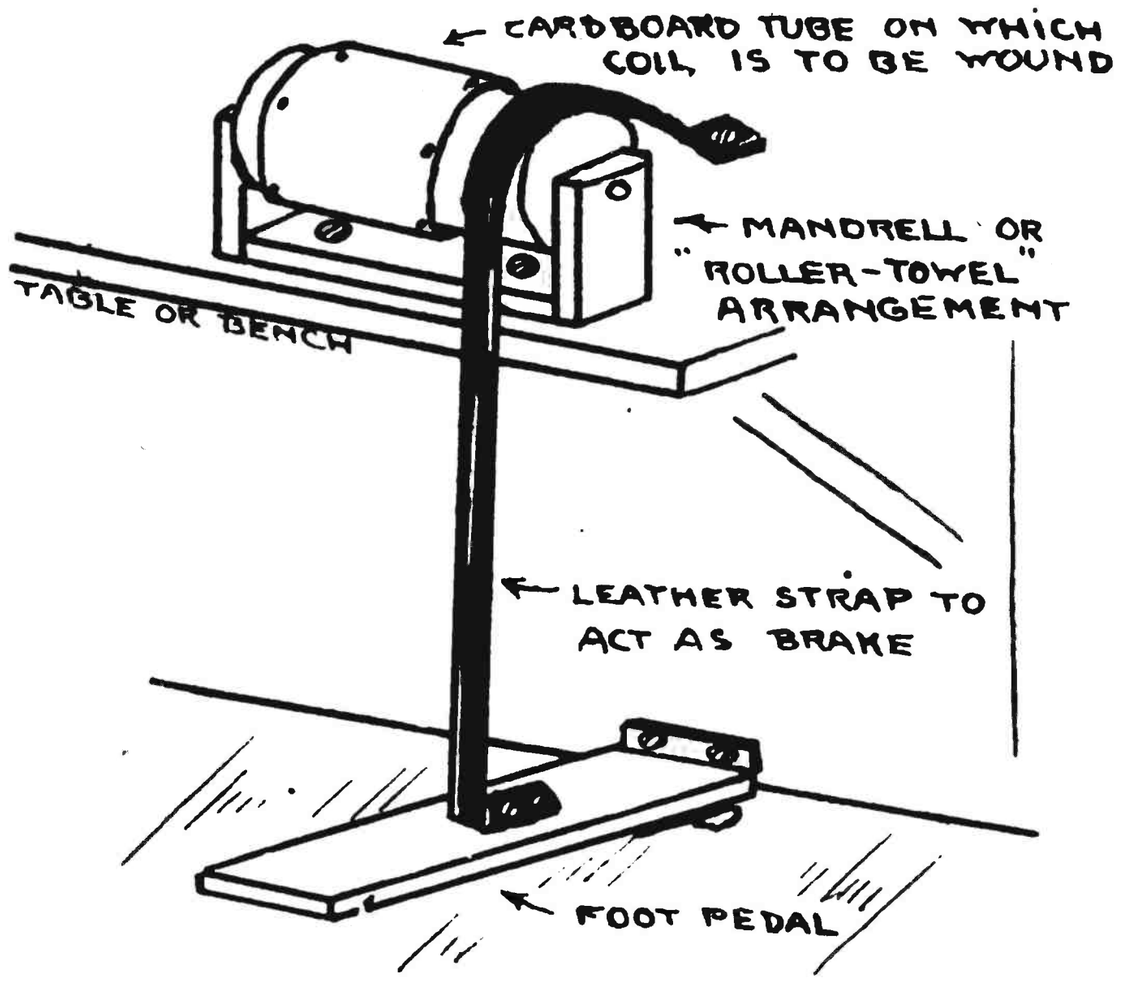


Fig. 1. A mandrel or winding-jig recommended for winding the bank-wound coils described in the text. It is almost impossible to wind coils by hand without a device of this sort.

not only cut down the size of the coil but actually increased the inductive effect to a maximum. One of these forms is the double, triple, or quadruple-layer coil which, because of the manner in which it is wound, is commonly known as the bank-wound coil.

Many amateurs wonder why it is not feasible to wind a number of layers of wire, one on top of the other, thus making a compact long-wave tuner. In such a winding, the effect known as distributed capacity is at a maximum. Distributed capacity may be defined as that loose and undesirable element in a radio receiver over which the operator has no control. When it is present to any degree at all, the coil or circuit will have a natural period or wave length of its own, and will perform more satisfactorily on one wave length than on any other. Tuning is rendered difficult if not impossible, and sometimes the other instruments in the circuit are prevented from functioning. In order to overcome this effect there have been evolved many types of winding, and among them is the bank-wound coil.

It is not an easy winding. Without some arrangement such as shown in Fig. 1, and a supply of collodion or coil cement, it is practically impossible. Yet when the amateur goes about it with care, first mastering the method as described in this article, bank-winding becomes easy. Once the amateur completes a finished coil, he will become official bank-winder for the whole neighborhod.

The home-made form needed consists of a wooden roller just the size of the inside diameter of the cardboard tube on which the coil is going to be wound. A three and one-half inch tube is about the size recommended. This wooden roller is mounted on a wooden bracket much after the fashion of a roller towel arrangement, the important part of the construction being that the roller can be taken from the bracket at will. When the bracket is screwed down to a bench or table, a leather strap is fastened to the table just behind it, and passed over the roller to a foot pedal hinged to the floor or wall. This pedal is the brake, and when winding, a slight foot pressure will hold the coil rigid so that the turns may be wound very tightly. This mandrel—another name for the device—need not be anything elaborate; the roughest construction will do the work.

The cardboard tube on which the winding is to be placed is tacked to the roller. Place the tacks along the end of the tube so that they can be withdrawn after the winding is completed. Supply yourself with either collodion or cement so that you can make the turns self-supporting as you go along. Then begin the winding.

Bank-wound coils may be double, triple or quadruple layer. A double-banked coil is easier to wind than a triple, while a triple is easier than a quadruple. The same principle, however, holds good for all, so in the instructions which follow for the winding of a three-layer coil the amateur will find a method for winding two and four-layer tuners.

The first step in winding a three-layer, bank-wound coil is to complete what are known as the "anchor" turns. They are six full turns wound in pyramid fashion on a base of three. In studying Fig. 2, in which four progressive steps are specified, give your attention to each step in turn, mastering the detail in one before passing to the next. Close your eyes and imagine yourself winding a tube on a form suggested in the preceding paragraphs. Get the idea of the winding firmly in your mind, and then, as the process is explained in detail in the next paragraph, follow each step through once again.

In detail, the procedure is as follows: Bring the wire (No. 20 or 22 S. C. C. copper wire) up from the inside of the coil, or from a binding post mounted on the coil and make three complete revolutions, laying down three turns as shown in "A" of Fig. 2. Put the brake on the winding device, and holding the free end of the wire with one hand, apply a solution of collodion or coil cement with the right hand. For this operation of cementing the three turns together, shellac will *not* do. In the first place, shellac is going out of favor with radio experts on account of its tendency to increase distributed capacity, and in the second place it is not of sufficient body to hold these first three turns together as firmly as they should be held.

At the end of the third turn, make a sharp angle to the left and wind the next turn on top and in the groove between turns Nos. 1 and 2. See "B," Fig. 2. Turn No. 5 is wound in between Nos. 2 and 3 as shown in "C," while the last turn of the "anchor" goes in the remaining groove, which is on top of and between Nos. 4 and 5. The last sketch in Fig. 2 shows the anchor turns complete.

At this point apply collodion once more. Now, when the anchor pyramid is complete and the collodion has hardened, make a sharp inward angle as though you were going to pierce the tube with the wire. Instead, straighten out with

(*Continued on next page*)

A Code of Ethics for Radio Fans

By O. G. De Witt

TWO simple yet important rules constitute what has been termed a "code of ethics for radio fans." In operating our radio receiver so as to get the maximum of enjoyment out of it, we should also think of the other fellow, and the two rules formulated by L. W. Chubb, a well-known radio engineer, show that this unselfishness is not only practical but that it really reacts to our own good.

Surrounding all of the high-powered broadcasting stations is a broad belt of radio receivers, most of them of the inexpensive crystal type. The first rule of behavior concerns the operation of crystal sets. Always de-tune them when they are not in use. It seems that when a radio receiving set is tuned to the wave length of a second station, the coils of that set absorb some of the radio energy, regardless of whether that energy is rectified by the detector and sent to the phones to be enjoyed by the listener. In other words, an idle crystal set, if in tune, will take away from the sum total of a sending station's energy and thus rob somebody else who is farther away from the transmitter.

To avoid offending in this respect, always throw your dials to the zero position when you sign off your crystal set for the night. It is not necessary to throw your detector out of adjustment. With this rule, the owners of vacuum tube outfits do not need to concern themselves, because when they shut off their tubes, their aerial and coils are harmless.

There is, however, a rule about vacuum tube operation that should be taken to heart by every tube owner. Do not hunt for stations with your tubes oscillating. To do so is to annoy the listener-in at a nearby set, who can hear a shrill whistle emanating from your set as you go up and down the scale in search of carrier wave whistles. One "peanut stand whistle," as this interference is called, is not bothersome, but when a thousand neighboring stations begin hunting with their cut-outs open, the resulting interference is the most persistent and annoying characteristic of present-day radio.

When your tube set is operating at excessive regeneration, it is in reality a miniature transmitting set. It sends out at once everything that it brings in. There is, of course, an appreciable lag between the original signal going on its way and the re-transmitted signal from your receiver. When another receiver is reached, it not only records the reception of the original music but it also piles on top of that music, the reproduction of it sent out by your station. This is what causes the gurgling and distorted music and speech often received over the radiophone.

You are frequently annoyed by these apparent defects in radio. Why not resolve now to help the situation by tuning-in with your set just on the verge of oscillation, and not in a howling state of excessive regeneration? If we want the quality of broadcasting programs to improve, we must also improve the quality of broadcasting reception, and there is no better way for a radio fan to do this than to observe one or both of the rules given above.

(*Continued from preceding page*)

another sharp angle and continue the winding, laying turn No. 7 alongside No. 3. As turn No. 8 comes around it goes on top of No. 7 and runs next to No. 5. Turn No. 9 is on top of No. 8 and next to turn No. 6. Turn No. 10 comes down to the first layer again, and the succeeding turns are wound *against the inclined bank* of the three preceding turns, and so on until the required number have been placed on the coil. Every third turn after the sixth appears on the top layer, and the only difference noted between the appearance of a bank-wound and a single layer coil is the spiral path indicating where the top turns, one after the other, have been turned down to make the next turn on the first layer.

Don't make all the turn-downs in the same place, but drop back about ¼ of an inch each time. In taking out taps—about every twenty-four turns—take them from the first layer always, so that the two other layers can cross over the twist and help to hold it in place. Be liberal with the coil cement and above all things—take your time!

Four and five-layer coils are wound in the same way as three-layer, with the exception that four and five layers, respectively, are placed at the base of the anchor winding.

Bank-winding is not used in short wave tuners, but in loading coils or in long wave instruments, nothing is quite so effective. On a cardboard tube no larger than that used for an ordinary tuner operating on 360 and 400 meters, enough turns can be bank-wound to bring in everything that sends on less than 3,400 meters—and that's pretty nearly everything. Bank-wound coils are intensified inductance, and not only that, but they keep down to a minimum that deadening effect known as distributed capacity.

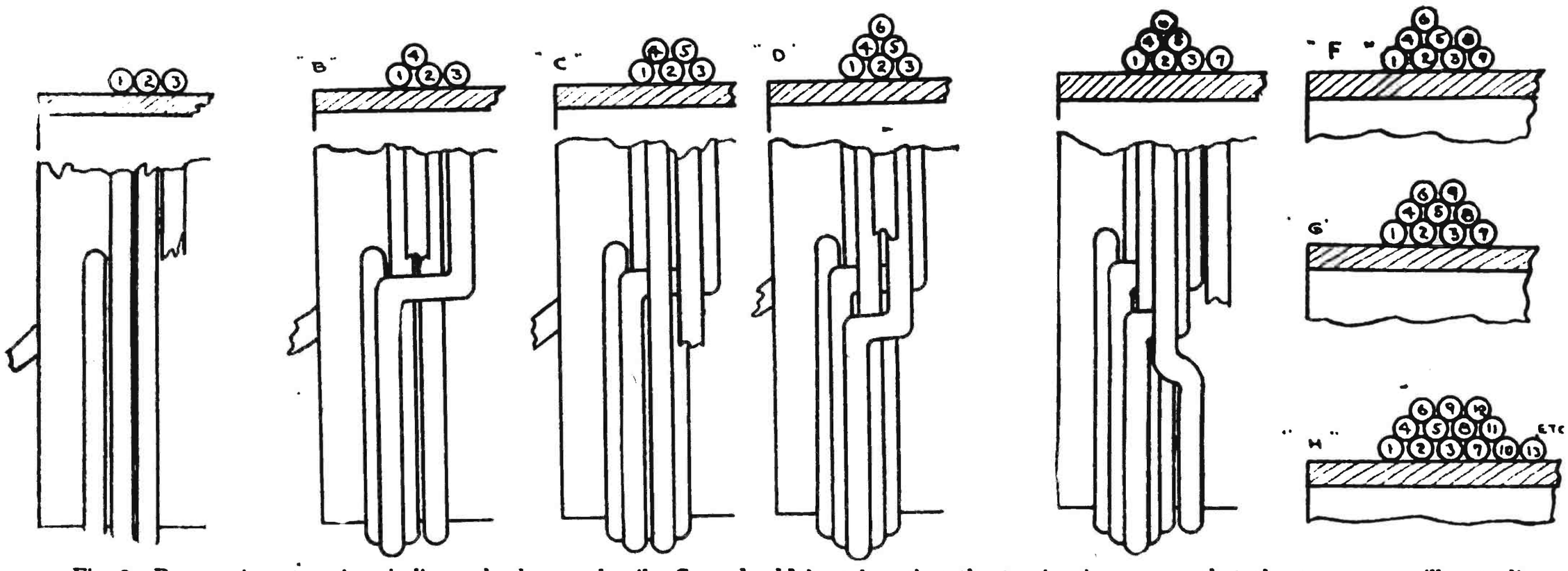


Fig. 2. Progressive steps in winding a bank-wound coil. Care should be taken that the tension is even so that the top turns will not slip.

A Long Distance Three Tube Set

By H. Spencer Lewis

THE most important tuning element in this strange set is the combination coil containing the primary, secondary and regenerative windings. Contrary to popular belief the induction set up by a primary winding is not best absorbed by a secondary winding inside the primary, but on a plane with it and outside of it. This gives a maximum induction in one sense and a maximum of selection, permitting extremely accurate tuning. Hence this tuning coil should be made of a cardboard or fibe tube six or seven inches long and four inches in diameter. At one end there should be twenty turns of number eighteen D. C. C. wire. S. C. C. wire will not do. More turns can be used for this primary winding if higher wave lengths are desired, but 20 turns will take care of wave lengths up to about 700 meters. By putting the primary condenser in parallel with these twenty turns the wave length can be increased. If more turns are used, taps should be put on every second tap above and beginning with the eighteenth. Note that the last turn, toward the center of the tube, must have the connection from the *ground*.

to modulate the whistling, while acting at the same time as a tuning device, for with this condenser alone one can tune in or out a number of stations on any given wave length without disturbing the other condensers once they are set. And stations selected in this wise would not be located if this condenser did not do this little trick.

The elements in the set are as follows:

1. Fixed condenser, .00025.
2. Variable condenser, 43 plates.
3. Variable condenser, 43 plates with one vernier of 3 plates.
4. Fixed condenser of .00025 mfd.
5. Fixed condenser of .00025 mfd.
6. Variable condenser 43 plates.
7. Fixed condenser of about .0005 or .001 mfd.

Transformers of any standard make, at right angles, are used. If possible use regular 4 to 1 transformer for first stage and 7 to 1 for second stage or a R. C. A. audio transformer. The rheostats for detector and first amplifying tube should be Bradleystats, because they permit extreme

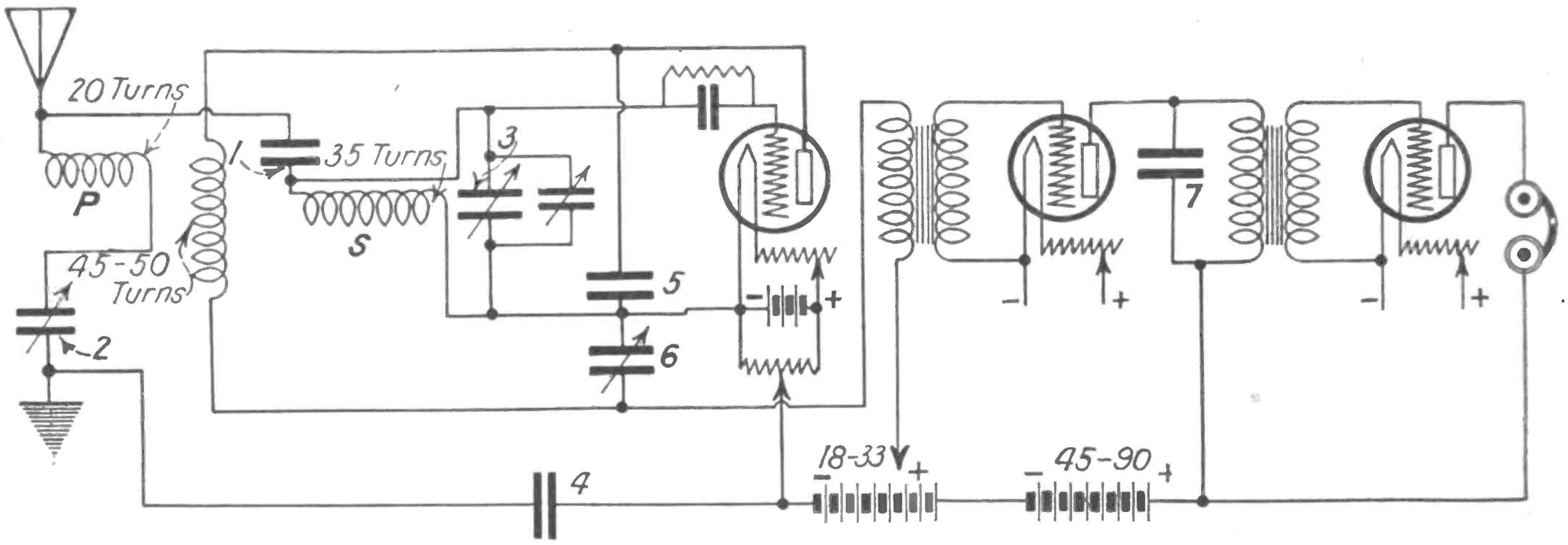


Fig. 1. Schematic diagram of the set described by H. Spencer Lewis in the accompanying article. The filament leads for the second and third tubes are left open to show that each of the tubes is supplied from separate batteries. This is done to prevent any back-coupling through the battery leads.

After this primary winding is completed, leave a space of half an inch and wind 35 turns of the same wire. This forms the secondary winding. It should be wound in the same direction as the primary winding, and both windings are determined by the winding of the rotor within the tube, for the rotor must be wound in the same direction as the primary and secondary. The rotor should have about 35 or more turns of 22 S. C. or D. S. wire.

The shaft for this rotor should come in the half-inch space between the primary and secondary windings, and the ball should fit snugly in the tube. Therefore, before starting to wind the tube get your ball and either shave down the ball to fit your tube or make the tube slightly smaller to fit the ball. In making the secondary connections be sure that the first turn of the 35 secondary turns, the one nearest the rotor, goes to the grid leak. The connections to the rotor from plate and transformer will have to be determined by listening for the regeneration and oscillations. If wrongly connected there will be few or no oscillations. The rotor acts as a tickler despite the fact that it is located between primary and secondary and you will soon note that it seems to be regenerating radio frequency oscillations in a manner peculiar to itself.

The other odd feature of this hook-up is the condenser shown at No. 6. This I call a *modulating condenser,* for it acts as a vernier on the tickler regeneration and also helps lowering of current, gradual increase, fine adjustments, and are absolutely noiseless, which is exceedingly important in picking out weak distant stations before bringing them up to maximum loudness.

The potentiometer shown at No. 8 should also be one which is not in steps, but graduated like the Bradley, for stations can be tuned in or out on this alone, sometimes a slight increase bringing a change of many stations.

The detector tube should be preferably an A. P. or Moorehead, but for those who are out of luck in this regard, some Radiotrons or Cunningham tubes are critical and oscillate at a low point and these are very fine. Any good tube, even the four-volt Myers tube will also work well. The first amplifying tube will be almost as critical as the detector tube.

In finding the proper plate voltage on the detector tube, do so with the potentiometer set in its middle or neutral point so as to leave a range for increase or decrease. The more distant the station being tuned-in, the less plate potential and filament current will be needed and in some cases loudness is reached by turning down the amplifying tubes, even turning the last one down to its lowest point and at other times by turning the first one way down and the second one on full.

