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**THE FORD OF RADIO** *An Inexpensive  
1-Tube Set*

**AUGUST 2**  
1924.

**HOW TO CONSTRUCT THE IDEAL LOOP**

# RADIO WORLD

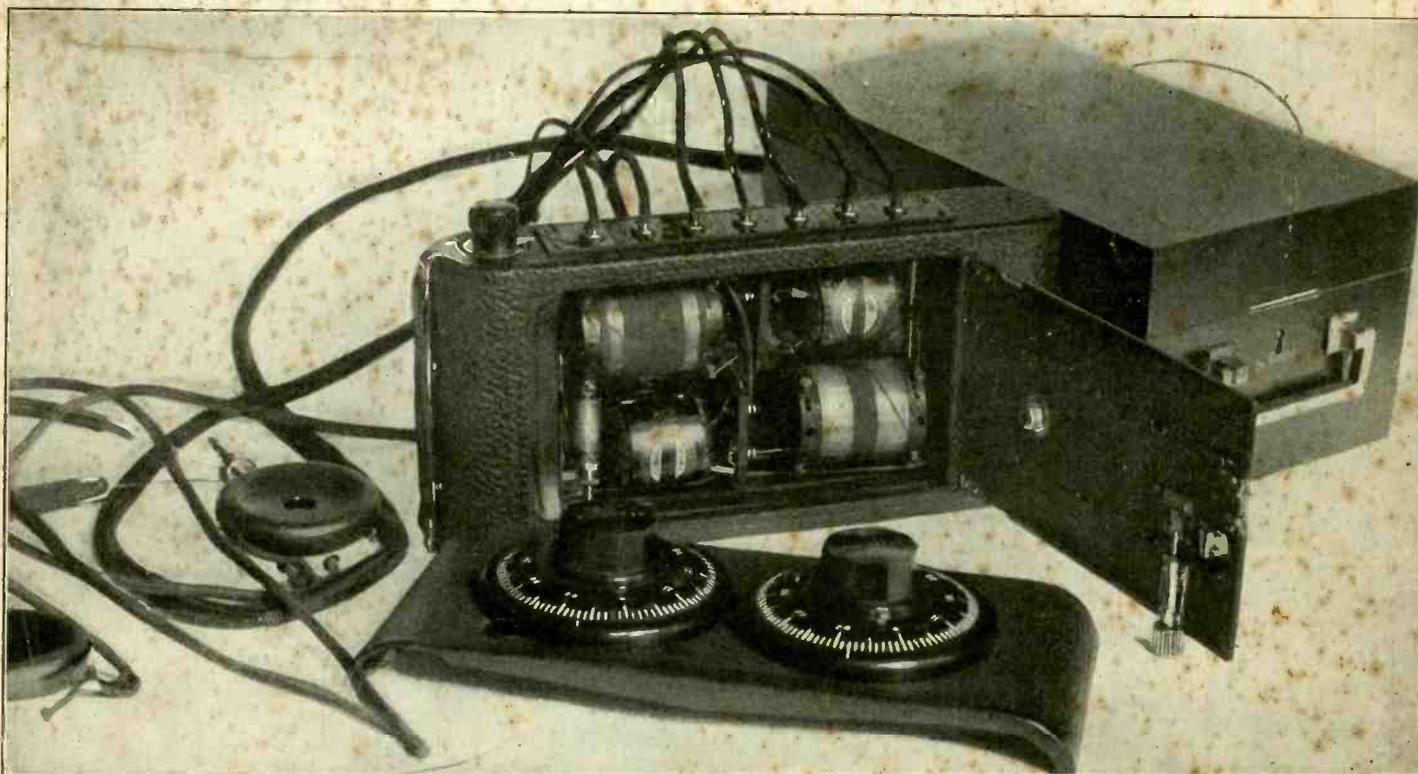
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VOL. 5. NO. 19.

ILLUSTRATED

EVERY WEEK

## Building a Set in a Camera Cabinet



(Wide World)

**BUILT IN A CAMERA**, this set gave good results. It consists of one stage of RF, crystal detector and two stages of AF. The rheostat was installed where the winding key had been. The batteries are in a neat little case at right. Dry cells are used. The wiring data and diagram are published on page 19.

**A HOME-MADE LOW-LOSS TUNING COIL**  
**NO B BATTERY IN STANDARD TUBE SET**

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**Before you purchase a radio receiver  
listen in on a Crosley Trirdyn**

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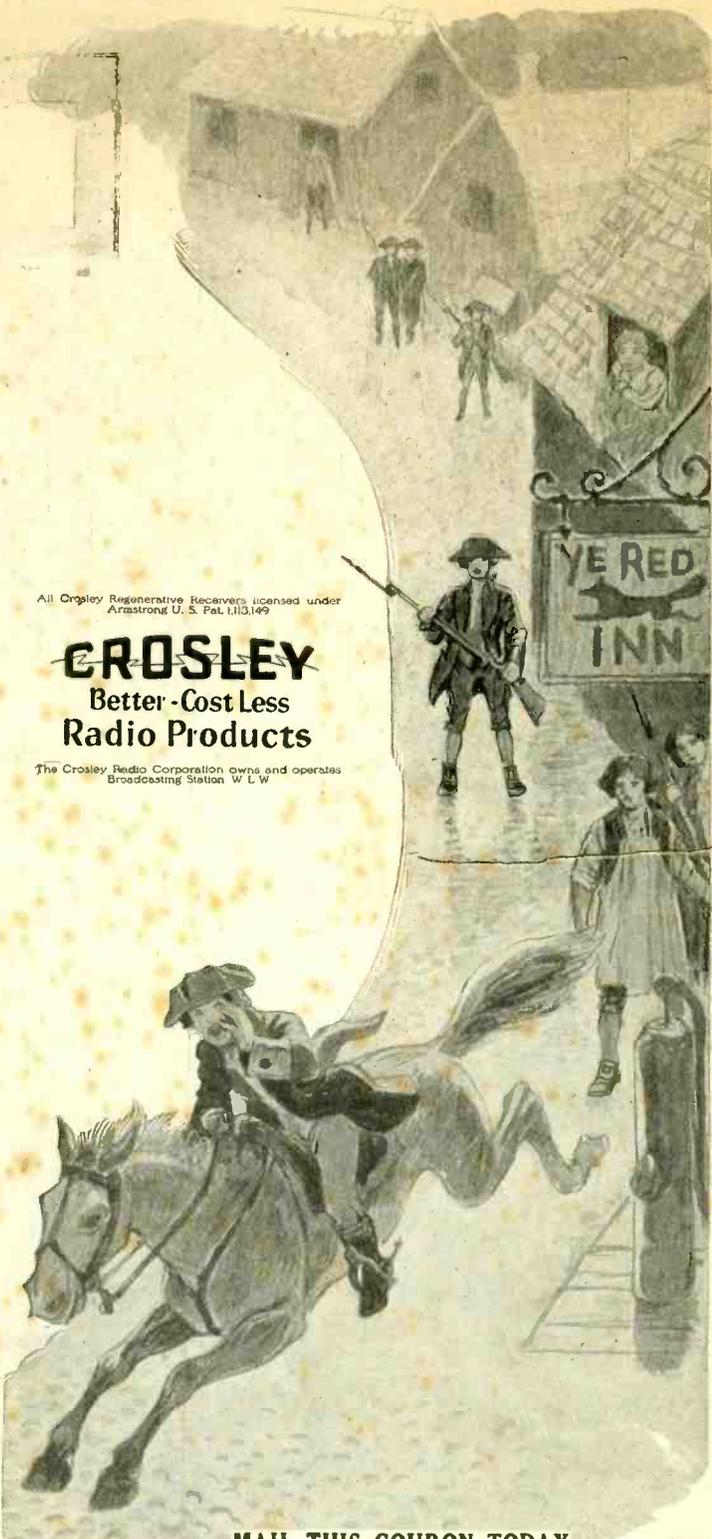
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## The Crosley Radio Corporation

POWEL CROSLLEY, Jr., President  
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# RADIO WORLD

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## Set Works Without Any B Battery and Uses a Standard Tube

By Chester Charlton

**T**HE setting up and operation of a B batteryless receiving set is not hard. Standard apparatus may be used throughout and most experimenters have all the necessary instruments on hand. The circuit uses audio-frequency regeneration. The electronic stream flowing through the tube furnishes a small B battery potential from the A battery, which potential is regenerated through the audio-frequency amplifying transformer back to the grid circuit where the signals are amplified again. Thus it is possible using only an A battery to obtain good results. But they are not as good as those obtained from the use of a B battery.

The audio-frequency regenerating circuit herewith is the result of many experiments. The constants follow: C is a very small capacity fixed condenser about .00015 mfd. C1 is a variable condenser for controlling the wavelength and should have a capacity of between .00015 to .0005 mfd. C2 may be a standard grid condenser with a capacity of .00025 mfd. C3 is a by-pass condenser of .002 mfd. capacity. All of the fixed condensers should be of the mica-insulated type so that losses will be reduced to a minimum. A low-loss variable condensers should be used for C1. Coil L may be a honeycomb coil of either 50 or 75 turns, as many as may be found best by experiment. Coil L1 may also be a honeycomb coil of 75 to 100 turns. The size of this must also be determined by experiment. A radio-frequency choke coil must be used in series with the audio-frequency transformer and the grid. This is done so that there will not be a short circuit of radio-frequency current from the grid to the plate. The radio-frequency choke coil is represented by L2 in Fig. 1 herewith. This may be a honeycomb coil of 250 turns.

The resistance R1 is a standard rheostat, the size of which will depend upon the tube. It should be equipped with a vernier, as the adjustment is quite critical. R2 is an A battery potentiometer with a resistance of 300 to 400 ohms.

The tube to be used in the circuit should be of a 6-volt type, very poor results having been noted with the low voltage type. The tube used must give a very liberal filament emission. A UV201A or a VT1 will give excellent results.

Fig. 2 gives lay-out of the apparatus used. This arrangement should be closely adhered to, so as to prevent any undesirable interaction between the various instruments.

Coils L and L1 are closely coupled together. The filament is turned up quite bright. A howl should be heard and if not, the set can be made to howl by adjusting the potentiometer. First get the howl and then adjust the potentiometer until the howl vanishes. The coupling between L and L1 may then be loosened if

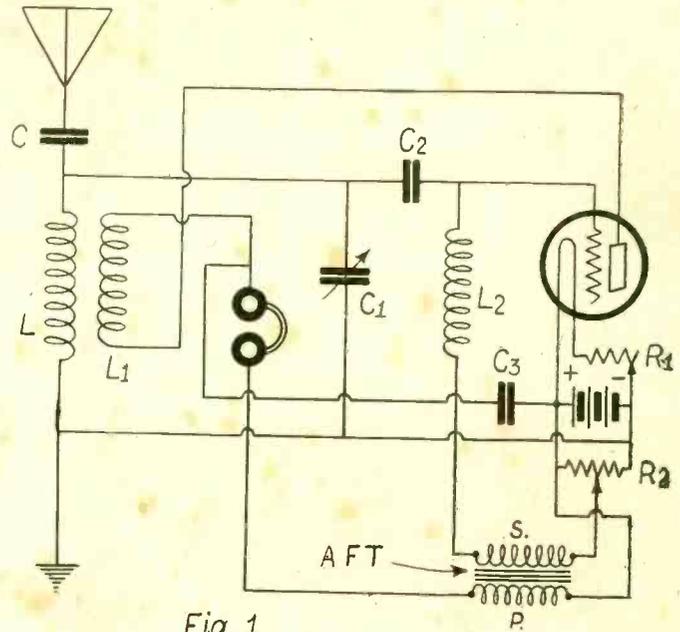


Fig. 1

NETWORK of the B Batteryless Circuit. C is a .00015 fixed condenser, L is a 50 or 75-turn honeycomb coil, L1 a 75 to 100-turn honeycomb coil, C1 a low-loss variable condenser, maximum capacity between .00015 and .0005 mfd.; C2, .00025 fixed condenser; L2 is an RF choke coil, 250-turn honeycomb or equal; C3 is a .002 fixed bypass condenser, R1 a rheostat, R2 a 300 or 400-ohm potentiometer and AFT an AF transformer.

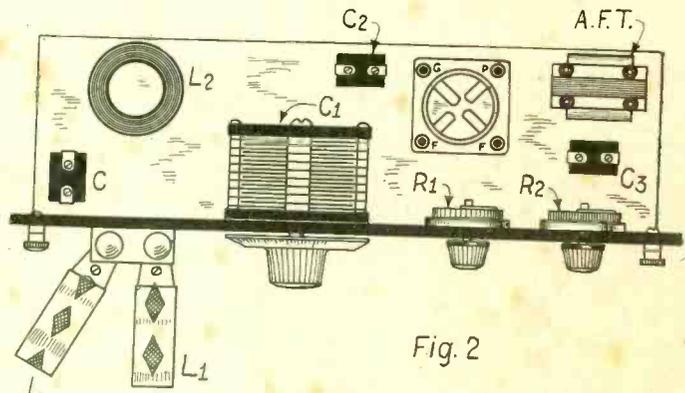


Fig. 2

HOW to mount parts in constructing a 1-tube circuit that operates without a B battery. UV201A tube or equal should be used. The designations correspond with those used in the text and shown in the circuit network, Fig. 1.

found desirable. Tune in a station with C1. Once the station is heard the usual procedure of small adjustments of each instrument is carried out until the signal strength is greatest and clearest.

If after connecting up the apparatus and trying it out, signals are not obtained, it may be because the audio-frequency transformer connections are not correct. Try reversing them until results are obtained.

This circuit is only an experimental type and must not be considered as perfect.

# THE FORD OF RADIO—A 1-Tube, Single-Knob Set, Resistance-Controlled

**C**IRCUIT can be enclosed in a 7"x10" panel—3 coils on one tube

**T**HE set is easy to build, easy to operate and easy to control, as to oscillations

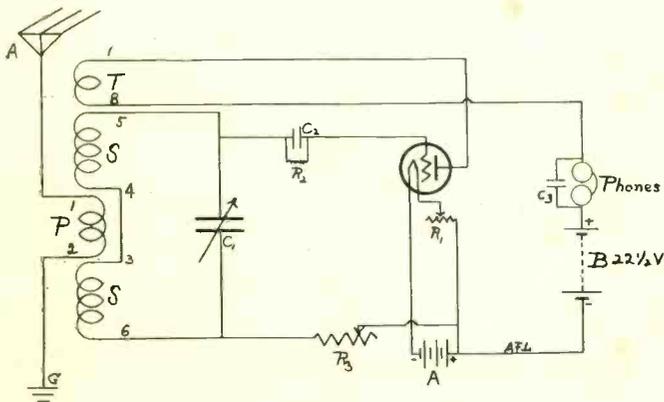
**I**T measures up to the merits of the best one-tube receivers and is inexpensive to make

By **A. F. Lapierre**

Consulting Engineer

**A** RESISTANCE-CONTROLLED regenerative set has several desirable features, among them simplicity of construction and operation and easy control of oscillations.

The coils P S and T are the "works" of this set and must be very carefully wound. A tube 5" long by 3" in diameter of either bakelite or cardboard is necessary. Coil T is wound first, starting  $\frac{1}{4}$ " from the edge. Leaving 5" to 6" of wire loose, wind 40 turns and terminate this coil with about 6" of wire. Next we will wind the first half of the secondary. Starting again with about 6" of slack about  $\frac{1}{4}$ " from the previous coil, wind about 30 more turns in the same direction and then terminate in the same fashion as before. The primary P is the next coil to wind and this consists of 15 turns started as before,



**NETWORK** of the circuit presented by A. F. Lapierre, consulting engineer, whereby resistance is used to control oscillations in an inexpensive 1-tube set. It is a 3-circuit tuner and is selective. The resistance is simply a 400-ohm potentiometer (R3), in series in the grid return lead. The coil may be wound by the constructor, as directed in the text. The fixed condenser C3 shunts the phones, but it may be placed with the battery end at B—instead of at B+ as an experiment to determine whether better results are obtained. Either dry cell or storage battery tube may be used.

$\frac{1}{4}$ " from the previous coil and terminated with the usual amount of slack. The other half of the secondary is now wound on and this consists of 30 turns started  $\frac{1}{4}$ " from the primary coil and wound in the same direction as the others. **IT IS IMPORTANT THAT ALL COILS BE WOUND IN THE SAME DIRECTION.** No. 22 DCC wire may be used for all these coils.

Now we need a .0005 mfd. or 23-plate variable condenser and a 400-ohm potentiometer besides the regular rheostat for controlling the tube and the usual grid condenser and leak, socket, phone condenser, wire, and binding posts.

The panel may be laid out to suit the reader. A

panel 7"x10" will be found adequate if a detector alone is to be used.