In operating observe these points: First, find where your

(*Continued on next page*)

(*Continued from preceding page*)

detector oscillates by adjusting the primary condenser, rotor and secondary condenser along with the detector, *rheostat* and potentiometer. Once the oscillations are noted, keep your adjustments confined to that small field and try to soften the oscillations, remembering that you may be generating QRM for many others in your neighborhood. Once you locate some broadcasting station, either 360 or 400 wave length, you will find that all other stations are within a quarter-inch on all your condensers. But for long distance stations you will have to slightly increase the position of your rotor. In between the low soft whistles you will find the distant stations by adjusting the verniers on your secondary and primary condensers. Then use the modulating condenser and rheostats to clear away all

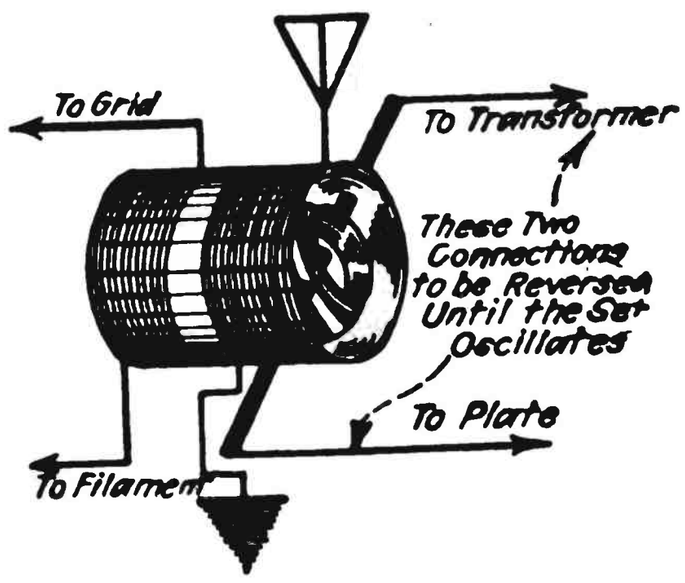


Fig. 2. Diagram of the coupler to be used with circuit shown in Fig 1. The two coils are wound on the same tube. The coupling is movable. Regeneration is obtained through varying the tickler.

whistling and add loudness. It will take probably several hours to become acquainted with the tuning of this set, but once you have found the critical points on each dial or knob, you will be able to go back any time and pick out any station. I have picked out seven distant stations on 360 meters by moving the vernier of the secondary condenser within a space of half an inch only.

Putting Themselves on Record

(C. Radio Corporation of America)

Three of the most prominent figures in the radio world today, putting themselves on record by means of the pallophotophone. Left to right they are: General Harbord, president of the Radio Corporation; C. A. Hoxie, inventor of the pallophotophone; David Sarnoff, vice-president and general manager of the Radio Corporation.

Difficulties of Radio Licensing

SECRETARY HOOVER will have to contend with many difficulties during the next year operating under the old radio laws of 1912. Conditions have changed in ten years. There were, in June, 1913, only 1,890 transmitting stations all told, whereas there are today almost twenty-one times that number—actually 21,065. There were no broadcasters in 1913, but in January there were 544, and today—576. Of amateurs, there were 1,312 in 1913 compared with 16,898—over ten times the number now. Special amateurs, experimental, technical and training stations number 618 against 20 ten years ago. Ship stations have increased nearly seven times, and commercial stations have grown from 79 to 218. Instead of one trans-Atlantic there are twelve such stations.

All of the above indicates how badly the Commerce Department needs new and specific laws for the assigning of more wave lengths and the policing of the air. If there was interference in 1913 there is over twenty times the interference today. Naturally, the Department has revised its regulations somewhat to meet the needs of this great increase in stations, but there is not much that can be done under the old law as it stands. Secretary Hoover's hands are practically tied until new legislation is enacted.

One of the first things to be done by the Department will be the extension of the license periods for broadcasters from three months to a year. Since the introduction of the White Bill last June the Department has been extending broadcasters' licenses every three months, on application, in anticipation of new regulations which would have followed closely upon the enactment of new laws. But the failure of the Senate to pass the radio bill precludes new legislation for at least a year, and twelve-month licenses will now be issued to save the Department time and work.

There are about four times the operators' licenses issued annually today compared with those issued in 1913. Ten years ago only 3,682 operators were licensed, but in 1922 the operators licensed totaled 12,113. Commercial licenses issued increased about 80 per cent, and amateurs' licenses were nearly eight times as many. In 1922 there were issued 8,920 amateur licenses, and in 1913 only 1,841. As all of these operators' licenses are issued for two-year periods there are practically double this number of amateur stations in operation.

Berlin, Germany, Picks Up WOR, Newark, N. J.

MUSIC transmitted from the United States was heard in Germany for the first time on February 24, according to a press dispatch from Lichterfelde, a suburb of Berlin. The experimental wireless station at Seehof, at 6 a. m., picked up the voice of Miss Edith Bennett singing in the department store of J. Bamberger & Co., Newark, N. J., station WOR.

The vocal and instrumental tones were perfectly audible. The transmission is regarded as remarkable since the broadcasting station operated on a 400-meter wave length, the same as is commonly used for nearby American listeners. Eight high vacuum amplifiers were used in receiving, but only ordinary antenna, eight meters high.

Methods of Measuring Properties of Electron Tubes

Apparatus Used by The Bureau of Standards

IN papers dealing with the operation of electrical circuits which use electron tubes, as well as in the design of radio equipment using electron tubes, certain properties of the tube appear to be of much importance. This article describes apparatus used at the Bureau of Standards, Department of Commerce, Washington, for measuring some of these properties. Those included are:

I. Combination alternating-current bridge for measurement of
  (1) Internal input resistance.
  (2) Internal output resistance.
  (3) Amplification coefficient.
II. Arrangement for measurement of
  (1) Direct-current characteristics.
  (2) Power output of generator tubes.
III. Measurement of detection factor,

There are other important factors which are not covered by this series of articles. Some of the more important of these are, inter-electrode capacities, mutual conductance, and detection factors defined differently from the one included in an article to appear later.

The methods of measurement used have been described by several writers* on the subject and this paper is intended to give convenient circuit arrangements that may be used for the rapid determination of the various properties with the values of the circuit constants that have been found most convenient.

I. Combination Alternating-Current Bridge for the Measurement of Internal Input Resistance, Internal Output Resistance, and Amplification Coefficient.

This bridge is an alternating-current bridge which by simple switching arrangements may be used to measure internal input resistance, internal output resistance, and amplification coefficient under any condition of grid voltage, plate voltage and filament current. The principle involved in each of these measurements can be seen by reference to Fig. 1. In each case the contact on the slide wire is varied until there is no sound in the telephone receivers. When this condition is satisfied the value of the factor desired is given by the relation indicated.

The complete circuit arrangements is given in Fig. 2 in which

1 and 2 are SPDT switches.
3 is a SPST switch.
4, 5, 6, 7, 8 and 15 are terminals to which auxiliary apparatus is connected as indicated.
9—Filament ameter.
10—Grid voltmeter.
11—Standard receiving tube socket.
12—Terminals for connecting non-standard tubes.
13—Slide wire.
14—Two-stage audio-frequency amplifier.
G—Ground terminal.
R—Standard resistance box, variable from 0-100,000 ohms.
R_1—Filament rheostat.
R_2—Grid voltage divider.
R_3—Rheostat 0-10,000 ohms.
R_4—Rheostat 0-1,000 ohms.
R_5—Voltage divider 0-1,000 ohms.
S—Reversing switch by means of which the grid may be made either positive or negative with respect to

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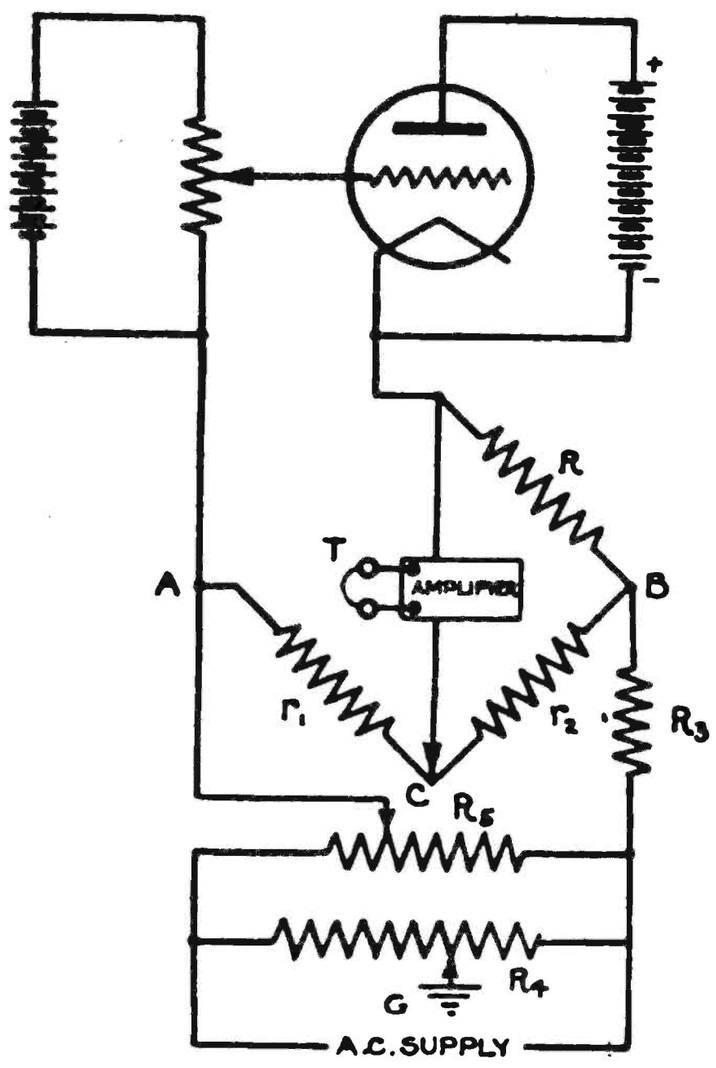


FIG.1.(a) INTERNAL INPUT RESISTANCE (r_g) WHEN THERE IS SILENCE IN THE PHONES T

$$r_g = \frac{r_1}{r_2} R$$

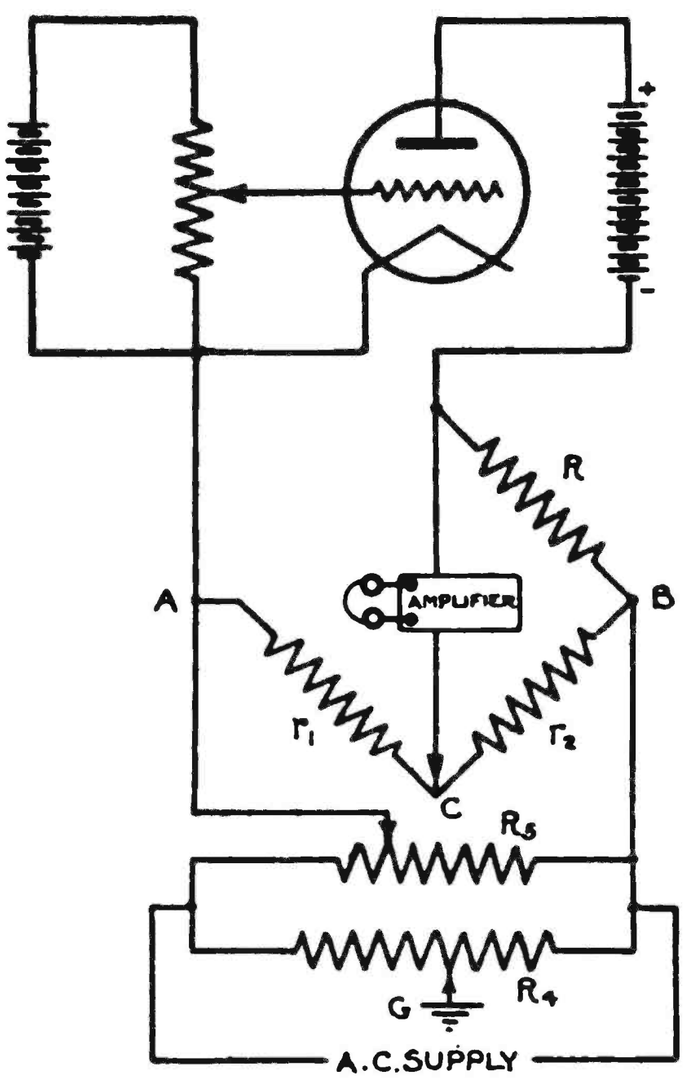


FIG.1.(b) INTERNAL OUTPUT RESISTANCE (r_p) WHEN THERE IS SILENCE IN THE PHONES T

$$r_p = \frac{r_1}{r_2} R$$

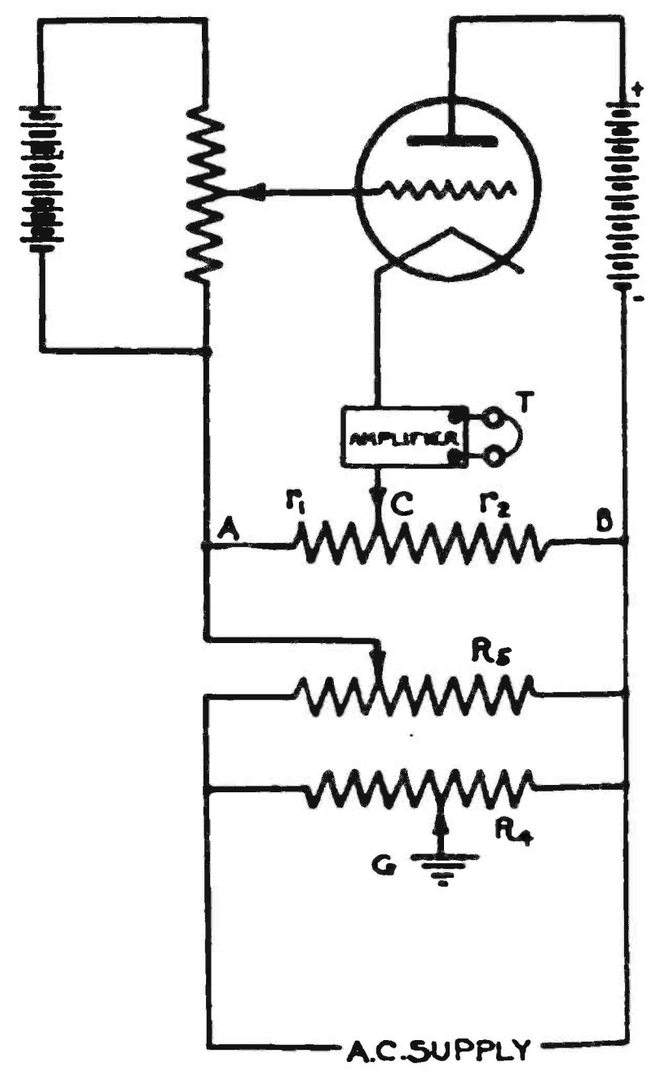


FIG.1.(c) AMPLIFICATION COEFFICIENT (μ) WHEN THERE IS SILENCE IN THE PHONES T

$$\mu = \frac{r_2}{r_1}$$

*J. M. Miller, Proc. I.R.E., June, 1918. H. J. van der Bijl, "The Thermonic Vacuum Tube," Chap. VII. J. H. Morecroft, "Principles of Radio Communication, Chap. VI.

(*Continued from preceding page*)

the negative side of the filament, as indicated by the + and — signs on the switch.

(1) Measurement of internal input resistance (r_g)

Switches: 1. Closed at a.
2. Closed at c.
3. Open.

When the switches are as indicated the circuit may be reduced to the simplified diagram, Fig. 1a.

The tube to be measured is placed in the socket 11 or connected to the terminals G, F—, F+, P shown at 12 in Fig. 2.

A filament battery is connected to the terminals at 4 and the current indicated by the ammeter (9), adjusted by the rheostat R_1 to the desired value. Between the two of the three terminals at 8 marked "Plate Bat." is connected a battery which must have the exact plate voltage desired as no means is provided for varying this voltage except by the addition of series cells. A voltage divider canot be used because of the extra resistance inserted in the plate circuit. A battery giving the voltage desired for the grid is connected to terminals 5. All the batteries must be placed near the apparatus and connected with as short leads as possible so as to minimize induction from any a. c. source. The audio-frequency generator used may be either an alternating-current machine or an electron tube generating set. It is desirable that it be capable of being varied over the audible range, although this is not necessary. Best settings may be obtained with frequencies of 1,000 to 1,500 cycles per second.

A high-resistance direct-current voltmeter having a resistance of 100,000 ohms or more, is connected to the terminals at 8 marked "Plate VM." The telephone receivers used for indicating a null point are connected to the second stage of the amplifier unless there is too much noise due to induction to make an accurate setting, in which case measurements may be made with less accuracy using only one stage of amplification. The grid voltage, indicated by the voltmeter (10), is adjusted by the voltage divider R_2 to the desired operating point, R is set at 100,000 ohms and the slide wire adjusted for a minimum sound in the phones. Further adjustments are made by changing the position of the slider of R_4 until the best minimum is obtained, then readjusting the slide wire, repeating this operation until almost a complete silence is obtained for the minimum. It will be noticed that R_4 is a resistance across the input leads, with a variable midpoint at which the ground is connected. It is possible to compensate for capacity-to-ground effects almost entirely by changing the position of the ground in R_4. When there is complete silence in the phones T then

$$r_g = \frac{r_1}{r_2} R.$$

If it is desired to measure the alternating current voltage applied to the tube during a measurement a low-voltage a. c. voltmeter (for example, a high resistance thermo-element and micro-ammeter calibrated in volts) may be connected across the input terminals (*7*, Fig. 2). It is evident that the alternating current grid voltage is equal to the voltage drop across r_1 (see Fig. 1a) when silence is obtained in the phones T. Then the impressed voltage

$$e_g = \frac{r_1 E}{r_1 + r_2 + R_3}$$

where E is the voltage impressed on the bridge and measured by the voltmeter connected across the input terminals.

If the input resistance of the tube is high (over 10^6 ohms) difficulty will be experienced in making accurate settings and accuracy of the bridge decreases.

(2) Measurement of internal output resistance (r_p)

Switches 1. Closed at b.
2. Closed at c.
3. Open.

When the switches are as indicated the circuit arrangement reduces to that of Fig. 1 (b).

Resistance R is set at about 50,000 ohms and the point C on the slide wire adjusted until a minimum is obtained. R_4 is adjusted along with the slide wire until complete silence is obtained in the telephone receivers. If the ratio $\frac{r_1}{r_2}$ is too large or too small for accuracy then R is changed to bring the setting near the middle of the slide wire. Readings are taken with two or more values of R and the results averaged.

With silence in the phones

$$r_p = \frac{r_1}{r_2} R.$$

This measurement includes the resistance of the plate battery which for new cells can be neglected in comparison with the resistance of the tube.

(3) Measurement of the amplification constant (/u)

Switches 1. Open.
2. Closed at d.
3. Closed.

This arrangement of switches reduces the circuit to that of Fig. 1 (c).

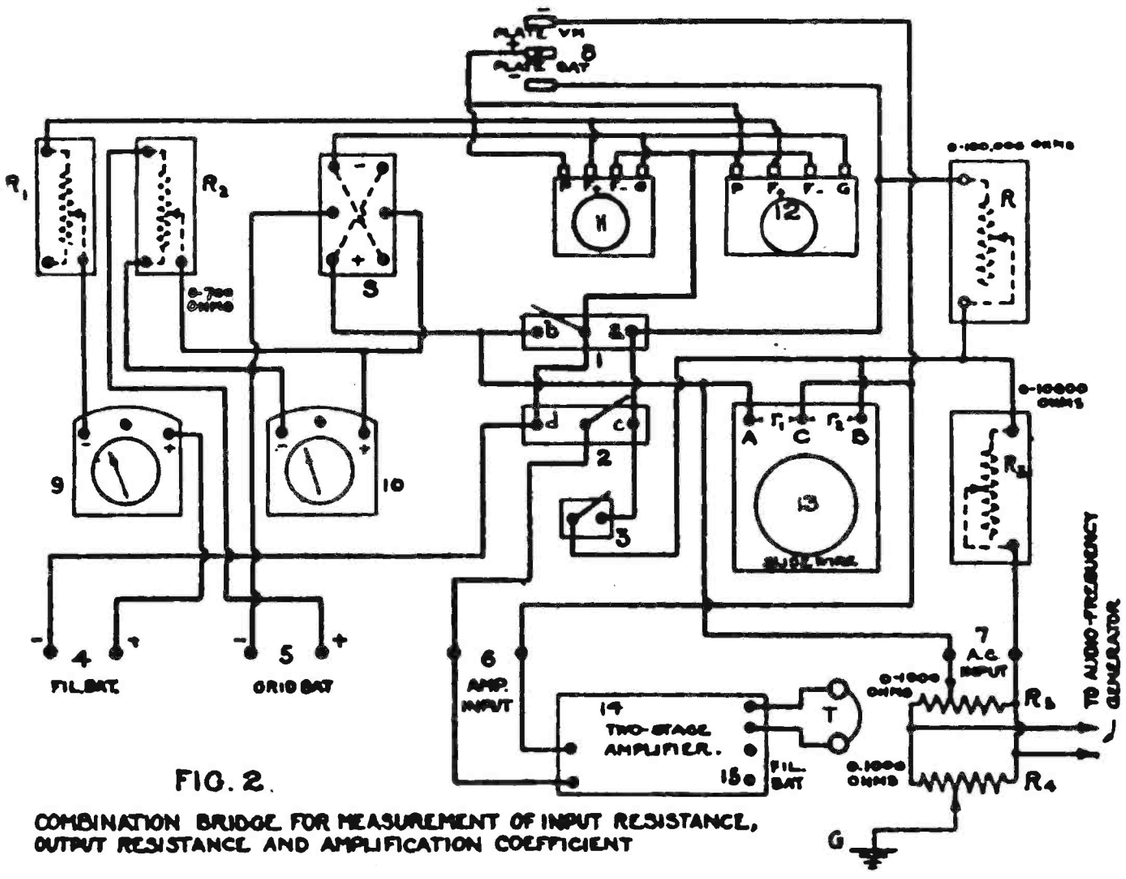


FIG. 2.

COMBINATION BRIDGE FOR MEASUREMENT OF INPUT RESISTANCE, OUTPUT RESISTANCE AND AMPLIFICATION COEFFICIENT

The slide wire and R_4 are adjusted for minimum sound as described above and when silence is obtained

$$/u = \frac{r_2}{r_1}$$

In all the preceding measurements, and especially in the measurement of r_g, care should be taken to keep the alternating current input as low as possible consistent with accurate setting of the slide wire.

When adjusting for minimum sound in measuring /u, the importance of adjusting R_4 closely is not marked, as it does not affect the slide wire setting appreciably, but in all the other measurements, changes in R_4 affect both the amount of sound at the minimum, and the setting of the slide wire, so R_4 must be adjusted carefully to obtain a minimum as close to silence as possible. This is best done by moving the slider of R_4 back and forth over the minimum point and at the same time turning the slide wire (13) slowly in one direction until the nearest to complete silence is obtained when R_4 passes its minimum point R_4 is left at this point and the final adjustment made on the slide wire.

Tubes should be left burning for two to five minutes before making measurements to allow them to come to a condition of stability.

(While this article is complete in itself, it will be followed by others on the same subject, and equally important.)

The Radio Primer

For Thousands of Beginners Who Are Coming Into Radio Circles

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

By Lynn Brooks

WHAT are the advantages of using a crystal detector in connection with a reflex set?

When using a reflex circuit a crystal detector is advantageous because it is the quietest detector known, not having troublesome tube noises and also being the most distortionless. A crystal, while not quite as sensitive as a tube, overbalances the slight disadvantages of this loss in a reflex circuit by being a quiet and distortionless detector.

* * *

A capacity of .006 is desired. The highest capacity condensers that can be gotten are .002. How can the difference in capacity be made up?

In the case of a certain fixed capacity being wanted, where there are a number of condensers of smaller value at hand, the higher capacity may be obtained by placing the condensers in parallel. Thus it is seen that if the desired capacity is .006 and there are three .002 condensers used in parallel, the desired capacity will be obtained.

* * *

What is the effect of connecting condensers in series?

When condensers are connected in series it cuts the efficient capacity down in direct ratio to the number of condensers as compared with the capacity of each. Thus for example three condensers connected in series, the capacity of each being .002, the method of finding out the capacity is as follows: Take the capacity of 1 condenser as .002. Divide by the number of condensers in circuit thus: .002 ÷ 3 = .000666, or the capacity of three condensers in series.

When making fixed condensers, state the precautions that are to be observed.

In the manufacture of condensers, if they are to be packed (rolled) the best method of making is to use tin foil and waxed paper. The paper used should be at least one inch larger all around than the foil. The waxed paper should be heavy enough to stand the strain. The lugs for connections should be taken off opposite sides.

* * *

When a receiving set is installed, and refuses to work, what should be done to test it?

In the case of a receiving set refusing to work when installed, the following should be done: See that the tube is lit properly. If there is no click when the B battery is connected, reverse the leads. If variable condensers are used across the secondary, rotate them to determine if they are short-circuited. If this is the case a series of loud clicks and knocks will be heard in the phones. See that the antenna is not grounded and that it is connected to the proper post of the set. See that all the lugs of the tube are making connection with the proper post of the socket. The lugs of the socket sometimes become bent and do not connect with the post, so see that they all make good connection.

* * *

Can a tube filament be repaired after the manner of a regular light bulb, by tapping the side of the glass?

This cannot be done, because of the fact that the filament in a tube is short and stretched tight. When burnt out, it fuses short because the filament is extremely thin. This leaves the filament too short to enable any jar to allow a short circuit to again connect the wires.

* * *

In the new 1½-volt tubes, vibrations are very apparent. What can be done to reduce the noises?

The socket should be mounted on a pad of thick felt or soft gum rubber and not screwed down. Glue should be used to fasten both the felt on the sub-panel and also to fasten the socket proper on the felt. This will reduce the vibration of the elements of the tube and decrease the noises.

SECOND DISTRICT RADIO CONVENTION A BIG SUCCESS

THE third annual convention and radio exhibition of the Second District Executive Radio Council, opened at 2 P. M., Thursday, March 1, with a bang. In contrast to the convention held last year, both from standpoints of beauty and usefulness, it overshadowed the second annual meeting as completely as a Rolls-Royce outclasses last summer's Ford.

The exhibits, which are really the hit of the show, were arranged in a most interesting and unusual manner. A point of note is the fact that the exhibits have practically the same amount of space allotted to each. Therefore, they stand out because of the value of exhibits themselves, rather than the amount of space allotted to them. This is a noteworthy idea, as no unfair comparisons can be drawn from the consideration of space alone.

The booths as allotted for the exhibition were occupied as follows:

Booth
3. Westinghouse Union Battery Co.
4. Electric Storage Battery Co.
5. Radio Corporation of America.
6. Mortimer Radio Co. and Advance Metal Stamping Co.
7. General Radio Co.
8. Acme Apparatus Co.
9. W. J. Murdock Co.
11. Jefferson Electric Mfg. Co.
12. American Radio Relay League.
13. F. A. D. Andrea.
14. Experimenters' Information Service.
15. Federal Tel. and Tel Co.
16. Diamond State Fibre Co.
17. A. H. Grebe & Co., Inc.
18. Executive Radio Council, Second District.
19. De Forest Radio Tel. and Tel Co.
20. Marco Storage Battery Co.
21. The Bristol Co.
22. Jewell Electrical Instrument Co.
23. Adams-Morgan Co.
24. Novo Mfg. Co.
25. Allen D. Cardwell Mfg. Corp.

In the Butterfly Room, which is right across the hall from the main exhibition, are the Club Exhibits. The following clubs were represented, in the booths allotted:

Booth
26. Radio Club of Brooklyn.
27. Hackensack and Ridgefield Park, N. J., Radio Clubs.
28. Chelsea Radio Association.
29. Radio Association of Greater New York.
30. Ridgewood Radio Club.
31. Hudson Radio Club.
32. Department of Commerce.
35. Bronxville Radio Club.
36. Bronx Radio Club of New York.
37. Hill City Radio Club.
38. Staten Island Radio Club.
39. Radio Club of Jamaica, L. I.
40. Radio Division, Hudson River Yacht Club.
41. Bushwick Evening Trade School Radio Club.
42. Roselle Park Radio Club.
43. Camp Walkill Radio Club.

The club exhibits at the third convention overshadowed those of all previous years, even beyond comparison. One of the finest installations of the radio clubs was that made by the Radio Division of the Hudson River Yacht Club.

In the next issue of RADIO WORLD will be published illustrations of the various exhibits and news of the convention.

One of the features of the show was the fact that A. H. Grebe & Co., Inc., installed a complete 500-watt transmitter under a special license to operate three days, the call being 2CYT.

Radio and the Churches

ROGER W. BABSON, the well-known statistical expert, is quoted as saying: "A hundred thousand churches in this country and their millions of members little realize how their institutions are to be changed by radio broadcasting. People, like water, travel along the lines of least resistance. If they can hear at home by the fireside, on the radio, the same service that they would otherwise have to go out and hear, they are apt to remain at home and use the radio."

Radio and the Woman

By Crystal D. Tector

UNKNOWN to F. H. the other day I visited town and, going to one of the largest radio stores, bought all the necessary parts for the "Flewelling Circuit." Two days later, when hubby arrived home on the 6:10, he was much surprised to find that I had taken his set and put it away, and in its place was my work of art. Well, you never saw a more surprised man in all your life. He just couldn't understand how any woman (he generally calls them "mere womings") could make a set. It worked so well that we decided to let the old set stay upstairs and play around with the "New Flewelling" awhile. You want to try it, girls! It's more fun than making a cake or a new dress, especially if you surprise some one with it. And the satisfaction you get out of it when you can stick up your chin and say: "Oh, yes; I made it *myself!*"

* * *

While we are on the subject of making things, I know that there are a lot of men in town that have turned out to be real handy around the house just by showing the folks that they could make things if they really wanted to. They had the bad habit of telling their wives and mothers, "Oh, send for the carpenter. He'll fix it. I'm too tired—hard day at the office," and all of that. But now that they have demonstrated that they can do something if they feel like it the plumber and carpenter don't make so much money driving a few nails or fixing a leaky faucet.

* * *

I had quite a time finding the correct way to solder, and nearly gave it up as a bad job; but by wasting plenty of solder, burning the table and my hands quite a few times, I finally found out that I had to clean the parts, then put a little flux on it (funny brown stuff that smells terrible when you put the iron on it), and *not* let the iron get red hot. It surely is a great satisfaction to see the parts stick together after you have "muffed" it a dozen or more times and then found out the right way all by yourself.

* * *

The large New York department stores are making quite a lot out of the radio craze these days. Last week a few of my friends and myself went shopping, and, of course, we had to do two things: one was to visit the millinery department and the other was to look around the music department. Imagine our surprise when we found that the store had given over half the space that they had for the music department to an up-to-date radio department, with plenty of sets and nice young men to demonstrate them for us. We listened to more sets and things than we had ever known existed, and the clerk was such an agreeable chap. He never did get tired of explaining just how everything worked, and it was perfectly understandable, too. Some of those radio clerks like to hear themselves talk about "super-impose, self-heterodyne" and any number of fancy technical terms which very few people understand, and it is a welcome relief to have somebody talk in such a way that you can understand. Of course I don't mean that I personally object, but it seems that the "experts" are acknowledging that just because they understand those terms there is no reason why every one should.

Radiograms

ALL police and fire-alarms will soon be broadcast if a series of tests which William B. Quinn, of Jersey City, is conducting are successful. He intends to install an intercommunicating system in every police and fire station throughout the city, and equip all the police and fire stations with receiving apparatus.

* * *

HOPE can now be held out for the deaf if experiments made by Dr. MacLeod Yearsley, of London, a famous aural surgeon, turn out successfully. He recently was inspired by the report that a deaf man 77 years of age, was made to hear the human voice for the first time in 30 years through a radio receiving set. Taking Harry Shwer, a boy 13 years old, who has been deaf from birth, he made the experiment of placing him before a loud speaker. The youngster quickly evinced the fact that he could hear, by tapping his foot in rythm with the music that was at the time being played. Dr. MacLeod Yearsley holds great faith in re-educating the deaf to hear by means of radio and thinks that this is the biggest step in that line that has been accomplished.

WHAT is said to have been the first time that proceedings of an important stockholders' meeting have been broadcast, was recently accomplished in Chicago, when the Chicago Edison shareholders conducted a long-distance meeting and voted by radio an increase of $20,000,000 in the capitalization.

* * *

A COMPLETE broadcasting equipment was installed at the Longacre Theatre in order to insure the successful broadcast of "The Laughing Lady" on March 2. This play was broadcast through Westinghouse, but the complete speech-amplifying and power-amplifying apparatus was installed at the theatre itself, to insure the successful broadcast.

* * *

A RECORD for 9 KP, the radio station of A. J. Leonard, Jr., of Chicago, was made recently when reception of his voice and CW signals were heard at the Awarua station at Invercargill, New Zealand. This is a distance of 8,000 miles, and clear reception was reported. This station is an amateur-owned and operated station and is rated at 500 watts. It was constructed entirely by the owner.

New York Department Store Holds Radio Exhibit

AN interesting exhibition of radio goods was held last week at Gimbels' department store, New York City. This exhibit, which occupied half the fourth floor, was one the neatest laid-out showings yet seen and was appreciated by large crowds.

This exhibit was held mainly to acquaint the public with the latest in radio and also to show people how broadcasting is actually accomplished. For this latter purpose, the Westinghouse station WEAF installed a complete station in the center of the floor arranged in such a manner that the visitors could see exactly how it is done. The broadcasting was transmitted over land wires through the agency of power amplifiers to the operating and transmitting rooms at Walker Streets, New York City, where the actual broadcasting was done under the most modern methods.

All of the latest apparatus was shown and quite a few of the exhibits related to the improvements that have been made in radio in the past few years. This was done by arranging the apparatus in use three and five years ago in such a manner as to show by steps the improvements that have been wrought in all the different lines. This was a very instructive and interesting way of conveying to the uninitiated by visual means just what has been accomplished in the way of improvements. The huge ungainly looking keys that take up half a table, the noisy, dirty spark gaps that look like a monstrous static machine, the "coffins," or transformers, and everything that used to be considered the height of perfection was exhibited right alongside of the present up-to-date apparatus that has taken its place.

New Zealand Hears Troy, N. Y.

THE broadcast of radio telephony from the Rensselaer Polytechnic Institute, at Troy, N. Y., on March 1, was heard distinctly in Invercargill, New Zealand. Both the speech and music were reported very clear and fairly loud. Not much interference was noticed. This is a new record for distance, as the receiving station was over 10,000 miles airline distant from the transmitter. The Troy station, WHAM, has recently established several long distance records, but the present one excels them all. It is a noteworthy fact that this station is not a commercial project, being merely established as a medium through which the students of the college may, through actual experience, become acquainted with the theory and practice of radio telephony and broadcasting methods.

Pictorial News Culled For Radio W

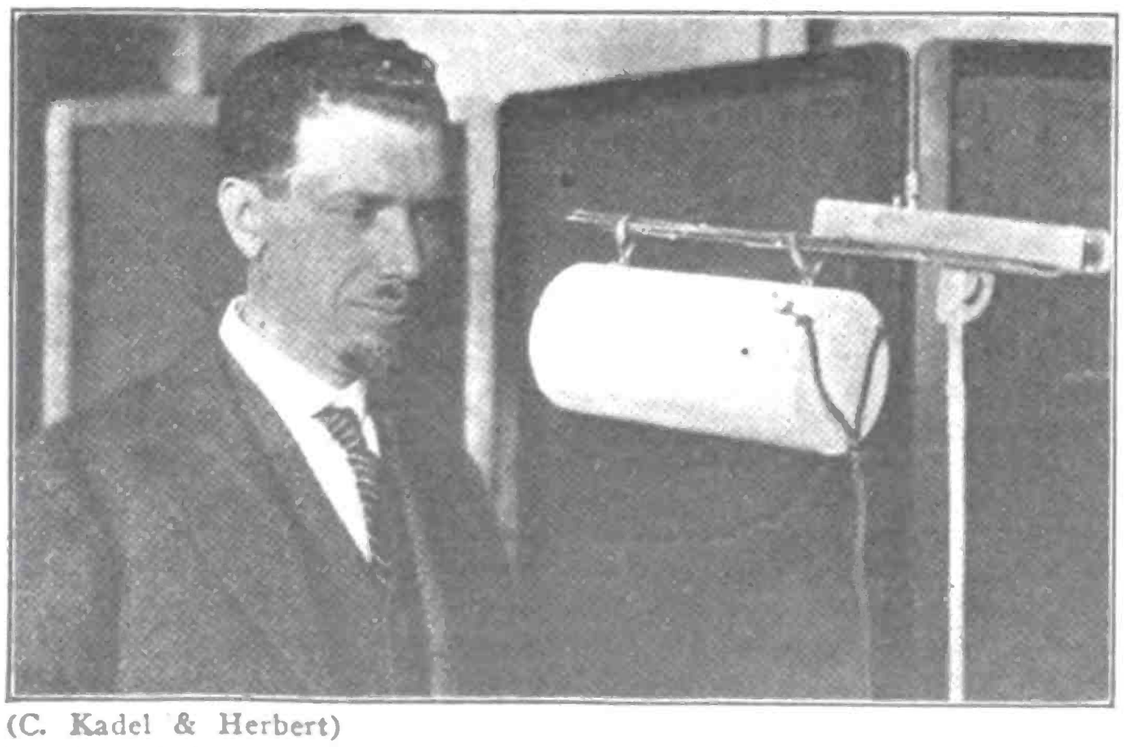
Captions by Robert

(C. Kadel & Herbert)

Mme. Ganna Walska, lyric soprano, when she sang for the benefit of a radio audience from the Waldorf Astoria studio of radio station WJZ. This was her initial appearance after her arrival in America.

(C. Underwood & Underwood)

Mlle. Andreé Lafayette, descendant of the famous French general and patriot, listening in to the super-regenerative set, nicknamed the "Rolls Royce" of radio receivers, at the Permanent Radio Fair, Hotel Imperial, New York City. Mlle. Lafayette distinctly heard a message of welcome broadcast from the Los Angeles "Examiner," Station KWH.



(C. Kadel & Herbert)

Mr. Herschel Jones, the man responsible for the fact that market reports are being broadcast to the agricultural industry. It was only through his constant attention to the matter that the Government finally decided to b[illegible] reports that help the farmer and people in the outlying di[illegible]. It is such men as these that realize the importance of radio to the farmers.

(C. Kadel & Herbert)

Dr. Francis Leroy Satterlee, noted X-Ray specialist, and his famous radio set. This circuit was demonstrated to all the foremost radio engineers of the world and proclaimed to be the most startling thing discovered in a long time. The set is incapable of oscillating and is therefore non-interfering.

(C. Kadel & Herbert)

The head of the Department of Physics at Fordham University, New York City, Rev. Francis Duffy O'Laughlin, S.J., Ph.D., who realized in the beginning the importance of radio and was instrumental in having one of the finest radio equipments installed at the University. The photograph shows Dr. O'Laughlin operating the model receiving station at the University.