The aerial binding post is brought to the coil P and soldered to point 1. The ground is brought to point 2 and soldered there. On the secondary S, 3 and 4 are brought together and joined inside the tube. It may be well to do this before any wiring is done on the set at all. Points 5 and 6 are shunted across the condenser and point 5 is brought to the grid condenser and leak and thence to the grid post of the socket. Next 6 is brought to one side of the potentiometer and the lever is then wired to the positive side of the A battery. The rheostat is placed in the positive side of the filament battery. This is done so that the grid has the correct charge upon it for efficient operation. In the opinion of some experimenters this does not make much difference in operation, but if meters are connected in the circuit the output of the tube is noticed to be somewhat higher if the rheostat is placed as advised here. Point 7 is connected to the plate and point 8 is hooked to one of the phone binding posts. The other post is connected to the B battery plus and both posts are shunted by a .001 fixed condenser. The minus B is connected to the positive A and that completes the wiring. This set should be wired with bus bar wire and the leads kept as short and as straight as possible. The plate wires should be kept separate from the grid wires. From the layout it will be seen that this is not a difficult thing to accomplish.

Cut out almost all the resistance in R3 and tune with the condenser C1. Then by adding or cutting out resistance in R3 regeneration and volume are readily controlled. Due to its one knob it will be found to be simple enough for the most inexperienced radio fan and will not howl. If a two-step amplifier is added to this set results will be found about equal to those of any 3-tube set.

## Parts Needed for Radio Ford

Cardboard or bakelite tube, 3 inches diameter, 5 inches long.  
 $\frac{1}{2}$  lb. No. 22 DCC wire.  
 One variable condenser, 23 plates (C1).  
 One 400-ohm rheostat (R3).  
 One grid condenser, with mounting and grid leak (R2 and C2). The author used an Amplex Grid-denser, enabling variation of the capacity.

One tube, with socket, A battery and rheostat (R1) to match.  
 One 22 $\frac{1}{2}$ -volt B battery.  
 One 7 x 10-inch panel.  
 One 7 x 10-inch cabinet.  
 One pair of headphones.  
 One .001 fixed condenser (C3).  
 Solder, lugs, binding posts, connecting wire and aerial.

# How to Construct the Ideal Loop

By Wainwright Astor

**T**HE construction of the ideal loop, which is of the box type, thus offering the greatest "front" to the incoming waves, is a simple and inviting piece of work. Fifty-five feet of wire is required, and this may be lamp-cord. If bare wire is to be used, No. 14 should be selected, and care exercised so that insulating blocks (A and B in Fig. 1) will safeguard against losses. In fact, even when lamp cord is used, these blocks may well be employed, so that they may be drilled with holes just wide enough to pass the wire through. In that way physical security is afforded for the wire.

The following is the list of parts needed:

- |   |  |
|---|--|
| One base.   | Fifty-five feet of lamp cord or of No. 14 bare wire. Lamp cord is preferred.   |
| One upright (L3) strip of bakelite or hard rubber, 30 x ½ inches. | Two cord tips, to be soldered to the terminals of the wire. Three tips are necessary if a tap is to be taken as indicated in Fig. 1. |
| Two cross arms (L1 and L2) 12 x ½ inches.                         |  |
| Four blocks, 2½ x 1½ inches, hard rubber or bakelite.             |  |

The first act in construction is to mount the hard rubber or bakelite arms as shown in Fig. 1. The constructor will decide for himself whether to use a rotating or a fixed upright. If a rotating one is used, of course the loop may be turned in the direction of the desired radiocasting station without lifting. A fixed one requires lifting the loop each time a change is made. The make-up of the base will determine whether the upright may be rotated.

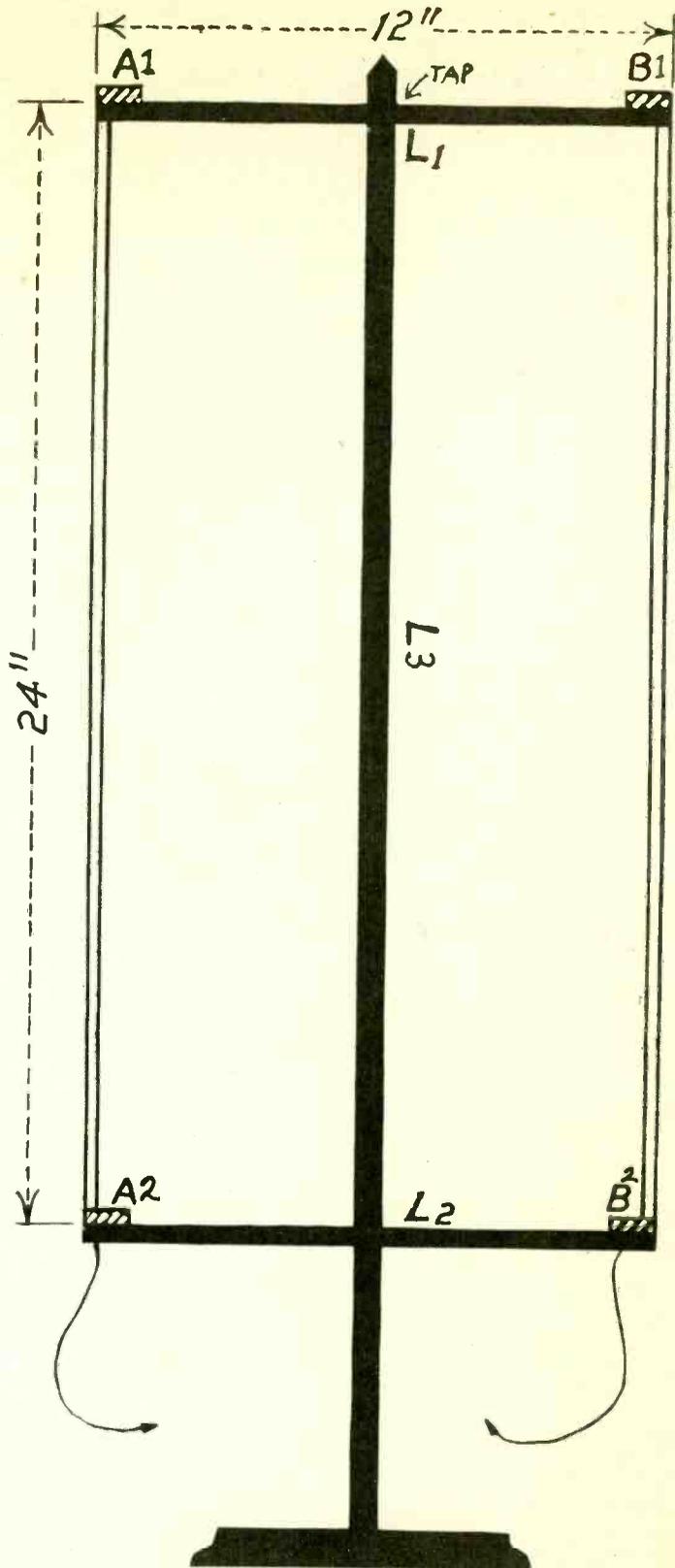
At the top of the perpendicular support (L3) ¼" or so may be permitted to stick up over the top horizontal arm L1.

The blocks A1, A2, B1 and B2 (each 2½" x 1½") are placed as shown in Fig. 1, at the ends of the horizontal arms. Fig. 2 details the drilling necessary. The blocks are laid flat on the horizontal arm, the long side of each block being at right angles to the long side of the arm on which it rests. If desired, the block may be secured to the arm by boring a hole through arm and block and using a screw and nut for fastening purposes. The protruding excess length of the screw may be removed with pliers by bending the screw back and forth. Six holes are drilled in the front of the block and five in the back, each hole being ¼" from its neighbor, the holes in back being drilled so that wire passed through them will be unobstructed by the wires passed through the front holes. This is plainly shown in Fig. 2. So, all told, there would be twenty-two turns.

In drilling the blocks leave enough room so that when mounted the holes will be entirely clear of the horizontal arm.

Now for the actual wiring. See A2 in Fig. 1. Turn the frame 90 degrees, so A2 and L2 point toward you. Pass one end of the wire through the first of the front row holes, at extreme left, that is, on the outside of the block. Leave 3' of wire slack, for connection to your set, if the loop is to be about 3' from the set. After unwinding the roll of wire you are to use, pass the other end through the first or corresponding outside hole of the top block at extreme left (A1). The wire is then threaded successively through these outside holes until the sixth turn is completed on A1 and A2, then it is threaded through the remaining holes, intended for the second tier of inductance. This second stage of the wiring will require that progression be from right to left, instead of in the opposite

(Concluded on page 14)



THE IDEAL LOOP (Fig. 1) has two cross arms, 12 x ½ inches, and an upright support 30 x ½ inches (L1, L2, L3). An upright 30 inches high leaves 6 inches under the bottom cross arm. A1, A2, B1 and B2 are blocks of hard rubber, radion or bakelite, the same thickness as found in panels, and measure 2½ x 1½ inches. These may be permitted to extend beyond the cross arms, to facilitate threading the wire through holes drilled in the blocks. Such extension is not shown in the diagram. In threading the wire the loop is turned toward you, so that A1 and A2 face you from the front and B1 and B2 are in the rear. This is a variation of 90 degrees from the position shown in the diagram. The four wires, two between A1 and A2 and two between B1 and B2, represent the two tiers, those on the inside showing the five rear turns and those on the outside the six turns. In respect to the loop as shown in the above diagram the direction of winding would be counter-clockwise. Full details regarding this winding are given in the text.