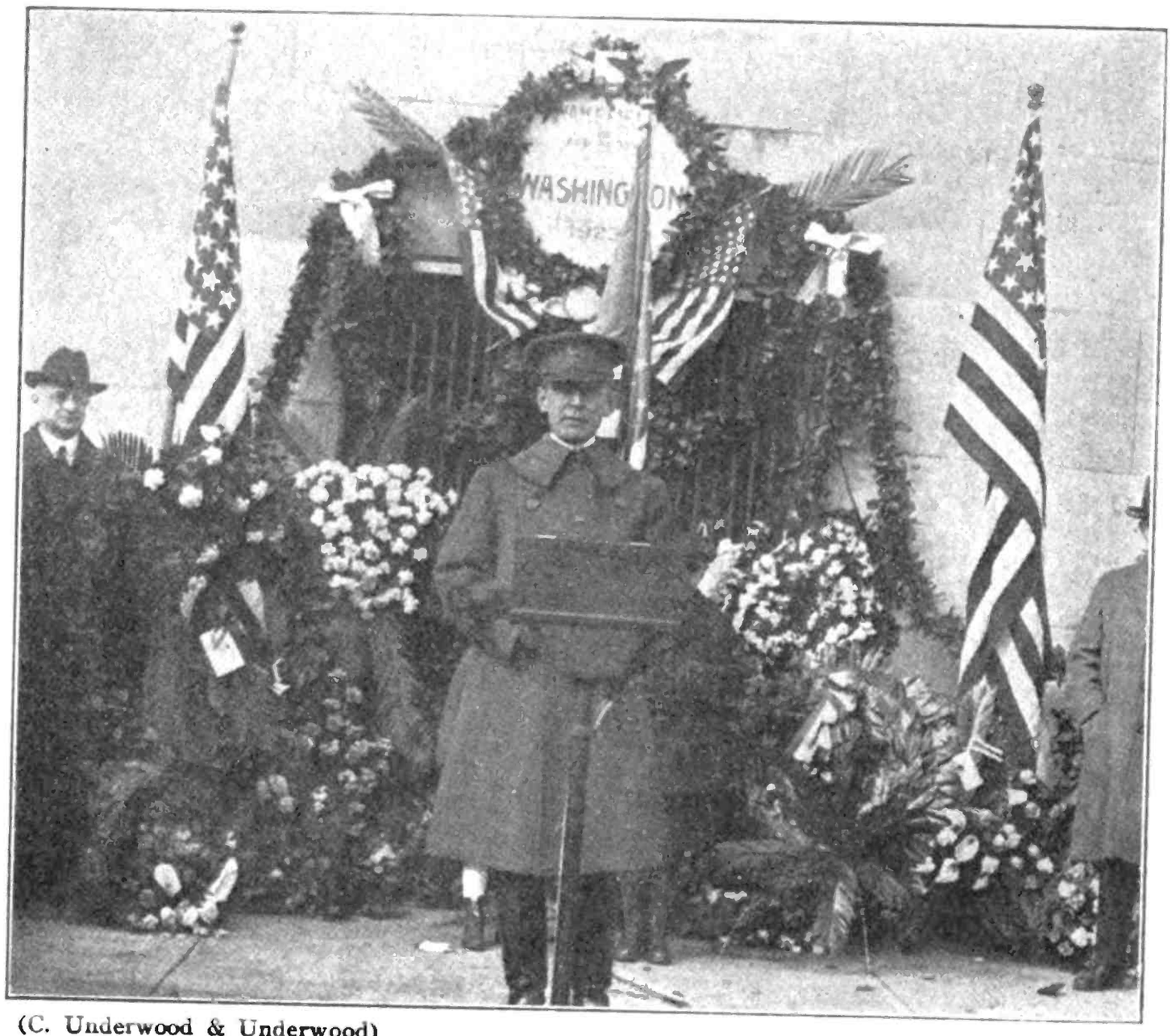
(C. Kadel & Herbert)

Gladys Ward, of the "Ziegfeld Follies," operating the super-regenerative set at the Permanent Radio Fair, New York City. Miss Ward, who is not very well acquainted with radio, hearing a buzz in the receivers and hearing somebody mention "B" batteries, immediately laid down the receivers and fled, saying that she didn't want to be stung. She wasn't.

from Everywhere
d Readers

Dougherty

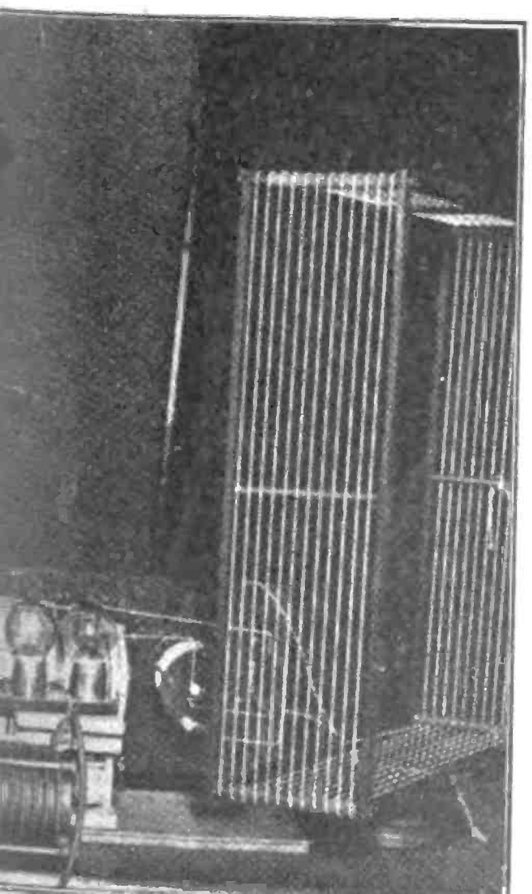
(C. Kadel & Herbert)
Thousands of listeners have heard the chimes ring out when Station WOR, of L. Bamberger & Co. Newark, N. J., signs off. The photograph shows Miss J. E. Koewing, one of the operators of the station, ringing the evening chimes of WOR. Miss Koewing has the distinction of being one of the first women broadcast operators.



(C. Underwood & Underwood)
Broadcasting the address made in honor of the "Father of His Country" at the foot of Washington Monument at Washington, D. C. Col. C. O. Sherrill, master of ceremonies, is shown making the introductory address. This ceremony was broadcast through station NOF located at Arlington.

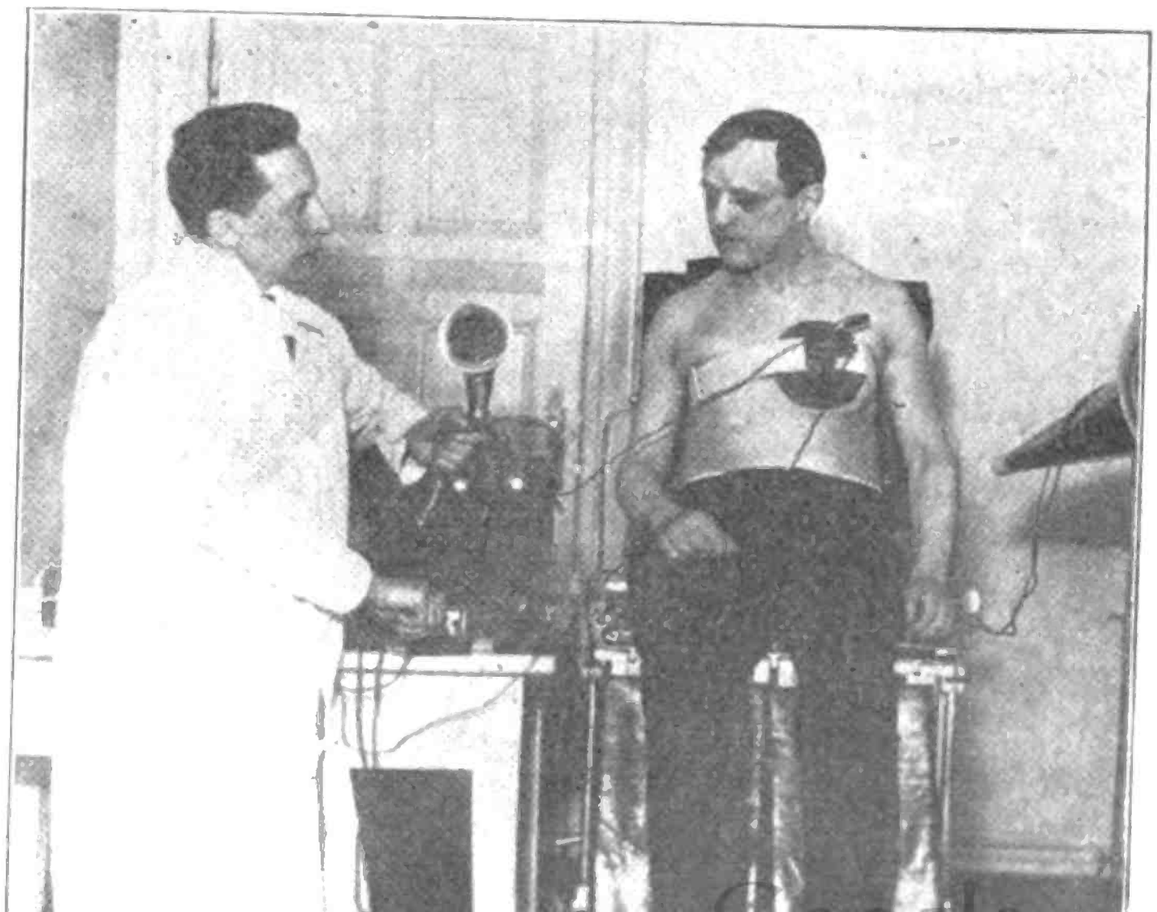
(C. Photo News)
A miniature radio receiving set built into a small filing cabinet. The set is a one-tube receiver and utilizes honeycomb coils for the inductances, as can be seen in the photograph. It was built by Milton E. Brounshield, of New York, and was one of the prize-winning entries of the amateur radio set contest held at the Hotel Imperial New York City.

(C. Kadel & Herbert)



A modern plumber has installed a radio set in his shop to draw trade and also to keep the men contented, while "sitting around." I have never seen a plumber who has been at a loss for "time to sit around," even in his shop, so must take it for granted that the owner is either an ardent radio fan or else must want to be.

(C. Fotograms)
A new device which calls radio into use has been perfected by Prof. Leo Jacobson, of Charlottenburg, Germany, for strengthening the beats of the heart. It was found especially useful in the cases of men doing strenuous labor, such as athletes and people called



Answers to Readers

1. *I have an antenna of two wires, each 175 feet long. Is this too long?*

2. *What coils should I use to tune in POZ?*

3. *Please give me a panel layout for a honeycomb coil set.—Jack Alison, 374 Broadway, New York.*

1. Your antenna is too long for efficient short-wave work, but for receiving the long-wave stations, such as Germany and France, it is O. K. For broadcast receiving and 200-meter work a single wire, 80 to 100 feet long, is sufficient.

2. You should use 1250 as a primary, 1500 as secondary and 750 as tickler. This is approximately the correct set of coils for the work, although you may have better success with 1300 as a secondary, depending entirely upon the construction of your set and what condensers you use.

3. A layout such as you want will appear in an early issue of RADIO WORLD, with a complete description of a very flexible set embodying honeycomb coils.

I am unable to erect an outdoor antenna, having had to use a flat loop or wire, as shown in the accompanying drawing. It is 125 feet long and located in the attic, 20 feet high. Will it work with the enclosed hook-up which was published in RADIO WORLD, *dated February 17, on page 11, by G. W. May? Will I be able to receive NAA by using this circuit?—Joe P. Harner, Nevada, Missouri.*

Yes, this circuit will work with the antenna you mention. Care should be taken that the antenna is well insulated at all places. This circuit will allow you to receive all wave lengths by slipping in the honeycomb coils in the space left for them. This circuit also permits you to load up to 24,000 by the use of the honeycombs.

* * *

In connection with the Flewelling circuit published in RADIO WORLD, *dated February 24, will you kindly advise me of the following: I constructed the set exactly as per instructions with the exception of using a 43-plate vernier in the circuit instead of the .0005 mentioned. I am using a WD-11 with 90 volts on the plate, and cannot get anything but local stations very weak. What is my trouble?—Michael Van Praag, 73 West 95th Street, New York City.*

As explained in the text, this circuit is somewhat critical, and it is absolutely necessary to use the correct capacities as shown. If you deviate the circuit will not work properly. The condenser bank is also very important. It should be hooked up with the correct capacities just as shown. Try re-hooking this set, using the correct capacities. The antenna should be hooked to post marked A in the circuit.

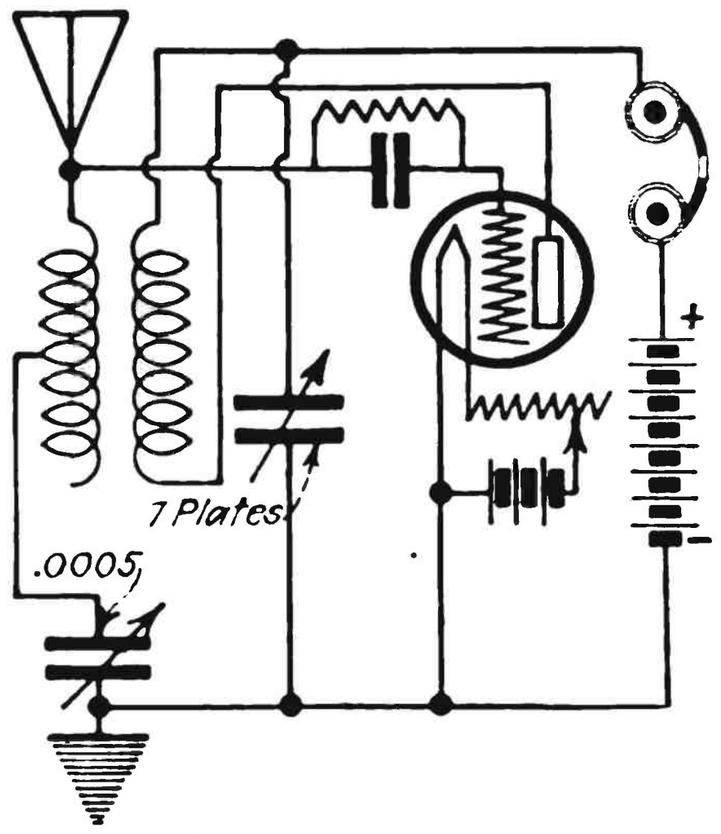
* * *

1. *I am enclosing a hook-up that I copied out of a radio paper we get out here, but fail to get any results. What is the trouble?*

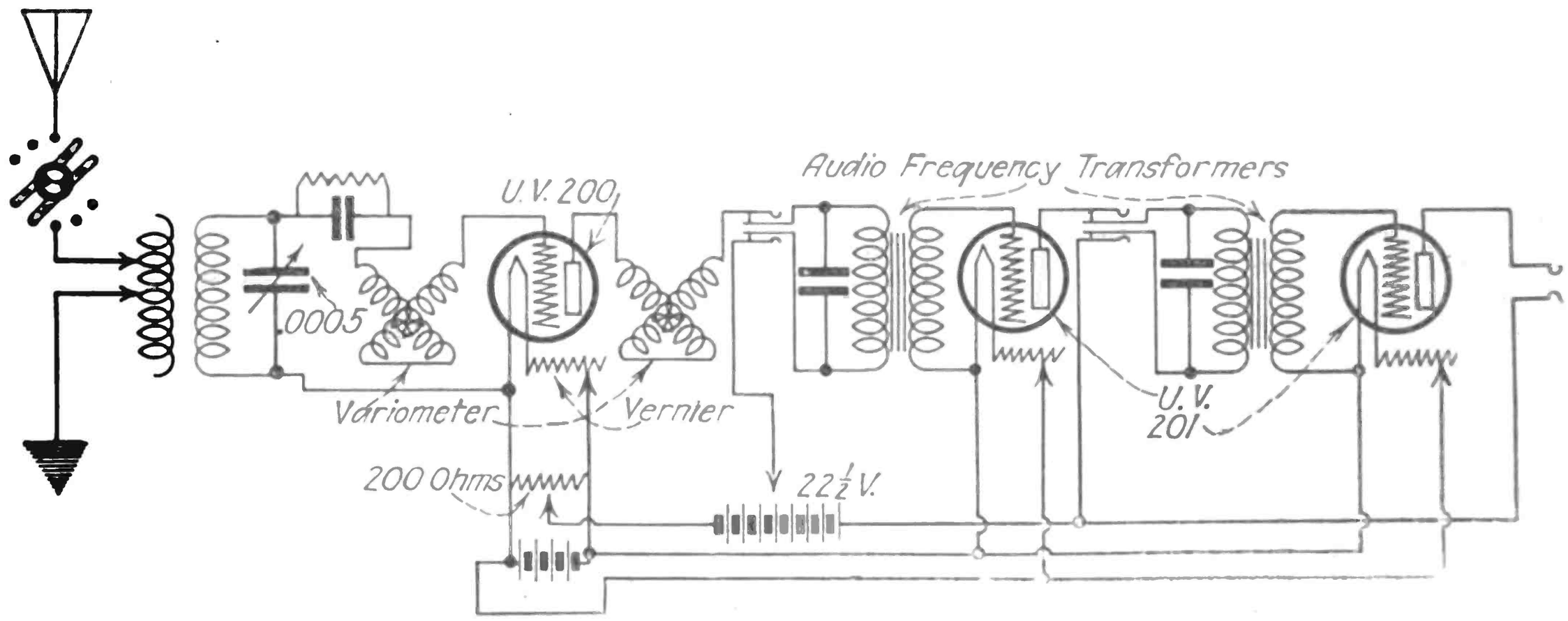
2. *Is the apparatus specified absolutely necessary? I am using an all-wave coupler instead of the one specified. Will this make a difference?—Carl Hausing, Box 61, Topeka, Kansas.*

1. Your hook-up is entirely wrong. It should be as per diagram. As it is the line shorts the tickler and also the plate battery, which is absolutely wrong.

2. It is not absolutely necessary to use the exact apparatus specified to such a great extent. Any coupler can be used. This also applies to the condensers. As long as they are of the correct capacity it does not matter what make they are.



Hook-up given in response to inquiry of Mr. Carl Hausing. The 7 plate condenser connected across the primary and tickler circuit tends to increase regeneration and affords easier control.



Hook-up furnished in response to query of Mr. G. W. Jamieson. It is the conventional regenerative hook-up embodying two variometers, a vario-coupler and two steps of audio frequency amplification. The condensers across the primary of the transformers may be dispensed with if necessary, but, if used, will tend to decrease any tendency of the amplifier to howl and distort signals. The potentiometer should be 200-400 ohms resistance for most tubes.

Kindly send me a hook-up for the following apparatus: One moulded bakelite vario-coupler; two moulded variometers; one 43-plate variable condenser; one 23-plate variable condenser; one potentiometer; three rheostats; three tubes; two transformers; two double-circuit jacks; one single-circuit jack; necessary grid leaks and condensers.—G. W. Jamieson, 209 Wellington Street, W., Chatham, Ontario, Canada.

The hook-up you request is published herewith.

* * *

On page 16 of RADIO WORLD, *dated February 10, you publish a picture of Dr. R. S. Piper and his one-tube set with patented coupling transformer. Where can I obtain this transformer? Where can I obtain a copy of the hook-up used?—Lewis McMahan, 112½ S. Denver Street, Dallas, Texas.*

We refer you to the photographers of [illegible] picture—Underwood & Underwood, 417 [illegible] Avenue, New York City. They can [illegible] all information on this subject if [illegible] rite them.

1. *Where can I get a wiring diagram of the Reinartz tuner circuit?*

2. *What parts are necessary?*

3. *How many plates in a .0005 and .001 condenser?*

4. *Is radio frequency advisable with the Reinartz hook-up?—Richard Burgess, 230 Main Street, Burlington, Vermont.*

1 and 2. We refer you to the Reinartz tuner circuit, published in RADIO WORLD, dated January 13, in answer to a question on the same subject by C. W. Stewart.

3. The construction of a .0005 variable condenser generally incorporates 12 stationary and 11 movable plates, which make 23 plates. In the .001 there are 22 fixed and 21 movable plates, which make 43 plates.

4. Radio frequency with a circuit such as this is not advisable, but more audio-frequency can be added. Preferably not more than two extra steps as it is not advisable.

Latest Radio Patents

Modulating System for Transformers

No. 1,442,146: Patented Jan. 16, 1923. Patentee: Raymond A. Heising, East Orange, N. J.

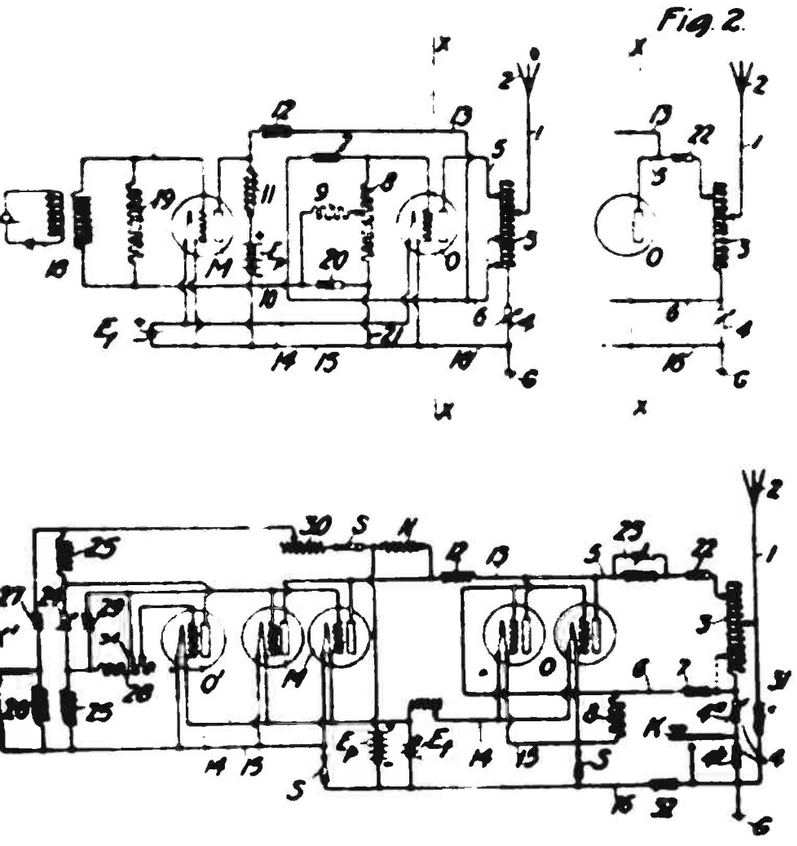
MR. HEISING'S invention relates to means for generating, modulating and transmitting electrical oscillations, and more particularly to generating oscillations by means of electrical discharge devices.

An object of the invention is to effect an improvement in the manner in which electrical discharge devices may be associated in signaling and other systems, and also to provide a system in which a plurality of electrical discharge devices are associated with suitable circuits to act as oscillation generating means.

Further objects are to produce a signaling system with which modulated and unmodulated signals may be sent, and in which a vacuum tube oscillates directly into an antenna.

The invention is exemplified herein in a radio signal transmitting system wherein the antenna itself is included in and forms a frequency-determining element of a high-frequency oscillating circuit, and is directly associated with a vacuum tube oscillator or a series of vacuum tubes acting as an oscillator. The oscillation frequency is determined by the circuit, which includes the antenna. Vacuum tubes for modulating have been provided to effect the signaling modulation of the oscillations to be transmitted.

Fig. 2.

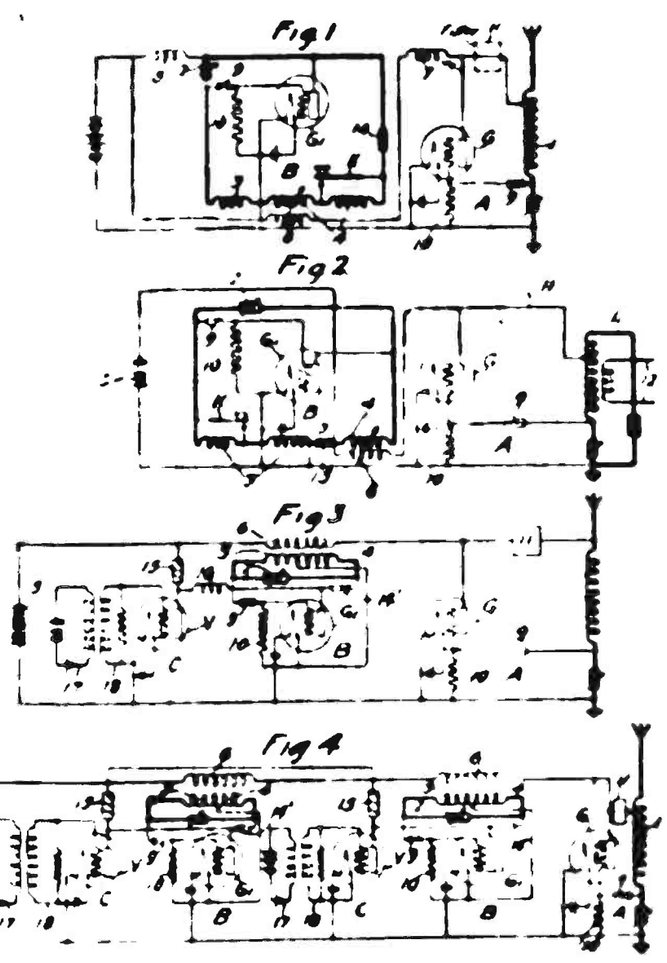


Heising's Modulating System for Transmitters.

New Method of Modulating Carrier Waves in Telephony

No. 1,444,685: Patented Feb. 6, 1923. Patentee: Raymond A. Heising, Millburn, N. J.

THE invention of Mr. Heising's relates to oscillation generator circuits and to signaling by means of modulated carrier currents or electromagnetic waves.



Signalling by Means of Modulated Carrier Currents.

One object of the invention is to associate, in a novel manner, two or more electron discharge oscillation generators.

In the operation of signaling systems wherein the principle of successive or plural modulation is employed, it is sometimes desirable that direct modulation of the high frequency carrier current by the signal current should be avoided. It is another object of this invention to provide combinations of devices for and methods of signaling through the agency of successively modulated currents, the devices being so designed and associated that the above mentioned or other undesirable modulation is prevented.

Since it is sometimes desirable to transmit a plurality of signals upon a single high frequency carrier wave, arrangements for multiplex signaling are also provided. In the operation of these there is produced a high frequency carrier current modulated in accordance with a plurality of intermediate frequency currents, each of which is itself modulated in accordance with a signal or low frequency current.

Internal Construction of Vacuum Tubes

No. 1,444,638: Patented Feb. 6, 1923. Patentee: Wm. C. White, Schenectady, N. Y.

MY invention may be applied to electron discharge relays or amplifiers of the pliotron type, and particularly to the construction of grids for such devices.

In apparatus of the type mentioned, which comprises an evacuated vessel containing an incandescent cathode, an anode and a grid electrode interposed between the cathode and anode, it has been customary to form the grid by winding a plurality of closely adjacent turns of fine wire about a supporting framework. Difficulty has been experienced in the construction and operation of such apparatus by reason of the fact that the turns of wire are apt to become loosened by reason of the unequal expansion and contraction of the wire and the framework. As a result the spacing between the turns may be changed, and in some cases the wire may move so as to come in contact with other parts of the device.

The object of my invention is to overcome the above mentioned difficulty and provide a simple and efficient construction in which the grid wires will always be retained in their proper position upon the supporting framework and the desired spacing between turns will be maintained.

In carrying my invention into effect I place along each side of the framework over which the wire is wound a closely coiled spiral of fine wire. When the grid is wound on the framework each turn slips between two adjacent coils of the spiral, and one or more of the coils of the spiral will be interposed between adjacent turns of the grid wire.

Fig. 1

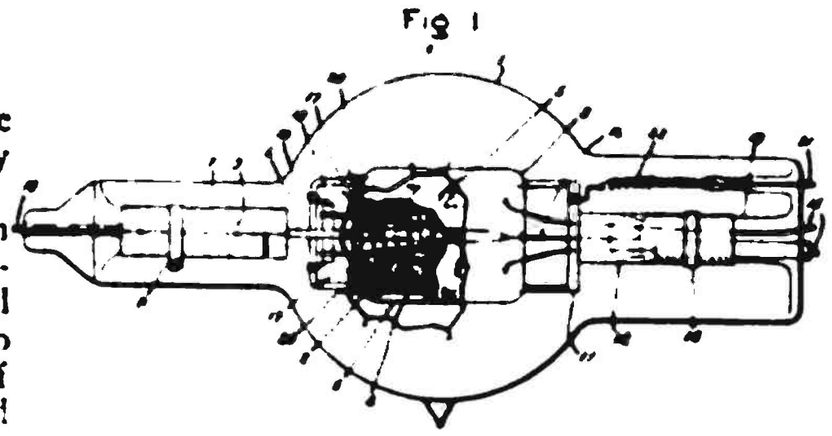
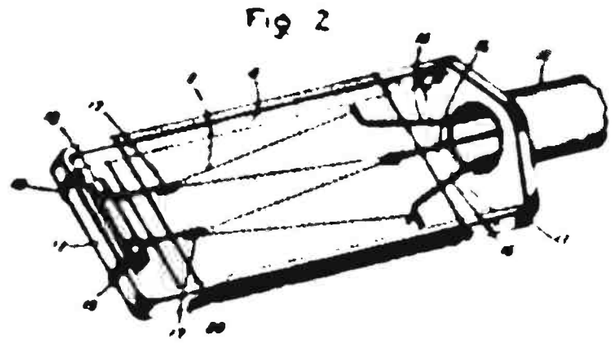


Fig. 2

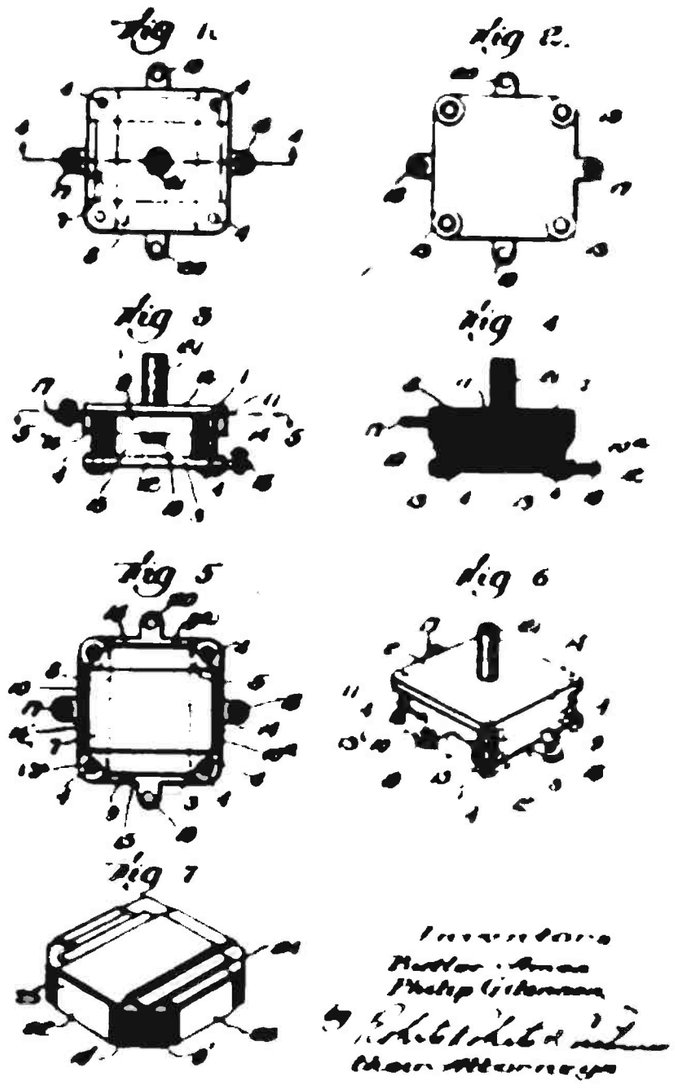


White's Method of Vacuum Tube Construction.

A Compact Condenser

No. 1,444,534: Patented Feb. 6, 1923. Patentees: B. Ames and P. J. Gillinson, Lowell, Mass.

THE invention of Messrs. Ames and Gillinson relates to electrical condensers and has for its object a condenser which is simple to construct, which is compact in form, which can be tightly compressed to expel any air trapped therein, which will



Ames and Gillinson's Compact Condenser.

fit into a magneto rotor or other restricted space, which has a large area of contact between the layers of conducting material and the terminals, whose layers of insulating material are symmetrical and imperforate, whose layers of conducting material are imperforate and formable from a band or ribbon of material, whose parts are secured together by means not extending through the alternate layers of insulating and conducting material, and which is of generally improved construction.

New Records of The DX Nite Owls

Wants to Hear from You

From Weston C. Libbey, Harlowton, Montana

HERE they are: WAJZ, 1,612 miles, heard once. The following heard any nite: WBAP, 1,025 miles; KUO, 850; KPO, 850; KFI, 850; WFAF, 470; KLZ, 470; KFGL, 470; CFCN, 350; KFCK, 725;

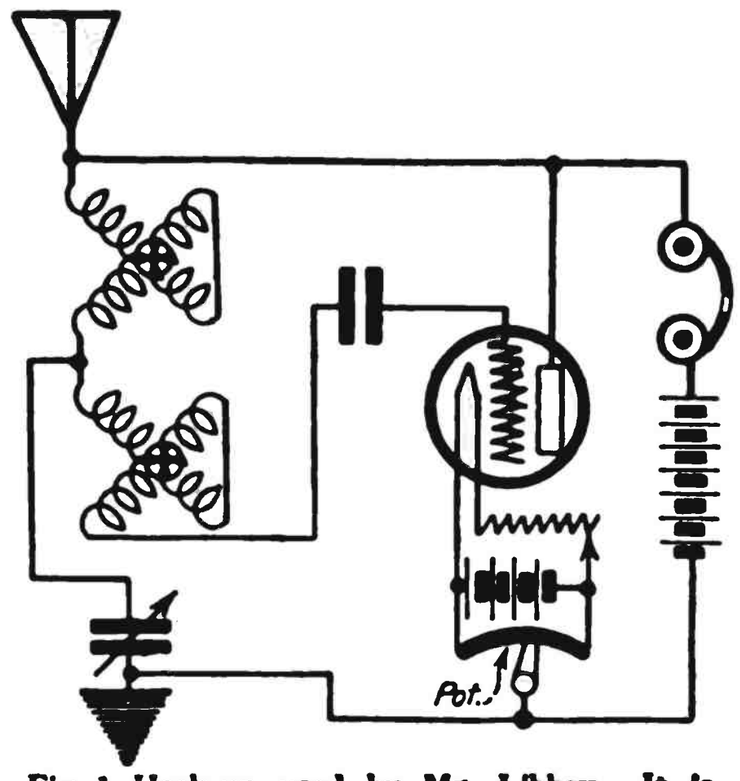


Fig. 1. Hook-up used by Mr. Libbey. It is practically the same as the Miller regenerative hook-up. The variometers should both be the same.

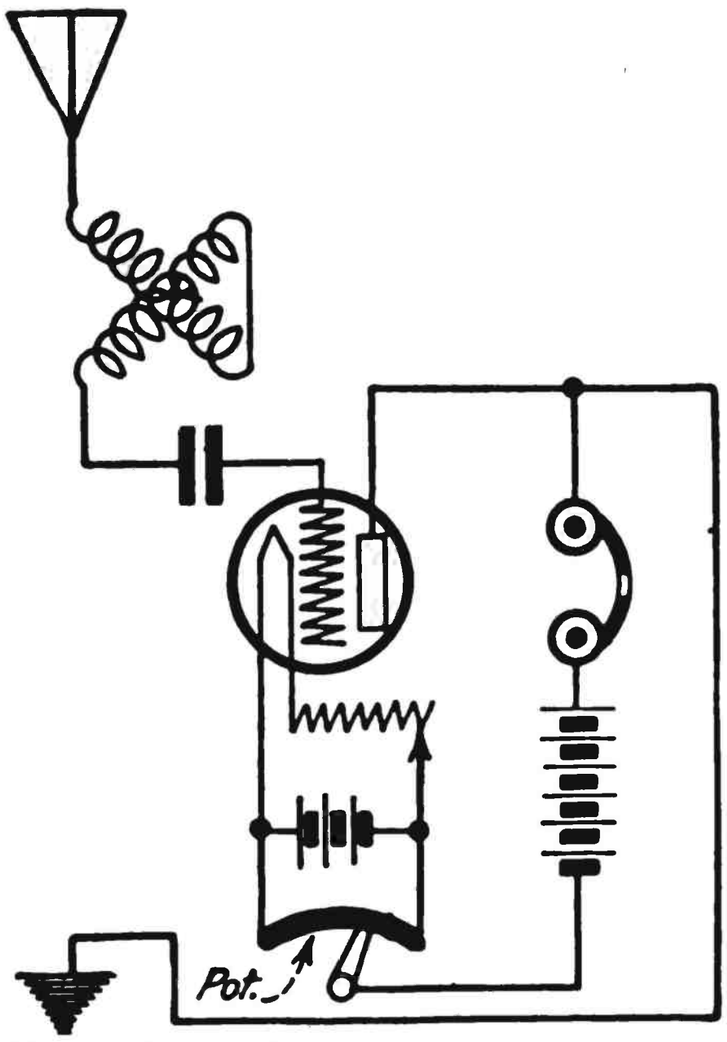


Fig. 2. One of the simplest regenerative circuits, but one that is efficient on phone work. The potentiometer is absolutely essential.

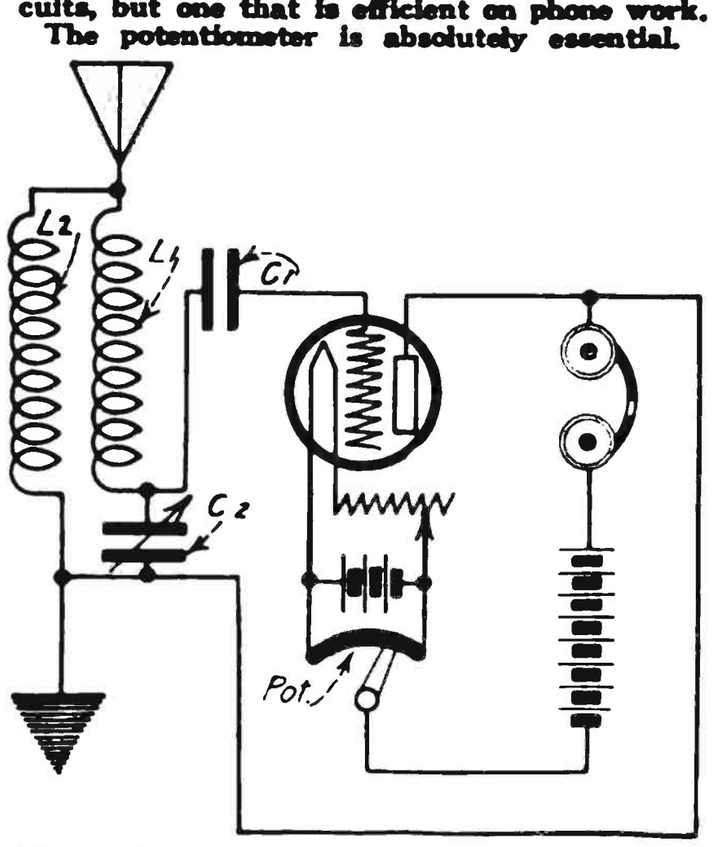


Fig. 3. Modification of Circuit 1. L1 can be a [illegible] but must be placed in inductive [illegible] 2, which is a coil of 175 turns.

THE Editor of RADIO WORLD will be pleased to receive sketches of hook-ups drawn carefully in black ink or heavy pencil from the "DX Nite Owls" who send in records with a view to publishing them.

Send hook-ups of your sets, provided they contain something unusual. Send, also, the names of the various makes of apparatus you are using.

Make your letters brief and informative. Write on one side of the paper only.

The letters and hook-ups will be published in the earliest possible numbers of RADIO WORLD.

WOC, 900; WLAG, 712 miles. CFCA, 1,325 miles, heard twice; WOI, 800, numerous times; WLAL, 900, numerous times; 9XU, WDAP, and KYW, 1,010, hear often.

The equipment that I got these stations with consisted of 1 Cunningham detector tube, 2 Duck variometers, 1 Remler potentiometer, 1 Duck socket, 1GR grid condenser and leak, Murdock condenser, a Remler aerial, 80 feet long, 30 feet high at lead-in end, and 15 feet high at free end.

Honeycomb coils ought to work all right in O2, or a bank wound coupler. I've not tried either yet, but am going to.

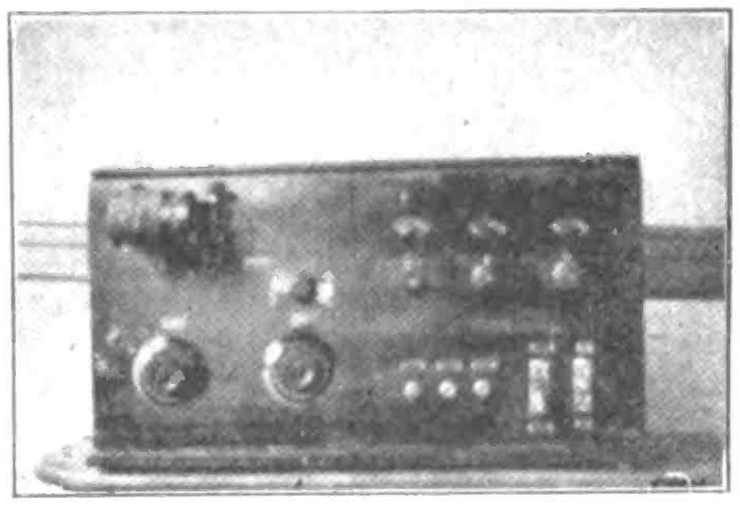
I would like to hear from any one trying either D1 or D2, letting me know what results they get.

* * *

NPG at 1 A. M.

From Dr. Arthur R. Garvey, 154 Moody St., Waltham, Mass.

I ENCLOSE picture of my latest home-made regenerative set, three stage audio frequency. It will be noted that I am using the duo lateral coils which I consider the best and only tuning inductance; one jack for the detector tube, and two jacks con-



Dr. Garvey's Home-Made Regenerative Set

nected in series which may be used on either the second or third stage by means of an anti-capacity switch mounted nearest the last jack. The other anti-capacity switch is for disconnecting the A and B batteries.

My first set, if I may call it a set, was in 1908, when all that could be heard was an occasional dash or dot and the time signals, from Boston, I believe. A 75 ohm receiver, a crystal detector and a home-made tuning coil completed the outfit. I had only reached the loose coupler stage when the war brought about the end of the amateur radio activities. The first time the voice was heard through the air stimulated interest again and led from one bulb to the present outfit.

The box is not compact, but is about 24 by 15 by 10 inches. Everything is so arranged that new hook-ups may be tried out with a minimum of trouble, and to this end I have a terminal rack or shelf under the bulbs and transformers. All battery connections and jacks come to these terminals, and it can be seen that there is no cutting of soldered connections for trying a new hook-up. There is room in the box for the B batteries and these also go to separate terminals, and a dead battery is easily removed or tested.

Many have found trouble working a third stage and so did I. A poor or dead B battery will cause much trouble and the inductance of each circuit must be under control. I have obtained excellent results with a slight loss of volume by using a fixed condenser .0005 across the plate and grid connection of the last tube. I think, however, this would be an excellent place for a small variable condenser.