# A Portable "Super-Het" for Mid-summer

By A. P. Peck

Associate, Institute of Radio Engineers

THE day of the portable radio set is here to stay. Let me tell you a little story about one "portable" set. It was left with me and I was asked to give it a good test under working conditions. I live in New Jersey. At the time of this story I was earning my vacuum tubes and B batteries in New York City. I toted the portable set over the river and through the woods to my humble abode.

I got over the river in safety and in the walk to the train, I noticed that I seemed to be getting some new blisters on my hands which were already calloused from cranking the family flivver. When I reached my home town at every four paces the "portable" set changed hands. When I arrived at home I felt as if I had been carrying the national debt for some time. The set weighed over forty pounds and was equipped with a handle calculated to make business for the manufacturers of callous removers.

Upon opening the set I found that besides the six tubes, transformers and other usual accessories, the case contained SIX NUMBER SIX DRY CELLS. The latter alone make a good handful.

In the writer's opinion the use of such a weighty source of filament current in a portable set is unnecessary. A portable set should be so designed that you do not need an automobile to take it to where you want it. Half of the thrill of the portable set is the use of it in some spot off the beaten path that usually can be reached only by walking.

Now, let us take a glance at what I consider the best portable set. I take no credit for the design and construction. This all goes to Raoul Theiman, a New York City amateur.

The portable Super-Heterodyne is contained in a wood case built to fit. Any one with a little knowledge of woodworking can easily duplicate it. The dimensions of it are about 14 inches square by 7 inches deep. These figures will probably have to be changed to fit the panel on which you find you can mount the instruments. Space should be left in the rear of the cabinet in which the batteries are to be placed. This is shown in the photograph (Fig. 2). A panel with suitable terminals should be provided to cover this space. The terminals on this panel should match up with terminals on the main panel so that short pieces of wire may be run

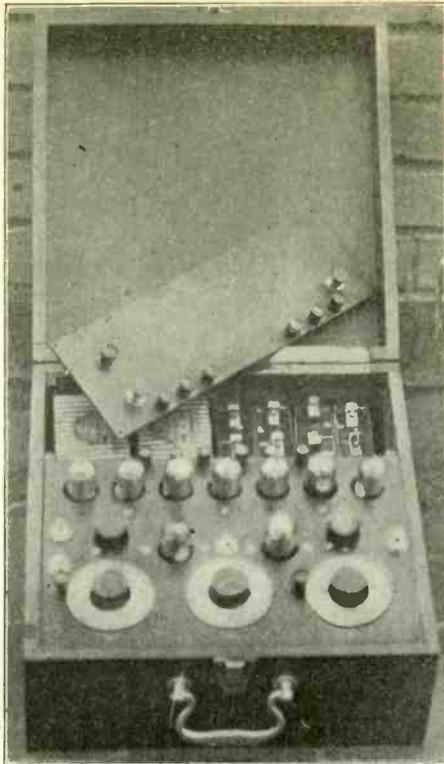


FIG. 2.—How the portable 9-tube Super-Heterodyne actually looks. Note the binding posts on the piece of insulating material used as the cover for the battery compartment. The dimensions are 14 inches square.

across to make the connections from the batteries to the set. A push-pull switch may be mounted on the battery terminal panel so that the A battery circuit may be opened when the set is not in operation. Since UV199 tubes are to be used throughout, there is no necessity of having taps on the B battery. Sixty-seven and a half or ninety volts will give very satisfactory results on the plates of all the tubes. The smallest sizes of batteries should be used so as to save space and cut down the final weight. The A battery may consist of two or three of the 3-cell units usually sold for C battery use connected in parallel. A fourth one of these batteries is employed as a C battery in the audio-frequency circuit, as shown in the diagram herewith (Fig. 1).

In the original set no loop was incorporated in the set proper, as an external folding loop was to be used and plugged into a jack provided for that purpose. Placing a loop in a set of this kind would not be a hard job, however, and if you wish to try it, you will do away with one other thing that would otherwise have to be carried separately. A good place for a loop would be in the cover of the box. The loop could be built therein permanently, or if greater flexibility is desired, a loop of the correct size to fit in the lid could be built and provided with a plug. It could then be placed in a jack which must be connected to the set. When not in use, the loop could be fastened inside of the lid, being held in place with two simple clips. In my opinion the clip method is to be preferred.

Neither did the builder of the set illustrated place a loud speaker therein. You could easily do this, however, by making the cabinet a little longer and placing a loud speaker unit and a small horn in the space so provided. The bell of the horn should be placed directly in back of a wire screen-covered hole cut in one side of the cabinet. By placing the loop and speaker as described your portable "Super-Het" would be entirely self-contained.

Holes were drilled in the side edges of the radio or intermediate frequency transformers and tapped for machine screws. The transformers were then fastened directly to the bottoms of the sockets which in turn were bolted to the panel so that the tubes could be inserted in them through holes provided. The potentiometer and the rheostat were then mounted and the filament circuits and parts of the plate circuits were wired up. The jacks were next fastened in position and connections made thereto. The other apparatus followed, the wiring being placed as each instrument was added. It was found unnecessary to mount the two fixed condensers rigidly, as they could be bridged across two connections and soldered to them. Be sure that you place the condensers across the two leads that they should be connected to. By placing them in this manner, the wires serve the double purpose of supporting the instruments and making the connections.

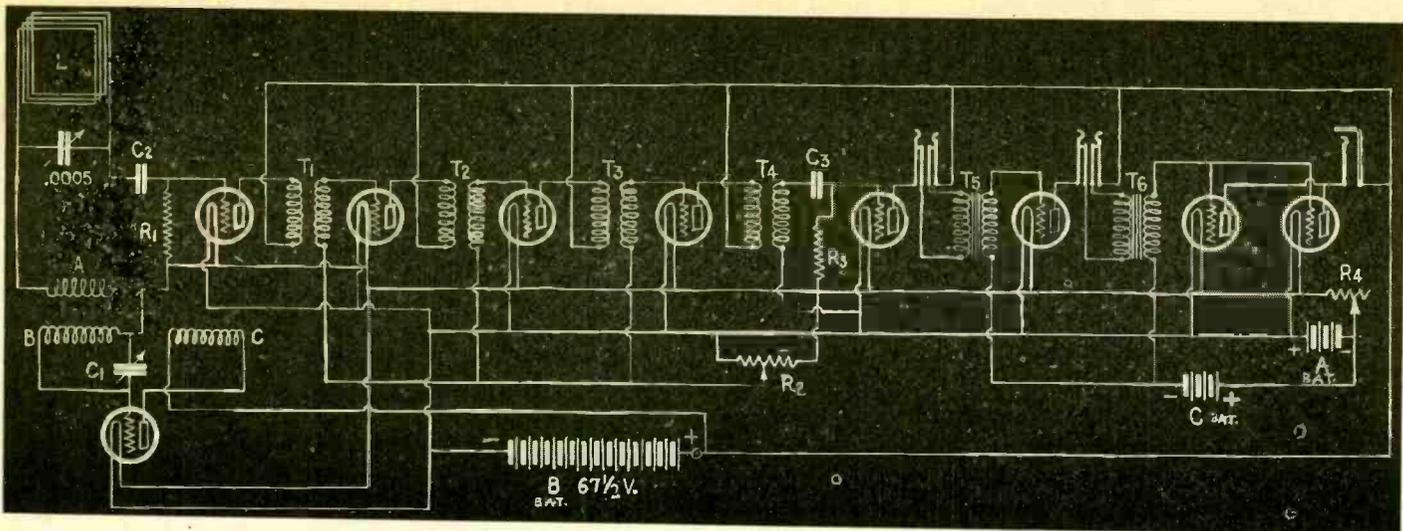
The general constants of the instruments shown in the diagram are:

T1, input transformer. (If desired or necessary a small variable condenser may be shunted across the primary coil. T2, T3 and T4, intermediate frequency transformers. T5 and T6, standard audio-frequency transformers. L, loop. A, B and C, the oscillator coupler coils. C2 and C3 have a capacity of .00025. R1 and R3, resistances of  $\frac{1}{2}$  to 3 megohms. R2, standard potentiometer. R4, rheostat.