Although it is claimed that duo lateral coils are harder to tune, I do not find it so, and enjoy the advantage of listening on any wave length, making it possible, as I have done, to listen to the high power French stations and time signals all over this country. Recently I listened to NPG, at San Francisco, ticking off the 1 A. M. signals.

P. S.—My antenna is wholly indoors, being about 120 feet of bare wire in the attic of the house.

* * *

"Clear and Loud"

From Lloyd R. Dickens, 222 Windsor Ave., Windsor, Ont.

POSSIBLY some other readers of RADIO WORLD may be interested in the performance of WD-11 tubes, so I will describe results obtained here.

Some months ago I constructed a regenerative circuit, using hook-up shown and installed it in my home in Stratford, Ont., 150

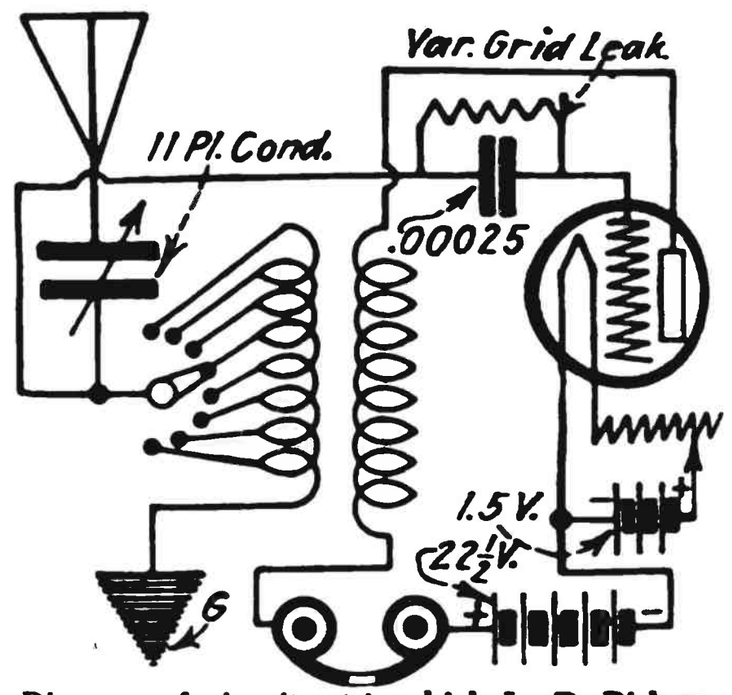


Diagram of circuit with which L. R. Dickens had accomplished marvellous results. It is a single circuit receiver using the rotor for a tickler.

miles northeast of here. I use WD-11 tube and my aerial consists of 100 feet of wire strung in the attic. Some of the stations heard from follow: WWJ, 150 miles; WCX, 150; WBV, 350; WGY, 350; WEAF, 400; WJZ, 375; WOC, 525; WKAG, 450; WDAF, 775; CKCB, 900; WDAO, 1,140; WPA, 1,175; KDZP, 2,100 miles.

These are not all by any means, but will give some idea of range covered and I think the last one, KDZP, Los Angeles, will open the eyes of some. This was logged on the night of Feb. 6, and again on Feb. 8. It came in quite clear and loud.

* * *

Glad to Hear from DX Fans

From M. F. Drudy, Jr., Woodhaven, N. Y.

MY experience with the short wave regenerative receiving sets and the honeycomb, or duo lateral coil receiving sets, prompts me to defend the latter, notwithstanding the criticism that the honeycomb is inefficient and unsatisfactory.

In one evening I have heard as many as seventeen different stations, distances ranging from a few miles to thirteen hundred and fifty miles; tuning out local stations and bringing in the most distant with perfect

(*Continued on page* 21)

DX Nite Owls

(*Continued from page 20*)

ease. Furthermore this is done with an outside aerial only fifty feet long, including the lead-in.

My location is 8825 Seventy-sixth street, Woodhaven, Long Island, N. Y., and would be glad to hear from any DXers.

From January 8 to February 8 I have received the following stations: WAAM, KDKA, WGY, WEAF, WHN, WOR, WJZ, WGAA, WDT, WDAP, WBAN, KYW, WIP,, WWJ, WFI, WSB, Atlanta, Ga.; WRW, WBZ, WHAS, WBS, WDAF, Kansas City, Mo.; WLW, Cincinnati, O.; PWX, Havana, Cuba; WOC, Davenport, Iowa; WHAM, WGM, Atlanta, Ga.; WGI, WOO, KQV, WEW, St. Louis, Mo.; WAAB, New Orleans, La.; WGAM, Orangeburg, S. C.; WGR, WBAP, Fort Worth, Texas; WMAK, WMAQ, WHB, Kansas City, Mo.; WBT, Charlotte, N. C.; WMC, Memphis, Tenn.

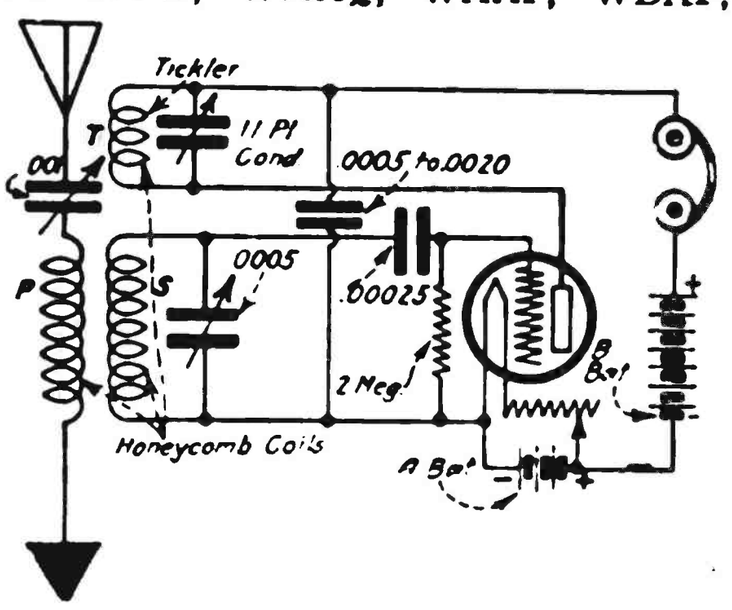
With a loud speaker I was able to bring in such stations as Schenectady, Pittsburgh, Atlanta, Memphis, Springfield, Buffalo and Chicago. Sitting twenty-five feet from the set, we could all hear plainly and pleasantly.

* * *

And Without Amplification

From A. Riddell, Chicago

ENCLOSED find the hook-up of my honeycomb receiver which you may publish on the "DX Nite Owl" page. The stations I have heard from Jan. 1 to date are: KYW, WMAQ, WAAF, WDAP,



Hook-up used by A. Riddel for one WD-11 tube. The condenser across the secondary and tickler enables the set to oscillate easier over much lower wave lengths.

WBU, WHB, WPAD, WGAS, WGY, WWJ, WGM, WAAK, KDKA, WSB, WOC,, WGAN, WHAS, WDAA, WOAG, WCAF, WAAM, CFCF, WJZ, 9ZAF, WOR, WGAK, WWI, GFGA, WKY, WOE, WLW, WIAO, WHAI, KSD, WBAP, WCAE, WNAV, WDAF. All were heard on a WD-11 tube without amplification.

* * *

Records By Three Sets

From Floyd Meyers, Du Quoin, Ill.

ENCLOSED you will find record of the stations that I have received with my three sets:

Crystal Detector—WOC, WSB, WHB, WDAF, WGM, WWJ and KSD. Record with my 1-tube set (variable condenser and variable coupler) is nearly the same as that of my honeycomb coil 2-stage set.

The record of both combined is as follows: WOH, WLK, WSY, WOK, KHJ, KFI, DM4, KFAF, WDAL, WSW, WGM, WDAJ, KYW, WAAF, WMAQ, WEAC, WOZ, WOI, WIAS, WOC, WGAM, WJAM, WEAB, WHAE, WGF, WBL, WAAP, WEAH, WHAS, WIAR, WCAQ, WAAC, WMAF, KOP, WWJ, WCX, WMAT, WLAG, WAAH, WOS, WOQ, WMAJ, WEAK, WCK, WEW, WMAY, WOAL, WNAL, WOR, WMAK, WEAF, WHAM, WBL, WGY, WLW, WJAX, WKY, WLAL, WNAD, KDKA, WCAE, WQAA, WFAT, WQAQ, WCM, WFAA, WBAP, WPA, WKAL, WOAI, WFAH, KDYL, WIAO, WPAH, WGR, KFDF, CFCN, CGCJ, CFCA, PWX, KLZ, WAAZ.

I also receive PWX, KHJ, and Canadian stations regularly and will be glad to furnish hook-ups for either of the three sets. My sets are all home-made. I constructed them all myself.

* * *

Listens Every Night

From Thos. A. Peacock, 645 Portage St., Westfield, N. Y.

HERE is a list of stations I hear from every night. I can hear them very plainly: WGY, WGR, WOR, CFCA, WHAS, WEAO, WEAF, WDAP, WJAX, WWJ, WJZ, WPAB, WJZ, WLAB, WHB, WEAE, WBAP, WDAJ, 9XD, KDKA, WOC, LMC, and also have heard from Omaha, Neb.

* * *

On a Two-Stage Amplification

From Richard Loughran, Greensburg, Pa.

I HAVE received the following on a two-stage amplification and one detector:

WSB, WLC, KFV, WEAD, WLW, WNAP, KYW, WDAP, WMAQ, WWI, WNAC, WNAF, NBZ, WEAF, WGV, WRW, WHAZ, WHAM, WDR, WCAE, KDKA, WJAS, WBAK, WIP, WFI, WQAA, WHAS, KSD, WHB, CFZC.

Every one of these I heard plainly and distinctly.

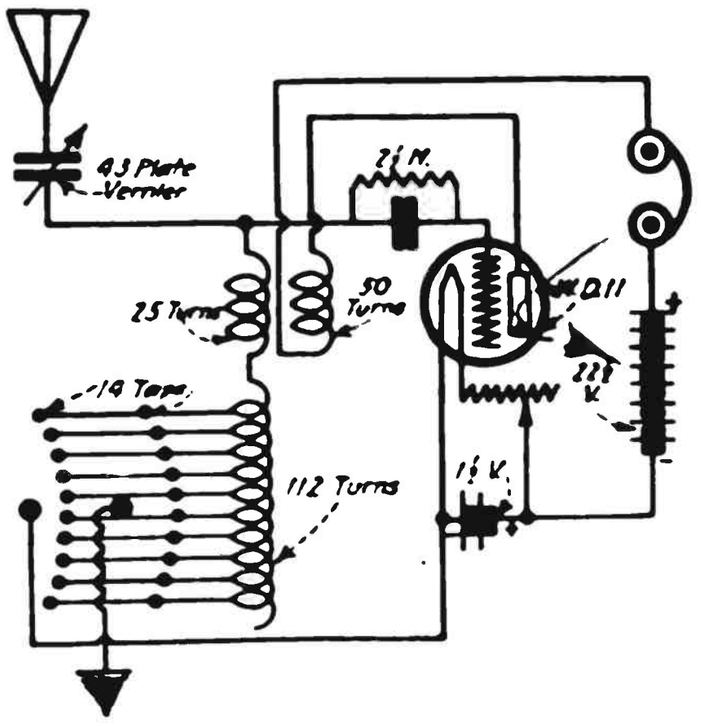
* * *

A Happy Family

From M. J. Wigman, 1639 Addison St., Chicago, Ill.

BEING one of the happy family of readers of your magazine I am sending you the hook-up of my outfit that has been a great comfort to our whole household. We have so far been able to hear on just the one tube the following broadcasting stations:

WDAP, KYW, WAAY, WBAA, WBAD, WBAP, WBAY, WBS, WBT, WBU, WBZ, WCAY, WCX, WDAE, WDAF, WDAJ, WDAY, WEAB, WEAF, WFAA, WFAC, WGAY, WGM, WGY, WHAA, WHAS, WHB, WJAD, WJAP, WOC, WRR, WHB, WJZ, WWJ, CFCF, WBZ, KSD, WYJ, WPA, KDN, KHJ, KLZ, WOS, WPM, KDKA, WEAB, CHBC, KDYL.



Single circuit receiver used by Mr. Wigman. Note the novel method of getting feedback by the use of separate coils in connection with the tuner.

My place of residence, where my family and outfit are, is at Green Bay, Wis. My business being in Chicago I do not personally hear very much, but my wife and children have the pleasure every night.

My hook-up and record you may publish in one of your issues if you wish as there may be some brother or sister fans who may be interested.

(*Continued on page 25*)

New Radio Firms

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

Moss Radio Sales Co., 1 Beacon St., Boston, Mass.; Henry C. Lynch.

Instrument Co., manufacture electrical and radio instruments, $50,000; William E. Orth, D. L. Diehl, John F. Whittaker, Harrisburg. (Corporation Service Co.)

Iowa Radio & Electric Co., Ollie, Ia.; V. Gilbert Fye, successory to F. M. Andrews.

Central Illinois Supply Co., 119 N. Main St., Abingdon, Ill.; Fred B. Ferris and Guy E. Bonney.

Baldwin Radio Sales Corporation, 1800 Montrose Ave., Chicago; Henry T. Roberts and others incorporators.

Schott Radio & Electric Co., Emington, Ill.; F. H. and Wm. P. Schott.

W. T. Rock, 2115 N. Main St., Bridgeport, Conn.

Liddell Electric Co., 89 S. Main St., Waterbury, Conn.

Sunflower Radio Co., Room 333, Sunflower Bldg., First and Main sts.. Wichita, Kan.

Alexander Radio Electric Co., 1515 Olive St., St. Louis, Mo.; J. G. Alexander and others.

International Electric Co., electrical supplies, $500,000, Wilmington, Del. (Corporation Trust Co. of America.)

Firth Radio Corp., New York City, $5.000; M. Bernheimer, S. McGovern. (Attorney, E. Bernstein, St. George, Staten Island).

Hoosic Engineering Co., Hoosic Falls, N. Y., make electric specialties, $20,000; F. S. and S. P. White. (Attorney, E. Tiffiny, Hoosic Falls.)

Owing to confusion caused by a similarity of names between the Radio Corporation of America and the Radiola Wireless Corporation, of New York City, the latter has decided to adopt the name of The Aerovox Wireless Corporation, based on its trademark.

Radio Stocks

(Quotations as of February 28, 1923, furnished by Frank T. Stanton & Company, 35 Broad Street, New York City, Specialists in Wireless Securities.)

Stock	Bid	Asked
American Marconi Stamped	5c	15c
American Marconi Stamped	$5	$7
American Tel. & Tel.	123	123¼
Canadian Marconi	2½	3¼
De Forest Radio	7	10
Dubelier Condenser	4½	5
English Marconi com	11	15
English Marconi pfd	11	15
Federal Tel. Calif.	5	6
General Electric	185	186
Hennessey Radio Corp. Pub.	9	11
Manhattan Elec. Supply	55	56
Mackay Company com.	115	116
Marconi Int. Marine	8	10
Radio Corporation com	3⅜	3½
Radio Corporation pfd	3	3⅛
Spanish Marconi	1	3
Western Union	116½	117
Westinghouse E. & M.	64	65

Coming Events

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

SOUTHWESTERN DIVISION, NATIONAL ELECTRIC LIGHT ASSOCIATION, Oklahoma City, Okla., March 14 to 16; S. J. Ballinger, secretary, San Antonio Public Service Co., San Antonio, Tex.

ILLINOIS STATE ELECTRIC ASSOCIATION, Chicago, March 16 and 17; R. V. Prather, secretary, Mine Workers' Building, Springfield, Ohio.

Prevents Phone Tips Falling Out

THE difficulty of preventing phone tips from falling out of binding posts and the poor contacts that often occur have been eliminated by Union radio phone tip jacks, made by the Union Radio Corporation, Newark, N. J. Union radio jacks are especially convenient in CW circuits, WD-11 connections, coil mountings, experimental circuits, or, in fact, any part of a set where quick changes are needed. In addition to accommodating any telephone cord tips manufactured they also can be used with several sizes of bare wire. To mount Union radio tips on any panel a hole is drilled, using a 7/64 drill, then the bushing inserted and the lock nut which holds the combination tension spring and soldering lug in place is screwed on.

New High Power Wireless Station for Canada

IT is reported that the Marconi Company has matured plans for the erection of a powerful wireless station at Vancouver, British Columbia, which will cost $2,000,000. This station, it is said, will be one of the giant stations of the world, exceeding in power any other Marconi station at present in existence, and which will in effect make western Canada an important factor in world wireless communication, linking it up on one side with Australia and the Orient and on the other with Europe.

Relaying and Broadcasting on Different Wave Lengths

REPORTS coming from Cleveland that radio concerts from KDKA, the East Pittsburgh, Pa., broadcasting station of the Westinghouse Electric & Manufacturing Company were being received with greater volume than the broadcasting of local concerts occasioned little surprise to members of the radio engineering department of the Westinghouse company who had been experimenting with short wave broadcasting and relaying of KDKA's concerts..

It had been confidently expected that radio enthusiasts in Cleveland would be surprised to hear KDKA coming in with great volume as experiments in the relaying of short wave signals had been going on for some months under the direction of the radio engineers.

Many fans of Cleveland are still puzzled at the good volume of KDKA's signals because their city seems to be a perfect dead spot and has been so recognized by radio men for years. It has been said that getting into Cleveland via the ether is a task that radio experts have been working on for some years but with little success.

This characteristic of Cleveland is one of the reasons that Frank Conrad, assistant chief engineer of the Westinghouse company and a radio inventor who is recognized all over the country, chose to relay his short wave signals from KDPM, broadcasting station of the Westinghouse company located in Cleveland. His experiments were carried out through the assistance of L. W. Chubb, engineering department and the results attained through this method of broadcasting have been so good that a new era in radio entertainment may result.

Short wave relaying is the newest method of radio broadcasting. To those who are unfamiliar with the terms it means in short broadcasting on 100 meters or lower wave lengths by a powerful station. These short wave signals are then picked up by a short wave receiver and in turn relayed through a broadcasting station tuned to 360 meters. The person operating a 360-meter receiver, of course, hears the 360-meter signals and will not hear the 100-meter waves as most of the receivers in common use will not work such short wave signals.

Relaying these short wave signals as the Westinghouse company does through its Cleveland station is interesting to the radio amateur, particularly as the 100-wave meter signals are sent out simultaneously with the 360-meter concerts, neither interfering with the other. It requires special apparatus.

For instance, at East Pittsburgh for this short wave broadcasting there has been installed two transmitters controlled from the same microphone, one transmitter operating on 360 meters, the other on 100 meters. There are also two antennae, KDKA's long antenna which is 105 feet high and 200 feet long used for sending on 360 meters and the short wave antenna which is 35 feet high and 40 feet long, used, of course, for sending the 100-meter signals. A significant

casting is that very short antennae are used both for sending and receiving.

In Cleveland the 100-meter waves are received on an eight-foot square loop for the reason that a short antenna is needed and that seems the best way out of the problem. The antenna is located inside the building and is connected to a single circuit tuner, detector and two stages of amplification. The output of this receiver is put into a 250-watt transmitting set, containing one oscillator and one modulating tube. The sending antenna at Cleveland is a duplicate of the one at East Pittsburgh used for sending on 360 meters, being 105 feet high and 200 feet long.

There are, naturally, difficulties encountered in relaying these short wave signals. For instance, the small size inductances and capacities are difficult to construct. A slight change, like the swinging of an antenna will change the wave length and throw the receiver out of tune. One of the reasons for using the loop as a receiving antenna is to guard against such mishap. Also a separate building on the roof of the Cleveland foundry of the Westinghouse company, located on the lake end of West 58th Street, had to be erected as the rattle of the foundry set up interference with reception.

On the other hand the efficiency at 100 meters is much better on account of the lower electric losses, which condition permits more radiation from a given antenna from the same amount of power input than

Broadcasting Bill's Radiolays

By WILIAM E. DOUGLASS

IN last month of many birthdays when we heard so much on "Truth" just because one bright young feller pulled a good one in his youth, I have often stopped to wonder, after all, if it was true that the world is gettin' better ev'ryday. I wish I knew. Just the other night by radio some wise gazaboo's son handed out a lengthy lecture on the life of Washington. Yes, we told how George chopped cherry trees an' wouldn't tell a lie—said the Father of our Country couldn't do it if he'd try. But I reckon Father Georgie never fooled with Radio, or stayed up all night to "listen in" or else I guess he'd know how hard it is to tell the truth 'bout stations you can get, when you've gone bugs on Radio an' got a wireless set. An' of course he never had to try new hook-ups every night that are printed in the papers. There ain't half of 'em that's right. Gosh I reckon Ananias with his whiskers to his knees would be tickled half to death if he could work with some of these. He could tell the world about 'em, how with just a single tube he could "pick up" far off Russia—if you b'lieve him yer a boob. Down in our town there's a feller with a hook-up that's a peach, when you hear him talk about it, it's an outfit with a reach. So I've often stopped to listen on this "wonder set" of his, hopin' he'd make good his story if his set is such a whizz. But of course when I drop in on him he's got a tale of woe how his set wuz working beautiful until an' hour ago, when this thing er that had happened. I remark "That maybe true." Then he springs a lot of alibis until the air is blue. Now you take that little set of mine with only the detector, it's surprizin' how I get 'em, it's a regular collector. With a pair of rubber earmuffs fastened on my head real tight, I pick up a hundred stations just as easy any night. Distance don't make any difference I can get 'em without tryin'. "I can't hear yet!" wha' ja say Min? No, of course not, I'm not lyin'.

RADIO WORLD

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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 of patents, priority of claims, the proper working out of technical problems, or other matters that may be printed in good faith and on information furnished by those supposed to be trustworthy. This statement is made in good faith and to save time and controversy in matters over which the publisher cannot possibly have control.

Do Magnets Affect Tubes?

There has been considerable mention lately in radio literature regarding the effect which a strong, permanent magnet exerts upon the action of audions. Experiments conducted by John Stone Stone are recorded wherein the author describes a magnetic field created in and around the tube in such a manner that the vertical axis of the magnetic field is approximately parallel to that of the filament, grid and plate elements. When the proper location of the magnetic field was found an increase in tube efficiency resulted.

The presence of an electro-magnetic field is said to increase the flow of electrons from the filament through the grid, to the plate, and this increased flow means an intensification of the volume of amplification.

When used on a two- or three-element detector the accelerated electron flow due to the presence of the magnet is indicated as being the means of giving the detector tube additional amplifying qualities.

In whatever form the magnet is used, however, its position relative to the tube elements must be according to a definite space relationship between the filament and the poles of the magnetized cup, cylinder or other shaped mass of magnetically-charged iron.

It is well known that only certain kinds of iron will retain a magnetic charge. Certain grades lose their charge almost immediately after being charged, while other alloys requiring special heat treatment will retain their magnetism almost indefinitely. This is an interesting field for amateur and professional experimentation, and one which will probably result in hanging up some new distance records in the radio hall of fame.

DX Nite Owls

(*Continued from page 21*)

Two Interesting Logs

From Robert H. Anthony, Boston, Mass.

INASMUCH as you were kind enough to publish in a recent issue stations received with our No. 3500 Amrad radio-frequency outfit, I thought you might be interested in extracts from our log book, covering two recent evenings' reception. The logs are as follows:

FEBRUARY 10TH AND 11TH
(10:30 *p. m. to* 1 *a. m.*)

PWX	Havana, Cuba. Piano Solo.
KHJ	Los Angeles, Cal. Woman Singing.
WBAP	Fort Worth, Texas. Speaker.
KYW	Chicago, Ill.
WOC	Davenport, Ia. Mississippi Syncopation.
WHAD	Milwaukee, Wis.
KJJ	Sunnyvale, Cal. Radio Shop. Singing and Orchestra.
WFI	Philadelphia, Pa.
WOO	Philadelphia, Pa.
WDAP	Chicago, Ill. Drake Hotel Orchestra.
KOE	Spokane Chronicle, Washington. (Signed off 7:34, Pacific Coast Time.)
WOR	Newark, N. J.
WNAT	Philadelphia, Pa.
KUO	San Francisco Examiner, California. Music.
WCAE	Pittsburgh, Pa.
WDAF	Kansas City Star, Missouri. Jazz Orchestra.

Total, 17,972 miles. Time, 2 hours 40 minutes.

FEBRUARY 15TH, 1923

Time P. M.	Call	Location	City	State	Country
	WBZ	Springfield		Mass.	U. S.
8:10	CFCF	Toronto		Can.	Can.
8:10	WEAF	New York City		N. Y.	U. S.
8:17	CHVC	Montreal		Can.	Can.
8:25	KVKA	Pittsburgh		Pa.	U. S.
8:27	KNAC	Boston		Mass.	U. S.
8:29	WGY	Schenectady		N. Y.	U. S.
8:30	WOC	Davenport		Ia.	U. S.
8:31	WWJ	Detroit		Mich	U. S.
8:45	WFNA	Dallas		Tex.	U. S.
8:50	WSB	Atlanta		Ga.	U. S.
8:55	CJCE	Vancouver		B. C.	Can.
9:08	KYW	Chicago		Ill.	U. S.
9:10	WHAS	Louisville		Ky.	U. S.
9:17	CFCA	Toronto		Can.	Can.
9:25	WGI	Medford		Mass.	U. S.
9:40	WCAE	Pittsburgh		Pa.	U. S.
9:55	WJZ	Newark		N. J.	U. S.
10:00	PWX	Havana		Cuba	Cuba
10:11	WBAP	Fort Worth		Tex.	U. S.
10:20	WOAA	Parksburg		Pa.	U. S.
10:40	WGM	Atlanta		Ga.	U. S.
10:50	KLZ	Denver		Colo.	U. S.
10:55	WLW	Cincinnati		Ohio	U. S.

Total, 17,484 miles. Average, 5,828 miles per hour. Time, 2 hours 45 minutes.

* * *

Not Claiming Special Honor

From Theo. Newsom, Lawton, Oklahoma

I AM taking the liberty of writing you in regard to some DX records I believe to be good. However, I am not claiming special DX honors, and also am not sending a list of stations that I can't duplicate every day. Also I receive these stations on my magnanox, using a single circuit detector and two stage three to one transformers. Stations: KYW, WCX, WWJ, WDAP, WLAG, WOC, KHJ, WSB, WHB, and many other nearer stations. The above stations were loud enough to be heard all over a four-room house, using 90 volts B battery.

* * *

From Canada to Corona

From T. Eisenstein, Corona, N. Y.

I AM a constant reader of the RADIO WORLD and have read some of the DX records. I am somewhat of a "DX Nite Owl." I have a senior set, using a WD 11 tube and have heard the following stations: Local—WEAF, WJZ, WBAY, WRW, WAAM, WOR, WHN, WBS. DX Stations—KSD, KYW, KDKA, WBZ, WDAP, WFI, WEAN, WGI, WGY, WHAZ, WOO, WSB, WWJ, WLW, WMAC, WNAC, WMAQ, WOC, WIP, WMC, WHAS, and one station in Canada CFCF.

* * *

Has Caught 80 Stations

From Donald Crowl, Wenatchee, Wash.

I AM sending my receiving record of the past three months.

WLAG, Minneapolis; WMAT, Duluth; WGF, Des Moines; WHB, WDAF, Kansas City; WBAP, Fort Worth; WFAA, Dallas; WOC, Davenport; WPAH, Waupaca, Wis.; KSD, St. Louis; WDAP, KYW, Chicago; WCX, WWJ, Detroit; WLW, Cincinnati; WCAE, KDKA, Pittsburgh; WDAJ, College Park, Ga.; WSB, Atlanta; WGY, Schenectady; WHAZ, Troy—distance, 2,300 miles; WIP, Philadelphia—distance, 2,300 miles.

LETTERS TO THE EDITOR

A Farad Symposium

EDITOR, RADIO WORLD: I note with interest the article on page 2 of RADIO WORLD, January 20 issue.

It looks to me as though Mr. Godfrey does not know the physical dimensions of a condenser which would have a capacity of .001 farads. The largest size condenser —that is, variable condenser—with which I have worked in radio work had a capacity of about .01 mfd., and it had quite a few more plates than the ordinary air condensers seen in the radio supply stores. Besides it had mica between the plates, which, of course, increased the capacity, due to the fact that the dielectric constant of mica is from 4 to 8.

Now Mr. Godfrey or any one else never saw a variable air condenser with a capacity of .001 farads, or any capacity anywhere near that much. I doubt if he has seen one with a capacity over .005, which is much larger than is used in any ordinary receiving set.

The term .001 mfd. is correct. It is written decimally .000000001 farad. Mr. Godfrey states that if the value .00025 mfd is correct then the capacity of that condenser is only 250 millionths of a millionth of a farad, which seems rather smallish to him. It is small, but, nevertheless, it is correct. This value written decimally is .000000000250 farad, or 250 micro-farad, which is a term being used more and more by radio engineers, as this is about the most convenient unit to use in radio work when dealing with receiving apparatus. Then an ordinary .001 mfd. condenser would have a capacity of 1,000 micro-farad. One micro-farad would be written decimally .000000000001 farad, which would be one millionth of a millionth of a farad.

I am sending this in with the hope it will make this matter clear to Mr. Godfrey and your other readers, as any one reading Mr. Godfrey's article who did not really know which was correct would be confused and perhaps misguided.

Very truly yours,
G. G. ADAMS.

Belmar, N. J., Feb. 23, 1923.

Home-Made Set Works Well

EDITOR, RADIO WORLD: In a recent issue of RADIO WORLD you published a letter from Burdette Bowman in regard to results secured by him with a receiving set consisting of two home-made honeycomb coils, a variometer, 23-plate variable condenser, rheostat, one WD-11 tube, one phone condenser and a grid leak. Being his roommate I made a set like it, and on the night of February 19, between 8 and 11:55 o'clock, I caught the Kansas City Star; Atlanta, Ga.; Minneapolis, Minn.; WBAP, WGY, WMAQ, WOF; the Missouri State Prison; the Manitoba Free Press, Manitoba, Canada; WLW, WSY and WJZ. The set is perfectly satisfactory. Instead of an aerial I used a Ducon light socket plug. The honeycomb coils were 25 and 50 turns. I also used 22½-volt "B" battery and one dry cell.

Yours truly,
J. A. O'NEAL.

Marion, Ind., Feb. 23, 1923.

The A. R. R. L. in Albion, Mich.

1212 Highland Avenue,
Albion, Mich., February 16, 1923.

Editor, Radio World:

Replying to your request in your February 17th issue, tabulate the Albion Radio Club (ARRL). Ed. Williamson, president; John Bryden, vice-president; N. F. Lovah, treasurer. It is an amateur organization.

Yours truly,
FLOYD B. QUIGG,
Secretary A. R. C.

TUNE-IN ON THE NATIONAL

WAVE LENGTH AND SAVE MONEY ON YOUR PURCHASES

Lowest Prices on Standard Radio Goods in the U. S. A.

FREE A HYDROMETER (Battery Tester) with each purchase of $1.00 or over **FREE**

HAVE YOU ENTERED OUR ADVERTISING PRIZE CONTEST?

FIRST PRIZE—

$250.00 Radio Set Free—Six Tube Radio-Audio Frequency Set

SECOND PRIZE—

$150.00 Radio Set Free—Four Tube Set, Detector and 3 stages Amplification

THIRD PRIZE—

$100.00 Radio Set Free—Three Tube Set, Detector and 2 stages Amplification

To advertise our business we will give the above prizes to the three persons sending us a list of five or more names of Radio fans and who compose the best slogan or phrase of words we can use for our advertising matter. We are interested in sending our catalogue and price lists to Radio fans.

If you are interested in Radio and in its future possibilities don't overlook this opportunity to get acquainted with us, secure low prices on your purchases and an opportunity to win one of the above prizes free of charge.

In the event of two or more persons submitting the slogan judged the best, second best, or third best, each will receive the full amount of the prize tied for. All entries must be received by us not later than *March 31, 1923.*

Our Peanut Tube Does the Work of WD-11

For Detector and Amplifying uses. Can be used on 1½ volt dry cells or regular 6 volt A Batteries. Fits standard V.T. socket. Uses about 1/10 ampere, on two 1½ volt dry batteries. Price of tube, $2.50, includes adapter.

1½ VOLT TUBE (not WD-11, but for same use). For detector and amplifying uses. Used on 2 Dry Cell batteries (1½ volt)..... $5.00

THIS WEEK'S SPECIALS

1,000 HEADSETS, $6.00 Value..... $2.99 each
Biggest Radio Bargain Ever Offered—Order Promptly

200 RADIOLEAN CRYSTAL SETS, $12.50 Value..... $6.50 each
Includes Receiving Set and All Antenna Equipment

VACUUM TUBES

U. S. Navy (Pliotron) used as a detector, amplifier and transmitting tube, all in one, type V. T. 14	List $8.00, now $4.00
U. V. 200 Detector	4.25
U. V. 201 Amplifier	5.25
U. V. 201A Amplifier	8.50
WD-11 1½ Volt	8.50
Cunningham Detector	4.25
Cunningham Amplifier	5.25
Myers Audion High-Mu	4.50

Vacuum Tubes Repaired. Broken and burned out tubes repaired. Mail them parcel post insured. Price, $2.79 each, cash with your order. Tubes returned by Parcel Post, prepaid. We guarantee them to burn equal to new tubes.

VERNIER CONDENSERS

11 Plate	List $4.00, now $3.00
23 Plate	" 5.00, " 4.00
43 Plate	" 6.50, " 5.00
Freshman Grid Leak and Condenser for Flewelling Circuit	" 1.00, " .75

TRANSFORMERS

Thordsen	List $4.50, now $3.00
Atwater Kent	" 5.00, " 3.75
Acme	" 5.00, " 3.75
WD-11	" 5.00, " 3.75

BUSS BAR WIRE—6 two-foot lengths..... $0.25

DX TRANSFORMERS, $9.00 Value, Special..... 6.50

HEADSETS

2200 Ohm, equals best $6.00 phones on market, now	$4.50	Dictograph	$5.00
Brandes—2000 Ohm	5.50	Federal	5.50

HOW TO ORDER

All goods forwarded by Parcel Post. Send Money Order with order, and include the following rates with same for postage:

On Purchases $1.00 to $5.00, 6 Cents Postage
On Purchases $5.00 to $10.00, 15 Cents Postage
On Purchases $10.00 to $20.00, 20 Cents Postage
On Purchases $25.00 to $20.00, 35 Cents Postage

Space being limited, we are obliged to omit other money-saving items. Write for quotations or ask for our latest Price Sheet Catalog.

National Radio Products Corporation

Mail Order Dept., 509 FIFTH AVENUE NEW YORK

Milwaukee Amateurs' Radio Club

THE design and construction of station 9AAP, Milwaukee's only station to have its signals span the Atlantic, was the subject of a paper presented at the Milwaukee Amateurs' Radio Club's first meeting in February by Marian Szukalski, Jr. E. G. Nickel and E. A. Cary, both of 9ATO and members of the club's publications committee, have given digests of current radio literature in their reports. The topic of one of the most interesting of these was station 6KA, its design and records.

District Superintendent C. N. Crapo announced in his monthly report that Milwaukee County, the smallest of the districts, with 415 messages handled, ranked second in the race among A. R. R. L. traffic districts of the state. A silver cup, known as the Wisconsin Cup, has been offered by B. A. Ott, assistant division manager in charge of the state, to the stations which monthly handle the greatest amount of traffic. Members of the Milwaukee Club are now out for this honor. City Manager I. H. Strassman, 9AHO, announced the presence of several unlicensed stations in the air and that he and his staff were taking steps to clear up the situation.

Incorporation of the Club under the laws of Wisconsin has been assigned to Attorney L. J. Topolinski, the society's general counsel. Business Manager L. S. Baird has opened negotiations with the South Side Radio Club and the West Allis Radio Club with the idea of bringing about consolidation with the Milwaukee club at the time of incorporation and forming one large county association.

Solid Wire Favored Over Litzendraht

LITZENDRAHT WIRE, which is a special cable consisting of a number of strands of fine insulated wire, has long held the reputation of giving lower losses with radio-frequency currents than any other type of wire. In most cases coils of high-grade Litzendraht may show a 5 to 50 per cent. decrease in resistance compared to solid wire, if all the strands are perfect. On test, according to the New York *Globe*, it has been found that a coil employing Litzendraht may act perfectly for six months or a year and then develop troubles which indicate a broken strand. This often occurs no matter how carefully the coils are manufactured, mounted and tested, although it does not make the set inoperative, and would pass unnoticed by many users.

Even with this drawback Litzendraht is the superior of the two. Actual tests have shown apparently no difference so far as sharpness of tuning is concerned or for its qualities in an oscillating circuit. But the desire to safeguard users from the freakish effects of broken strands is enough to throw the balance in favor of the solid wire.

Information for Sea-Going Radio Operators

READERS of RADIO WORLD who are desirous of securing information as to the proper procedure to follow in applying for positions as radio operators on American merchant vessels are invited to address Mr. Claude Cathcart Levin, associate editor, *The American Officer*, 37 Maiden Lane, New York City. Mr. Levin has very kindly offered to answer questions along these lines from RADIO WORLD readers who will enclose a self-addressed and stamped envelope. Mr. Levin served during the war as a commissioned officer in the Navy and holds both radio operator's and marine engineer's licenses. He is qualified to answer questions regarding the service.

Farmers Benefit Greatly by Radio Service

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

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

Radio has developed more rapidly in the Middle West in the corn, wheat and live-stock growing regions than in other farm sections of the country, the survey shows. Missouri, Illinois and Iowa lead in number of responses to the survey. Many farmers in this territory own radio equipment and praise the practical value of the service. In other sections farmers congregate at central points to get the reports, but an increasing disposition toward installation of sets for private use is indicated.

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

The department practically covers the country with its radio market news, and farmers everywhere are using the service to aid them in conducting the business end of their industry. In the replies received, numerous farmers gave instances of specific savings resulting from use of the information, one farmer declaring radio as a "direct gift from God." Numerous general stores and banks in small towns say that establishment of their places of business as a central point for receiving the reports has resulted in tremendously increased business in many directions.

Prospects Good for New Radio Stations

THERE are good prospects this year of a number of good stations being erected in parts of the country not now supplied with satisfactory broadcasting service. Outside of the more populated centers there are few really powerful stations, although there are many small ones with from twenty to forty watts of power in the antenna. These are obviously insufficient to supply service even to receivers close by, except to really good sets, which in any event can pick up the more distant stations. It will be a great day for radio, says the New York *Globe*, when every tube set in the country at least will be in range of a first-class broadcasting station, and, in addition, can pick up at will the next best station.

Vaudeville Stars on Radio

BLOSSOM SEELEY and her company and George Rockwell and Al Fox, while playing the Davis Theatre in Pittsburgh recently, broadcast parts of their acts from station KDKA. Both companies

DO YOU WANT TO BUY, SELL OR EXCHANGE RADIO OR OTHER GOODS? TRY THIS DEPARTMENT AT 5c A WORD

RADIO WORLD'S QUICK-ACTION CLASSIFIED ADS

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

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

RADIOPHONO Adapter—Your Edison, Brunswick Victrola or other talking machine has the finest acoustic properties possible. Radiophono Adapter enables you to use it as a loud speaker. Patent (Pend.) Molded Construction. Sent on money back guarantee. At your dealers or direct from us. $2.00 post prepaid. Industrial Sales Engineering Co., 671 Broad St., Newark, N. J.

HIGH GRADE ENGRAVING done on your radio panels at reasonable prices. T. Johnson, 15 Rosemont Rd., Worcester, Mass.

PHONES, TRANSFORMERS REWOUND. L. Werts, 409 St. Julian St., Pekin, Ill.

SELL—Regenerative set (unwired), $8.00 with circuit. CARL MASSON, 76 Boylston St., Jamaica Plain, Mass.

VARIABLE CONDENSERS at factory prices. 3 plate, $1.05; 11 plate, $1.35; 21 plate, $1.60; 43 plate, $2.05. Send cash with order. GREENLEAF, 34 Merchants' Row, Boston, Mass.

VERNIER VARIABLE CONDENSERS—Capacity, .0006. $1.48 postpaid. Fully guaranteed. Cherpeck Company, 3123 Davlin Court, Chicago.

RECEIVING SET, $10.00. Loose Coupler, $4.00; Battery, $7.00. Mele, 39 Foxon, East Haven, Conn.

R3-MAGNAVOX—BRAND NEW. First $30 takes it. Ted Boston, Marion, Kentucky.

PHONES, TRANSFORMERS REWOUND—L. WERTS, 409 St. Julian St., Pekin, Ill.

R3-MAGNAVOX—BRAND NEW—First $30.00 takes it. TED BOSTON, Marion, Ky.

VARIOMETERS, $1.50 each. These are regular 4½-inch square variometers. Couplers, $1.00 each. Both usually sell at three times the price. THE RADIO SHOP, 261 East Broadway, Milford, Conn.

SUPER-SIMPLCITY CIRCUIT

Hear Europe, Asia, Africa and Australia's long wave stations and LOCAL broadcasting, on ONE TUBE, one control. NO rheostats, storage battery, variocouplers, variometers, three-coil mounting, variable inductance, taps, switches, dead end losses or radio frequency. Cuts, hookup, everything. Nothing to guess about. Price $1.00. RADIO EXPERIMENTAL LABORATORY, Box 194A, Berkeley, California.

EXCHANGE LETTERS with friends everywhere. Pleasant pastime. Information for stamp. Smith, Box 3125, M. Portland, Ore.