The audio-frequency transformers were of a very small type. As they had to be placed very close to

(Concluded on next page)

# Great Volume Obtained Even on DX



A PORTABLE SUPER-HETERODYNE, using nine tubes, was built, following the above diagram (Fig. 1), and yet was a light, compact, easily portable product withal. Excellent volume was obtained, even on DX stations. UV199 tubes were used, two being hooked up in parallel in the second AF stage so that great clarity and purity would be achieved in loud speaker operation. And it was.

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each other, they were mounted so their cores ran at right angles to each other. This reduces the tendency towards squealing sometimes found in small compact sets. The other instruments, such as the variable condensers and the oscillation coupler, were of standard makes. They were mounted so that the dials controlling them were in a convenient position near the front edge of the panel.

We now come to another unique feature of the set, apart from size and weight, even though dry cell tubes are used, great volume can be obtained, even on DX stations. This is because the last two tubes are connected in parallel, so that the load is distributed and neither one of the tubes is overloaded. The method of connecting is plainly shown in the diagram. If it were possible to use storage battery tubes, it would not be necessary to resort to this use of an extra tube. However, in a portable set, it is desired to cut down weight. If you desire, there is no reason why you could not embody a push-pull amplifier in your set and so get even greater efficiency out of your nine tubes. You could also add a tenth tube without much more crowding, and thus increase your volume still more. In fact, the possibilities contained in a set of

this kind are limited only by your own ingenuity.

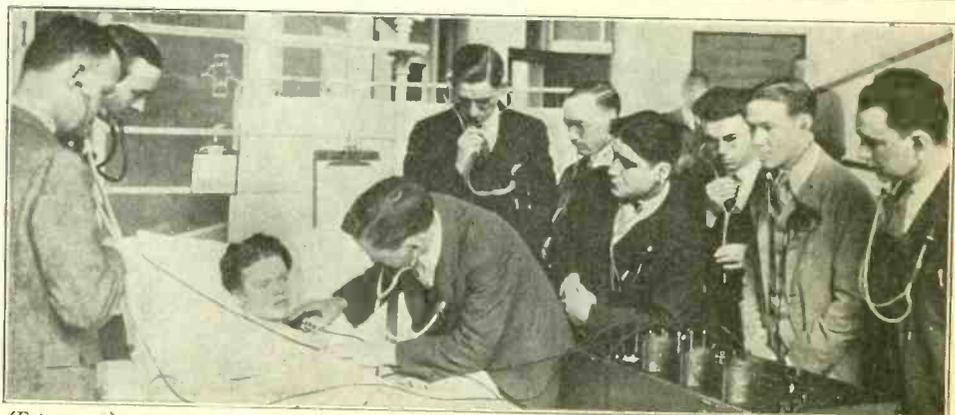
You will have to go about the building of the set as if you were designing one entirely new, because each constructor probably will purchase varying kinds of instruments. In general, I would advise you to purchase only standard apparatus of a good make. This will insure you against trouble.

Buy all of the apparatus that will be required, with the exception of the panel and case. Place all of the apparatus on a table and arrange and rearrange until you find the best and proper place for each part. In this work, bear in mind that the wiring must be kept as short as is possible.

Next figure out the size of panel that will hold it all. Mark out this size on a sheet of drawing paper and locate each and every hole that will have to be drilled. This paper may then be used as a template for drilling the panel. Before buying the panel, figure on the size of the battery space and provide for a cover for it. You had better let the building of the case go until the actual set is built and working. Then you can construct it, using half-inch material capable of taking a good finish. The lid should be provided with two or three strong hinges and a hasp or lock. A comfortable handle that will really fit the hand should also be provided.



AN INSPIRING COW MODEL—Talking over the air from WLS, the Sears-Roebuck station in Chicago, C. M. Long, addressing "the farmers of the nation," had a model of a Holstein cow before him to inspire his talk on raising and caring for cows. Also, he kept track of successive stages of his speech by keeping his eye on the model. Mr. Long found the method so good he will use it in the future. The only drawback is that after a long discourse the cow will not be able to refresh him with a glass of milk.



(Photograms)

The RADIO STETHOSCOPE has made it possible for persons ill at sea to have their cases diagnosed by doctors more than two hundred miles away. If a person is ill on a ship that has no doctor aboard, by sending out a radio call for medical aid, a nearby ship can perform the service by having their doctor diagnose the case over the radio stethoscope. The heartbeats are radiocast. The invention is the work of engineers of the Western Electric Company. This new advance opens up the possibility of doctors on different ships holding consultation on a patient's condition, although miles apart. To a doctor's ear the sound of the heart beat tells nearly everything about a person's condition. The photograph shows part of the transmitting apparatus used.

# Adding 500 Miles, Total Cost \$00.00

By Herman Bernard

**I**F you have a single-circuit regenerative set you probably do not find it very selective. Some owners of such sets, living in or near New York City, have complained recently, since WNYC, the municipal radiocasting station of New York City, went on the air, that they can not separate it and WEAF. The wavelength of WNYC is 526 meters and that of WEAF is 492 meters. Another source of complaint is that the set-owner can not get WNYC at all, because his circuit does not reach that high. The same pair of complaints, applied to other stations, are heard from all over the United States. **Yet there is no necessity, in this day and age of improved radio, for anybody having a non-selective set.** Especially may the single-circuit regenerative set be converted into a selective outfit, and the total cost is nothing! You have everything necessary right in your set this minute!

Remove your variocoupler from the set. From the beginning of the primary or stator count off ten turns. Remove an extra turn, to be used as slack for making a primary connection later. Cut the wire. Now press two holes beside this primary winding and thread the slack through the holes. These are the conventional apertures for securing the end of a winding, preventing unraveling. Now unwind another turn from the remaining part of the former primary, this, too, to be used as slack, and the end to be secured through two holes as was its predecessor. For making holes, if you haven't a sharp-pointed punch, file a wire nail or use a barely oversized drill. A pair of pliers and a good stiff darning needle often will do the trick.

With your former primary that possibly did not cover the radiocast band of wavelengths thus reduced you will begin to worry about whether you can even tune in the amateurs as they drone their proverbial "Hello, old man; hello, hello, hello." But there is no need to worry. You will find that the ten turns, which are to be used as an aperiodic primary, have the effect of raising the wavelength, when used in conjunction with the remaining stator winding—the new and tuned secondary. For instance, I used a Fada coupler, with 54 turns on the original stator, and it covered the band with a 23-plate Fett & Kimmel vernier condenser. After making provision for the 10-turn primary, and the two turns for slack, 42 turns remained. That was four turns too much. I found that out by experiment, for with the 42 turns, WEAF came in at 50, which

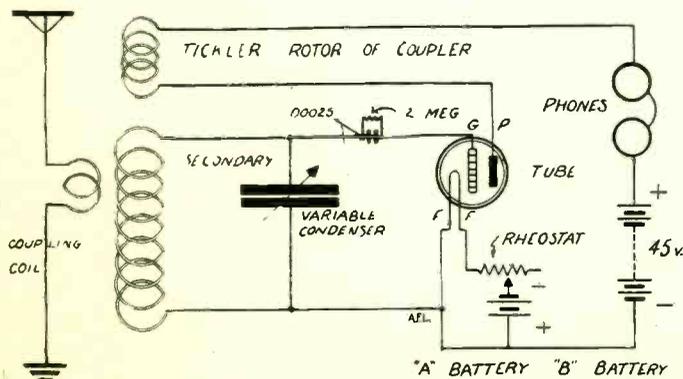
crowded me out of reception from the low-wave radiocast stations. Hence, removing the extra turns brought in WEAF at 60, and WNYC at 70, and preserved the precious low-wave competitors.

There is no difficulty in tuning out, although I live only six miles from WEAF and half a mile more from WNYC. The same set, tried out in the home of a friend living a mile and a half from these two stations, tuned them out at will. With the single-circuit arrangement, however, that could not be done, not even in my home. Also, the change helps greatly to control the operation of the set from the viewpoint of regard for the neighbors. Tuned properly—"by the voice and not by the whistle"—it does not radiate.

After you have remodeled your coupler as suggested, replace it in the set. The beginning of the primary should be connected to the aerial and the end of the primary to the ground. The beginning of the secondary goes to the grid and the end to the F+ or F-, depending on what kind of a detector tube you are using. Nearly all detector tubes require this grid return to the F+, but the UV200 is an exception. Anyway, you will know from the way you had your grid return connected before you removed the coupler just how it should be connected this time. Or perhaps you had it wrong previously, and now by experiment will determine which way is better. If you have the manufacturer's slip that came with the tube, consult that, for the manufacturer knows better than anybody else what the grid return should be. He spent many dollars finding out. This applies also to voltages for A, B and C batteries.