VACUUM TUBE RESULTS WITH A CRYSTAL SET! Cover distance with a "PT" ULTRA-SENSITIVE CONTACT in your crystal detector. Beats gold and other ordinary catwhiskers. DOES NOT JAR OUT. Myrle Wood, Rhinelander, Wisconsin, writes: **"That 'PT' Ultra-Sensitive Crystal Detector Contact I purchased is sure a wonder. Using the 'PT' contact and galena, I have heard over 43 different broadcasting stations, up to 1,000 miles distant."** The "PT" has received code 3,300 miles. Price, only twenty-five cents. "PT" CRYSTAL CONTACT COMPANY, Box 1641, Boston.

AMATEURS—LOOK! Send in 15 cents to RADIO WORLD for issue of January 20 containing panel layout, hookup and full explanatory data on the construction of a D-X receiver, which simply lays the long distance on your table. Or start your sub. with that issue. RADIO WORLD, 1493 Broadway, New York City.

STANDARD ELECTRICAL DICTIONARY— By Prof. T. O'Conor Sloane. Just issued an entirely new edition brought up to date and greatly enlarged—as a reference book this work is beyond comparison. as it contains over 700 pages, nearly 500 illustrations, and definitions of about 6,000 distinct w[illegible] terms and phrases. The definitions a[illegible] concise and include every term[illegible]ical **science. 707 pages, 477** ill[illegible]e 18 for fuller description.) P[illegible]mbia Print, 1493 Broadway,

RADIO TUNING RODS

(Patent Applied For)

Eliminates body capacity when tuning in. With Tuning Rod in your hand you can stop unnecessary noises and shrieking. Every radio fan should have Radio Tuning Rod. Send 35 cents stamps or money order. Radiophona Co., 505 Fifth Avenue, New York City.

TWO one stage amplifiers, Acme, $8; Remler, $7. King Amplifying horn, $7. Condensers. J. B. Rich, Hobart, New York.

THE IDEAL RECEIVER tunes with SINGLE CONTROL. No variometers, variocouplers. taps or switches. Cheapest to build. Particulars. ROKAY ELECTRIC COMPANY, Ingomar, Ohio.

CASH FOR OLD GOLD, Platinum, Silver, Diamonds, Liberty Bonds, War, Thrift, Unused Postage Stamps, False Teeth, Magneto Points, Jobs, Any Valuables. Mail in today. Cash sent, return mail. Goods returned in ten days if you're not satisfied. OHIO SMELTING CO., 337 Hippodrome Bldg., Cleveland, Ohio.

DO YOU WANT TO SAVE MONEY in making your set? Send for the Jan. 27 issue of RADIO WORLD, containing a full-page drawing of how to make filament control rheostats, as well as an easily understandable text, which makes the construction easy. 15c a copy, or start your subscription with this issue. RADIO WORLD, 1493 Broadway, New York.

OLD MONEY WANTED—$2.00 to $500.00 EACH paid for hundreds of Old and Odd Coins. Keep all old money. Send 10 cents for New Illustrated Coin Value Book, 4x6. You may have valuable coins. Get posted. We pay CASH. Clarke Coin Company, Ave. 83, Le Roy, N. Y.

RAND-McNALLY RADIO MAP OF UNITED STATES—Is 28 x 30 inches in size. The locations of broadcasting stations are shown by distinctive symbols. The call letters of each station are given, also the wave lengths of each. The Radio Districts with numbers are shown in red and the Radio Relay Divisions are in blue. Time zones are included. Alphabetical lists of stations and alphabetical lists of call letters are in the margins. Convenient pocket form with cover. Price, 35c. The Columbia Print, 1493 Broadway, New York City.

MODEL MAKING—By Raymond Francis Yates. A new book for the mechanic and model maker. This is the first book of its kind to be published in this country, and all those interested in model engineering should have a copy. The first eight chapters are devoted to such subjects as Silver Soldering, Heat Treatment of Steel, Lathe Work, Pattern Making, Grinding, etc. The remaining twenty-four chapters describe the construction of various models such as rapid fire naval guns, speed boats, model steam engines, turbines, etc. 400 pages. 301 illustrations. Price, $3.00. The Columbia Print, 1493 Broadway, New York City.

TWENTIETH CENTURY BOOK OF RECIPES, FORMULAS AND PROCESSES—Edited by Gardner D. Hiscox. This book of 800 pages is the most complete book of recipes ever published, giving thousands of recipes for the manufacture of valuable articles for every-day use. Hints, helps practical ideas and secret processes are revealed within its pages. It covers every branch of the useful arts and tells thousands of ways of making money and is just the book everyone should have at his command. The pages are filled with matters of intense interest and immeasurable practical value to the photographer, the perfumer, the painter, the manufacturer of glues, pastes, cements and mucilages, the physician, the druggist, the electrician, the dentist, the engineer, the foundryman, the machinist, the potter, the tanner, the confectioner, the chiropodist, the manufacturer of chemical novelties and toilet preparations, the dyer, the electroplater, the enameler, the engraver, the glass worker, the gold-beater, the watchmaker, the jeweler, the ink manufacturer, the optician, the farmer, the dairyman, the paper maker, the metal worker, the soap maker and the technologist in general. A book to which you may turn with confidence that you will find what you are looking for. A mine of information up-to-date in every respect. Contains an immense number of formulas that everyone ought to have that are not found in any other work. New edition. 807 octavo pages. Cloth binding. Price, $4.00. The Columbia Print, 1493 Broadway, New York City.

BATTERIES—Edison Storage "B" Battery Elements, 5c per pair; 18 will make one 22.5 volt Battery. GILMAN'S BATTERY SHOP, Chelsea Sq., Chelsea, Mass.

HOW TO REPAIR Vacuum Tubes. Complete literature, $1.00. Box 103, Station C, Toledo, Ohio.

RADIO-APPLAUSE Post Cards. Encourage broadcasting by such acknowledgment. 2 dozen, 25c, postpaid. D. J. SPANGLER, Elkhart, Ind.

GUARANTEED Radio "A" Batteries, 40 ampere hours, $12.00. 4" hard fibre tubing, 30c. per foot. Variocouplers, $2.25. RADIO ASSEMBLY, 1109 Valley St., Joplin, Mo.

EXCHANGE JOLLY, INTERESTING LETTERS through our club. Stamp appreciated. Betty Lee, Inc., 4254 Broadway, New York City

4 INCH HARD FIBER RADIO TUBING, any length to 4 ft., 20c. per ft. Variocouplers, $2.25. Radio Assembly, 1109 Valley St., Joplin, Mo.

AGENTS—Are you interested in radio? If so drop us a card. We have a proposition no live agent should turn down. Meets the needs of 90 per cent. of the public. THE WILKENDA CO., 500 Fifth Avenue, New York City. Dept R.W.

PATENTS PROCURED AND TRADE MARKS REGISTERED—Advice and terms upon request. Robb, Robb & Hill, 1403 Hanna Bldg., Cleveland, Ohio; 942 McLachlan Bldg., Washington, D. C.

NEWS AND GOSSIP OF THE STAGE—Send 10c. for specimen copy of the 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.

IF YOU ARE A REGULAR RADIO fan and like to hear the stations in the four corners of the United States come in with a bang, then you will want the Flewelling Circuit. If you do, send 15c for RADIO WORLD, issue of Feb. 27, which contains complete description and directions for the manipulation of the circuit. RADIO WORLD, 1493 Broadway, New York.

ATTENTION, Amateurs!! Have you seen the RADIO WORLD'S page of hook-ups in the Oct. 21 issue? 15c a copy or start your subscription with that Number. Many people are writing in for the hook-ups listed here. RADIO WORLD, 1493 Broadway, New York City

ADVERTISING SOLICITORS to represent RADIO WORLD. The best quick action radio advertising medium. State territory you can cover. Tell us about your past experience. Write Fred S. Clark, Manager, RADIO WORLD, 1493 Broadway, New York.

WIRING A HOUSE. By Herbert Pratt. Shows a house already built; tells just how to start about wiring it; where to begin; what wire to use; how to run it according to insurance rules; in fact, just the information you need. Directions apply equally to a shop. Sixth edition. COLUMBIA PRINT, 1493 Broadway, N. Y. C. Price, 25 cents.

A COURSE IN MECHANICAL DRAWING—By Louis Rouillion. The author has written a most practical book on the subject of Mechanical Drafting. It fully explains the art of Drawing, Lettering and Dimensioning. It is, by far, the most practical book ever published on this subject, for use in day and evening schools, and more especially adapted for the teacher and for self instruction. Fifteenth edition, revised and enlarged. Fully illustrated. Oblong. COLUMBIA PRINT, 1493 Broadway, N. Y. C. Price, $1.25.

HOW TO BECOME A SUCCESSFUL ELECTRICIAN—By Prof. T. O'Conor Sloane. An interesting book from cover to cover. Telling in simplest language the surest and easiest way to become a successful electrician. The studies to be followed, methods of work, field of operation and the requirements of the successful electrician are pointed out and fully explained. 202 pages. Illustrated. Nineteenth revised edition. Cloth. Price, $1.50. The Columbia Print, 1493 Broadway, New York City.

No Free List

RADIO WORLD has no free list. The only copies sent out by the publishers are to fill the ever-increasing orders of the American News Company, the large numbers of subscription orders received at the office of publication, and one voucher copy to each advertiser and advertising agent represented in current issues.
RADIO WORLD, 1493 Broadway, N. Y.

Howls from a Loud Speaker

NOW, if I were you, I would put another step on there and then you would hear everything."

* * *

"Say, you are doing that all wrong! Don't you know that if you tune your set that way, you can't get any results?"

* * *

"If I were the president of the RC, I would sell the tubes for cost, just to popularize them. Who wants to pay that price for them? It's ridiculous!"

* * *

"—— now as I was saying, just as I got KJH in nice and loud, I hear a terrible generator hum, and who do you think it was? You'd never guess! It was SPC down in South America. That's some little circuit I am using. No, I won't give it to you—I'm going to patent it first."

* * *

"So I sez to him, 'What do you think you're doing, putting up an aerial right over mine? Don't you realize that you won't be able to receive anything? I'll get it first and you won't get any,' and he turns around and looks at me and takes the wire down."

Church Broadcasting

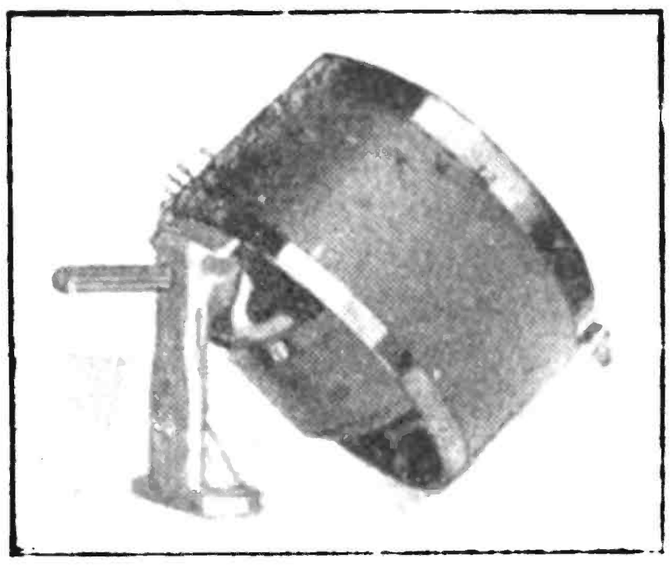
A SURVEY made by the National Chamber of Commerce develops the fact that there are eighty-three radiophone stations in this country broadcasting religious services. It is estimated that the territory covered represents about 65.2 per cent. of the total area of the United States.

YOU NEED THESE PARTS!

Designed by the Same Radio Engineers Who Designed Much of the United States Navy Radio Apparatus. Built with Micrometer Precision Throughout.

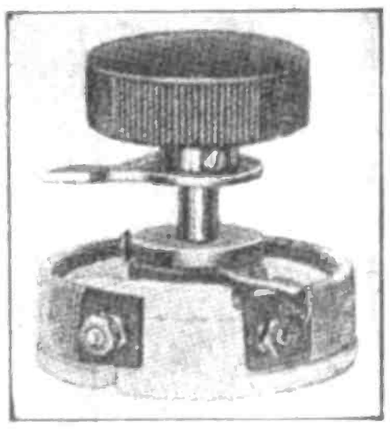
You Get Remarkable Adjustment and Avoid Dielectric Losses with this
GENUINE BAKELITE

VARIO COUPLER



This is a remarkable instrument and a remarkable value. Accurately calculated. Micrometer precision. Made of natural UNDYED bakelite. Avoids dielectric losses due to coloring materials. Special 2 to 1 rotor movement. 180° on dial turns, 90° on rotor. Very delicate adjustments. Made for table or panel mounting.

$2.25 (or $3. with dial)



New RHEOSTAT

Every radio enthusiast wants one of these. NEVER over-heats because it has a porcelain base. Suitable to table or panel mounting.

50c

IMPROVED JACKS { New Type

Open Circuit ..... **25c.**
Closed Circuit ..... **35c.**
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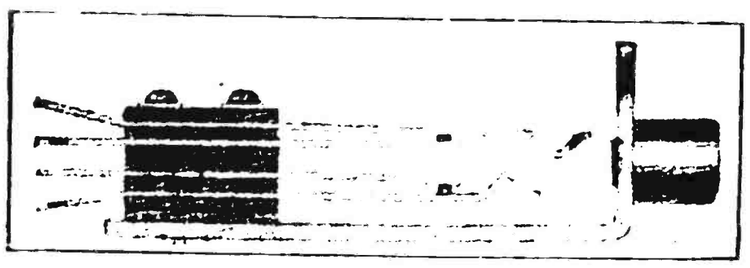
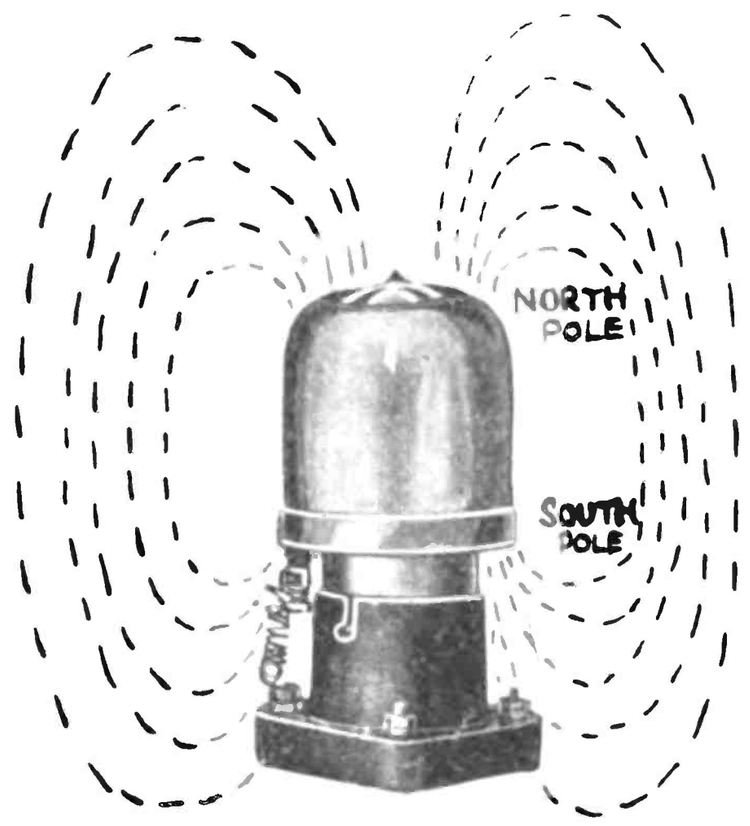


Increase Your Vacuum Tube Sensitivity 25% With This New

TUBE SENSITIZER



A recent editorial in a radio journal states, "The placing of a strong magnet in a certain space relationship to the vacuum tube often gives an increase in tube efficiency of 25%."

$1.50

The Dyna Tube Sensitizer serves 2 purposes: **First,** as a powerful permanent magnet, the electro-magnetic field existing between its North and South poles tends to increase the flow of electrons from the plate to the filament, thereby increasing tube power. **Second,** it acts as a **shield** which prevents electro static coupling with other elements in the set, also tending to eliminate stray capacity effects.

MADE OF SPECIAL PERMANENT MAGNETISM-RETAINING ALLOY. FOR LONG OR SHORT DISTANCE WORK YOU CANNOT AFFORD TO BE WITHOUT IT.

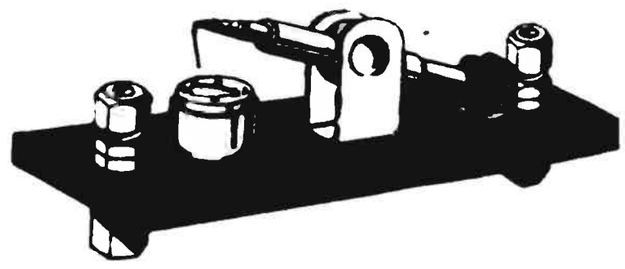
RADIO RECEIVER, Model 235, with power amplifier combined in one cabinet, as illustrated. Without equipment or horn. .....List. **$65**

Power Loud Speaker, extra **$25**

COMPLETE RADIO RECEIVER SET, with full installation equipment, including vacuum tubes, batteries, complete antenna equipment, telephone headset, telephone plug and horn. Free installation within 50 miles of New York... **$150**

A Super-Sensitive, Complete

CRYSTAL DETECTOR

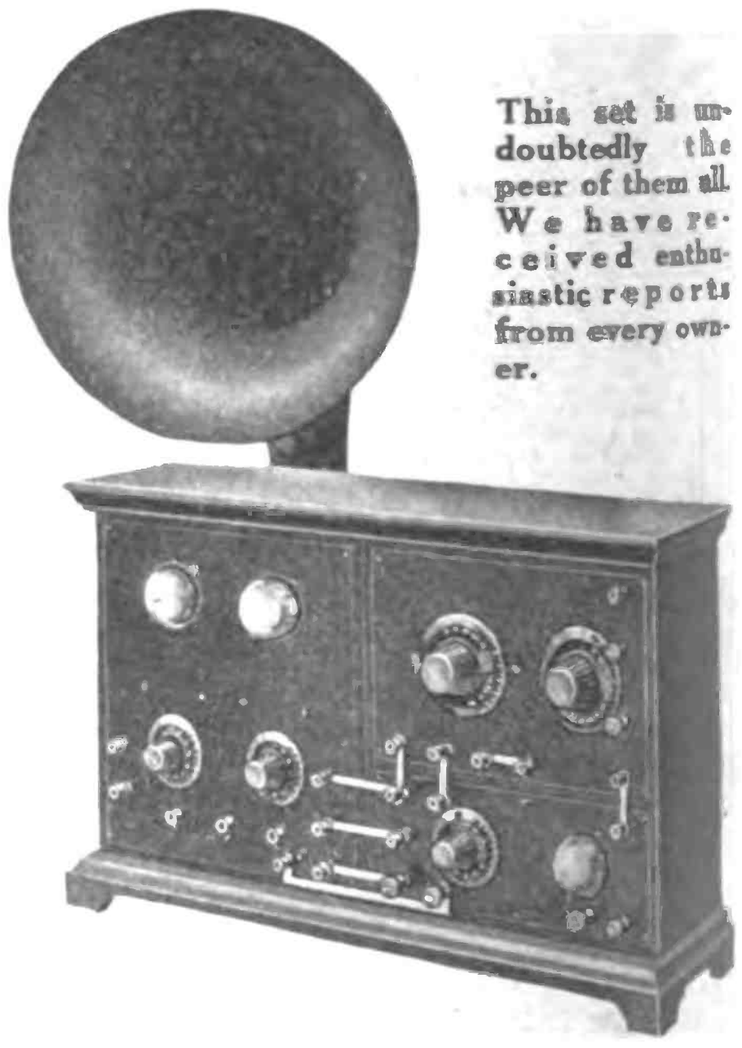


Includes triple-tested, guaranteed, million-point synthetic crystal. Base is of polished Bakelite arranged for table or panel mounting. Note new sensitive spring contact for delicate adjustment.

75c

Guaranteed Super-Sensitive CRYSTAL

Triple-tested Galena Radio Crystal. Absolutely Guaranteed Sensitive. Set in special mounting. Sealed in wooden box..... **20c**



This set is undoubtedly the peer of them all. We have received enthusiastic reports from every owner.

SET AS ILLUSTRATED ⟶ MODEL 235

PARTS SENT POSTPAID ON RECEIPT OF CHECK OR MONEY ORDER.
USE REGISTERED MAIL

Have Your Old Dead Phones Re-Magnetised 50c. or Taken in Exchange.

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New York Distributors of Freed-Eisemann and Other Standard Radio Apparatus

N. E. Cor. Fourth Ave. at 20th St. Telephone: Gramercy 4668 **New York, N. Y.**