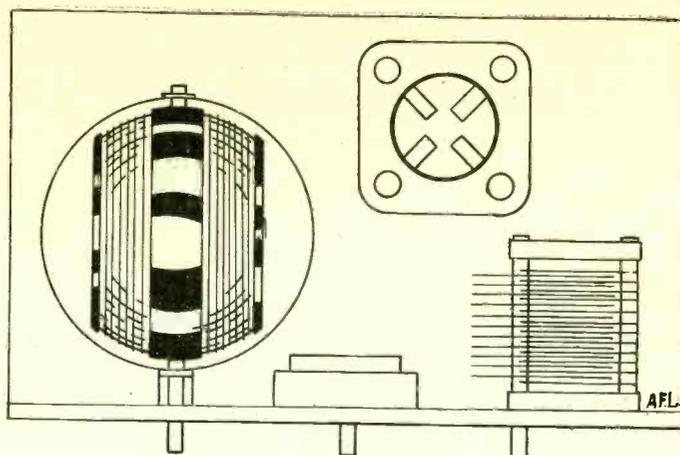
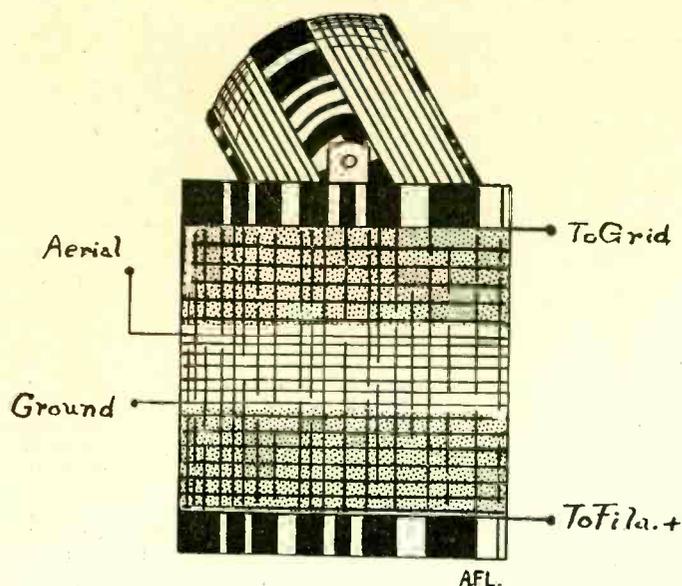
You still have some more experimenting to do, even after the grid return problem is solved. How does the wavelength condenser meet the range requirements now? Does a station on a wavelength of about 500 meters come in around 45 or 50? If so, you will have to remove some more turns from the secondary. This is an easy matter, since all you have to do is to push or pull the slack through the two apertures at the end of the new secondary winding. You should proceed cautiously, not cutting the wire until you are thoroughly satisfied that you reach the higher waves where you want them. Then do not forget that you want to bring in the low-wave stations, too. If you can get 492 meters at 60 and 526 meters at 70, but miss out entirely at 400 meters, you haven't done anything wonderful. So pick out your lowest wavelength station and see that that comes in around 5 or so. Then turn the wavelength dial and see where the high-wave stations come in. If your condenser does not enable you to bring in the stations from the lowest to the highest wavelength, then it is not of sufficiently high value, or its minimum is too far from .000025 capacity. In other words, it isn't a condenser of good quality. Moreover, if it will not cover the entire range now, it did not cover the entire range when hooked up in the single circuit. You will have to get a better condenser, **preferably of the low-loss type**, or put in a two-tap switch, so you can connect a loading coil, or shunt a fixed condenser in the aerial circuit. A 25-turn honeycomb coil will do for a loading coil. It is connected in series with the grid lead.

Probably the easiest and best remedy if your receiver does not reach the higher wavelengths is to insert a fixed condenser in the aerial circuit, one side of the condenser being connected to the ground and the other side to the aerial. This boosts the natural wavelength of the antenna, consequently the stations will come in at a lower dial reading on the wavelength



NETWORK OF THE 3-CIRCUIT TUNER (Fig. 3) shows that only two new connections are necessary for converting a single-circuit set into this. The parts needed for building the circuit are one variocoupler, one 23-plate variable condenser with vernier, one .00025 grid condenser with mounting and grid leak, one tube, one socket, one A battery, one 22½-volt B battery, one pair of earphones, one 7 x 10-inch panel, one 7 x 10-inch cabinet, 200 feet of No. 14 bare stranded wire for aerial, 50 feet No. 14 insulated wire for lead-in, two dials, if vernier condenser has dial, buy only one extra dial, bus bar, lugs, solder.

# Circuit Has Knife-like Selectivity



THE VARIOCOUPLER rotor may be divided in two parts, primary and secondary, as explained in the accompanying text, or six turns of No. 14 insulated wire may be wound over the stator winding (Fig. 1, at left). The shaded area on the coil represents the existing winding on the coupler. The light area shows where the six turns would be. They hide part of the winding on the stator. The connections are designated in the diagram. At right (Fig. 2), is a constructional layout, showing variocoupler, rheostat, socket and variable condenser. A 7 x 10-inch cabinet can contain the set if this plan is followed.

condenser, and high wavelength stations you missed will be reached. Try .001 first. The capacity represented by the difference in the dial readings must be more than made up in the antenna circuit. If necessary a switching arrangement can be installed on the panel, so the wavelength boosting condenser may be cut in or out, as desired. But if you get your highest desired wavelength somewhere around 80, you should get the low waves on the same variable condenser. If you do not, it is not the fault of radio but the fault of the set owner who is satisfied to get along with a makeshift. Such considerations as these are the ones that writers have in mind when they advise constructors to buy only good parts, the best, if possible. There is an exquisite charm about a set that functions perfectly, and the quintessence of radio can not be enjoyed without such a set. Why have anything less, when the difference in cost between the parts that accomplish it and those that make it impossible may be only \$6 or \$7 for an entire set like this one?

Some set owners already may have been experimenting with their variocouplers in another direction and may not have enough turns left on the stator even to accomplish the foregoing. For them the solution lies in winding six turns of No. 14 insulated wire on the stator, right over the existing winding, the terminals of the new wire being secured.

You will find tuning decidedly more selective on the 3-circuit set than formerly. Probably you will find a vernier necessary. As DX depends on selectivity, if you desire to hear DX stations, better provide yourself with vernier. The chances are about 100 to 1 that if you operated a single-circuit set the condenser had no vernier, for when a set tunes broad it is a joke to have a vernier condenser. It is necessary only when a set tunes so sharply that nice adjustment is vital. An extra knob, for fastening to the panel so that a rubber wheel makes contact with the dial, can be bought at small cost and gives good vernier service.

This added selectivity in the set I experimented with—comparable to that of the Super-Heterodyne—made it possible to reach out 1,000 miles, last Winter, whereas formerly the greatest distance obtainable was a little less than 500 miles. Moreover, the signals from the DX stations were satisfactory. I would not

call all the DX signals perfect. I have yet to hear all DX signals coming in consistently on a one-tube set that met all the requirements for tone quality, excepting where three controls were used. However, on the set I refer to Pittsburgh came in splendidly. Using two stages of transformer-coupled audio-frequency amplification the set worked a loud speaker to the Queen's taste. Also Chicago came in well on the speaker. Atlanta was clear, but faint.

If you have trouble getting DX or clear signals, reverse the leads to the secondary. Try reversing aerial and ground.

It must not be taken for granted, however, that the untuned primary is not tuned. Being in close coupling with the tuned secondary, the primary, by inductance, is subjected to forced tuning. The expression "untuned" has become popular because there is no wired connection between the primary and any tuning device. It would be quite a job to upset this terminology and to deviate from it might make readers wonder what you were talking about. The same situation exists as to the expression "3-circuit tuner." In the single-circuit regenerative set the plate is connected to the rotor, which functions as a tickler. The plate lead is not counted as a circuit. Just as soon as you use an—ahem!—untuned primary and tune the secondary, leaving the rotor or tickler intact, lo and behold, the plate rates a salute and you have the 3-circuit tuner.

Do not suppose, either, that the aperiodic or untuned primary is better than a directly tuned primary, which requires an extra control. A tuned primary naturally gives more volume and as great selectivity. But it invites complication and the tuning, due to the three controls if each circuit is separately tuned, is difficult. All in all, however, the circuit described herewith is entirely satisfactory and its economy and simplicity commend it to your attention.

For those who are desperately fond of DX reception I would recommend a stage of tuned radio-frequency amplification. This costs about \$10, including tube, socket, rheostat, condenser, form and wire. It should put your 3-circuit tuner in the 1,500-mile class—all signals fit for a musical ear to listen to, even those from DX stations. Moreover, a finer quality is pro-

(Concluded on page 14)

# How to Tap Loop and Insert C Battery

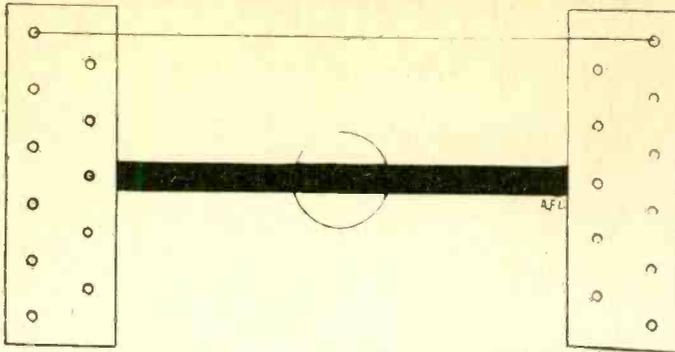


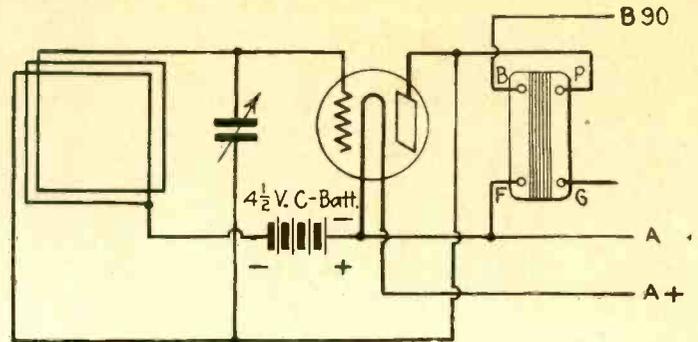
FIG. 2—How the block is made and drilled. The six holes are on the outside, the five on the inside. Between holes the space is  $\frac{1}{4}$  inch. The holes are drilled so that those in the five rear are not directly behind the six holes in the front. That affords clearance when the wire is wound on the loop.

(Concluded from page 5)

order, hence a reversal of the progression but not of the direction of the winding. That avoids a slanting lead. Now that one side of the loop is wired, the wire is simply carried horizontally across the top arm, L1, to the block B1. Turn the loop 180 degrees so that B1 faces you. The winding is now continued through the outside holes, beginning at left and B1 and progresses toward the right, successively through the front holes in B1 and B2 intended for the first tier on this side. Then, as before, the direction of progression, but not the direction of the actual turns of wire, is reversed for threading through the rear holes, so that the end of the wiring will terminate about where it began at B2.

As for provision for tapping the loop, this may be made where the wire is crossed over from the left to the right side of the loop at the top. The tap is indicated in Fig. 1. Scrape the insulation, if you use insulated wire, and solder an extra lead of 4'. Now solder tips, the same as the tips on your phone cords, to the two terminals of the loop and, if you tap the loop, solder a third tip to the end of the tap lead. Insulate the soldered connection between the tap and the loop with tape cut to  $\frac{1}{4}$ " width. If a tap is used, follow the connections in Fig. 3.

The loop is now complete. It will be found to func-



B

IF THE LOOP IS TAPPED (as described in text) the wiring connections should be made as shown herewith (Fig. 3). The outer turn of the loop is connected to the grid of the first tube, the inner turn to the plate and the center tap to the filament minus. The variable condenser shunts the grid and plate, that is, the inner and outer turns of the loop. Note how to insert a C battery, the C plus going to the A minus and the C minus to the loop. An RF transformer is at right.

tion, all in all, at least as well as any other loop, and usually better, because it is designed on the best electrical principles and catches the waves better than the diamond loop or any of the freak loops.

To point the loop, be guided by the horizontal arms. Whatever direction they point to, that is the direction from which the loop receives best. Do not point the broad side of the loop toward a station. In that way you tune the station out.

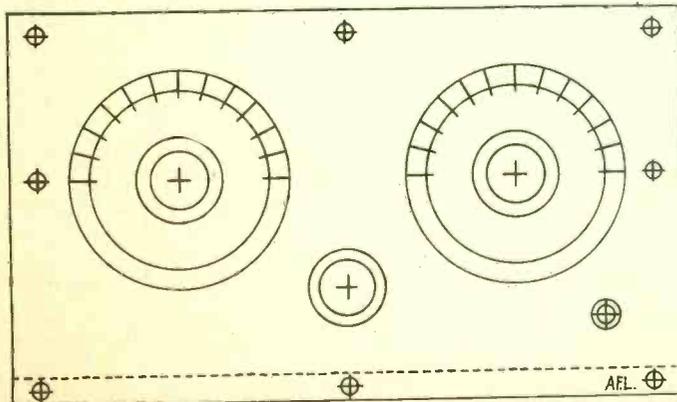
## See That Charger Matches the Current You Use

HERE are two kinds of current in many cities, direct and alternating. Direct current is usually in the business district, AC in the residential. Make sure which kind you have in your house before you buy a battery charger. A direct current charger will not work on alternating current and an alternating current charger will not work on direct current. You are likely to not only spoil the charger but the battery also, if you get these mixed up.

## RF Improves Resonance of the Set

(Concluded from preceding page)

duced on local reception, that apex of radio, actual resonance, being accomplished. The single-circuit set is no wonder at the achievement of such resonance, and while the 3-circuit tuner does it well for a one-



IF THE 3-CIRCUIT TUNER is made de novo a panel 7 x 12 inches will amply accommodate it, and even 7 x 10 inches will suffice. The panel layout (Fig. 4) shows the volume control dial at left, affecting regeneration by rotating the variocoupler rotor. In the center is the rheostat knob. The dial at right controls the wavelength by moving the plates of the condenser. This condenser bridges the F plus and the grid.

tube set that has any reaching out powers, a stage of tuned radio-frequency is really desirable. Moreover you may be in a semi-dead spot as to certain stations, getting their signals faintly, if at all, and only after an ordeal of tuning. These stations are on the regular visiting list when you add RF. Moreover, of all the circuits that have been devised so far, not one lends itself more readily to adding RF than does the 3-circuit tuner. Get a 3" diameter form, 5" long, wind 20 turns of No. 24 double cotton covered wire for the primary, terminate, leave  $\frac{1}{4}$ " space, then wind 60 turns for the secondary. Connect the aerial to the beginning of the primary and the ground to the end—just as you did on the primary of the coupler in your tuner. The beginning of the secondary goes to the grid of the first tube, the end goes to the filament (the grid return). The plate goes to the beginning of the primary of the variocoupler and the end of variocoupler is connected to the B+90 volts. In other words, the plate of the first tube replaces the aerial and the B+90 volts replaces the ground on the variocoupler primary. Therefore if the RF stage were built in a separate cabinet, 5" x 7", the connections to the tuner could be made in three or four minutes.

# A Low-Loss Tuning Coil

By Byrt C. Caldwell

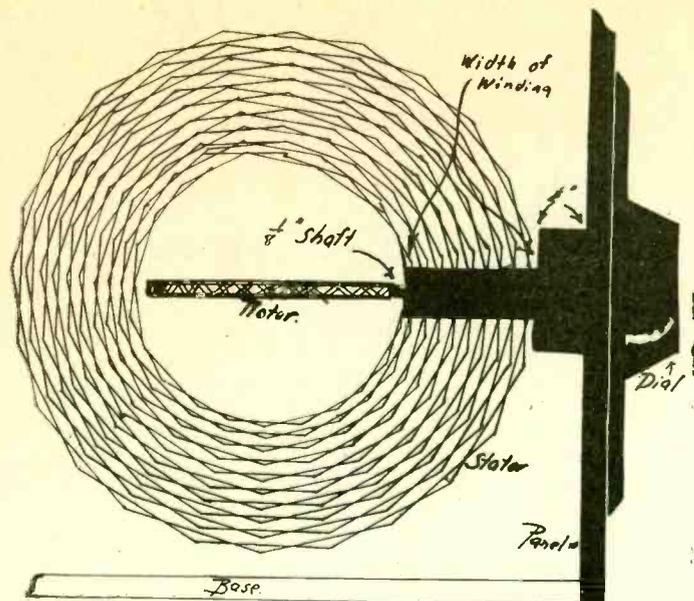


FIG. 1—Side view of Byrt C. Caldwell's low-loss coupler, showing position of the windings and shaft. The rotor, shown edgewise, just clears the fixed primary winding. Care should be taken to wind the secondary just small enough to pass the primary winding without touching. It is essential that the latter be held firmly.

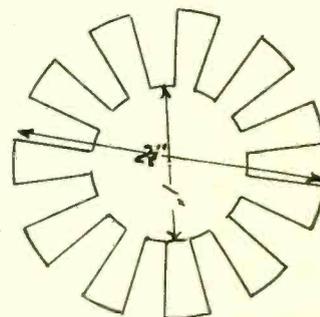
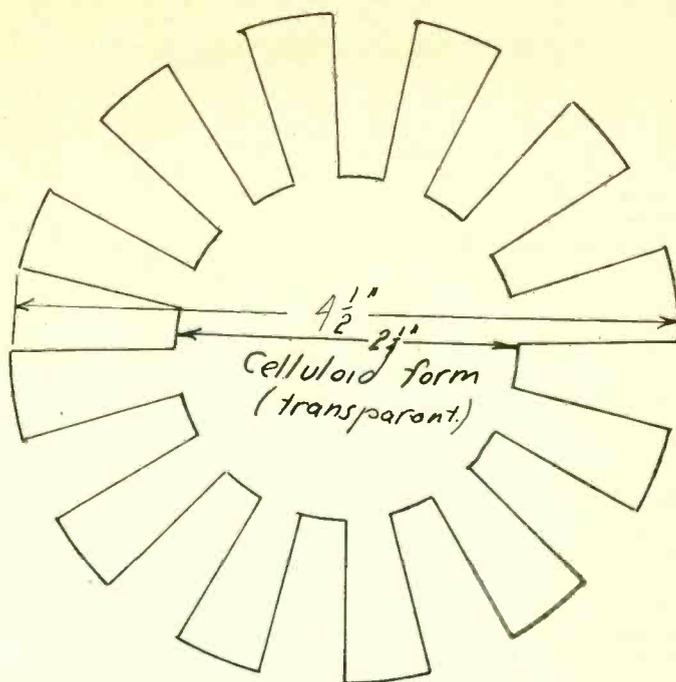


FIG. 2—Top shows the spider web form for stator, with cutting dimensions. After the wire is wound with the desired number of turns the whole is dipped into a basin of ether or amyl acetate to dissolve the celluloid. The same is done with the secondary form (rotor, at bottom) and the result is two self-supporting windings with extremely low loss. Do not place the whole coil in the solvent as the winding would become loose. The upper form for the primary winding is shown to have an even number of arms, but all standard spider-web forms have an uneven number, which is correct.

At present the manufacturers are putting out many different styles of low-loss variable condensers. To a degree they are also improving their couplers and coils so that losses are being reduced. However, there is as large a field for improvement here as there was for the improvement of the variable condensers. Thousands and thousands of beautiful glossy variometers and varicouplers are in use. But if we could in some way remove the entire bakelite support, so that there was no insulation at all, which would of course be mechanically impossible, we would have a coupler with several times the efficiency of the first. And if we left out the taps on the variocoupler, we would have another gain in efficiency. There are several instruments on the market at the present time which use bakelite as insulation, so moulded that the wire is supported on ridges. This is an improvement.

Obviously, it would be impossible to make variometers and variocouplers of the present style without a considerable amount of insulation. However, if honeycomb coils, or spider web coils are used, the supports may be made of an almost negligible amount of insulation, and due to this fact, and due also to the efficiency of these particular forms of winding, an extremely efficient tuner may be made. There are several good models on the market.

The present article describes the construction of a very good variocoupler which may be used in most of the circuits which we have today, including the reflex and the Superdyne.

The windings are made as follows: Two forms are cut out of sheet celluloid (not colored). They are made to the dimensions shown in the diagrams.

For average use, about 50 to 60 turns of No. 26 DSC wire should be wound on the large form, and 40 to 50 turns of No. 28 DSC wire should be wound on the small form. No exact number of turns need be given, as requirements differ. However, if it is being made

for substitution for another coupler, it should be so wound that it contains about the same, or a slightly shorter length of wire.

When winding a coil requiring a comparatively small number of turns, wind on every spoke. When the number of turns is large, so that they would not fit on the form, skip every other spoke, or every two out of three, or use smaller wire.

Taps may be taken off the large coil if desired, but it is best to leave taps strictly out of the circuit. They are not needed to cover the broadcast band of wavelengths. For the Superdyne coupler, half of the wire is wound on the large coil, and then, without breaking the wire, four or five turns of wire are wound for the primary, and then the secondary is finished. When the coils are wound, and the ends are fixed, the forms are removed. This must be done with ether or amyl acetate. Dip one part of the coil at a time into a dish of ether or amyl acetate, and in a few seconds the celluloid will dissolve. Take the celluloid out of the ether before too much is dissolved. That which is left will

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# An Auxiliary Terminal Strip

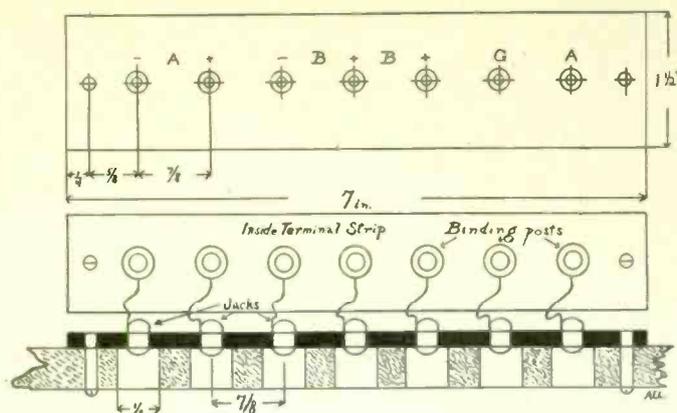


FIG. 1, top, shows how the new auxiliary terminal strip should be drilled. Bottom diagram (Fig. 2) shows how the leads are connected from the existing inside strip to the new one (black).

By Lieut. Peter V. O'Rourke

**M**ANY a short-circuit is caused by an experimenter when he tries to change connections to the terminal strip in the back of his set. Thus do tubes die an untimely death. Also considerable exasperation is caused by the difficulty of performing even minor operations in the cramped space, though no tube comes to its expensive end. Therefore it is decidedly advantageous to have some convenient and simple device that will enable one to change connections to the set at will and do it safely in a few seconds.

A good way to proceed is to leave your terminal strip just where it is and instead of making connections direct from the binding posts of the old strip to the antenna, ground, A-, A+, B-, B+ detector and B+ amplifier, to carry them to another terminal strip, placed against the back of the cabinet, on the inside.

Either buy such a strip already marked and drilled, or you can make one yourself. It consists of a strip of hard rubber, about  $1\frac{1}{2}$ " wide and 7" long. Do not buy binding posts to go with it as the present system contemplates the use of phone tip jacks instead. These jacks can be bought for a few cents a pair. Get the longest ones possible. The jacks accommodate phone tips, securing them, when inserted in the jacks, by a spring contact. Of course, in this case the tips, though they are exactly the same as those at the ends of telephone cords, will be instead at the end of the aerial, ground, etc. The ends of the leads—antenna, ground, etc.—are soldered into the tips, so that the connections from the leads to the set itself can be made simply by inserting the tips in the jacks.

To make this a neat job, bore holes in the strip just large enough to permit the front of the jacks to pass through. The jacks are secured to the strip by screws that come with them. Usually this will require  $\frac{1}{4}$ -inch holes being drilled in the strip. Therefore you may find that if you have bought a ready-made strip the holes therein may not be large enough, but this is easily remedied by redrilling with the correct size drill at the points already drilled.

Place the strip, already correctly drilled, against the back of the panel. If the placement is made on the outside the work will be made more convenient. Now mark on the cabinet the exact center points of the drill holes in the strip. Look over your drill bits and pick out the one that bores a hole just a trifle larger than that necessary to clear the bushing of the jack. If your variety of drills isn't very large, use  $\frac{1}{2}$ ". It is important that the tips be able to pass through the drill holes in the

cabinet without touching the wood, as otherwise a cause of severe losses may be introduced, and that would certainly nullify the advantages sought to be gained.

At the extreme ends of the strip, and at the corresponding places on the cabinet, drill holes to accommodate screws to be used in fastening the strip to the back of the cabinet. Fancy hard rubber or composition circlets may be bought at a hardwood or department store. They may be cemented in the holes or directly on the back of the panel (outside), to improve appearance. But be careful that they are thin, if they are to be cemented directly against the back of the panel. If they are deep, the bushing end must fit in the holes you have drilled in the cabinet, otherwise the tips may not prove long enough to make the connections desired.

Now permanently mount the jacks on the hard rubber strip, screw the strip to the panel, and solder the connections from the old strip to the prongs on the jacks used in the new one.

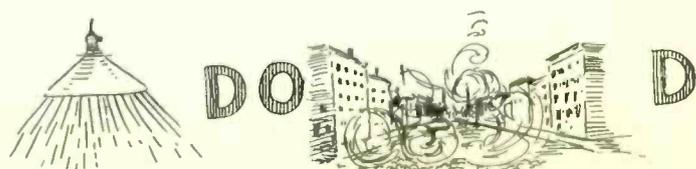
The question will arise as to the removability of the set itself from the cabinet, with the new device introduced. If the usual type of binding post is used on the old terminal strip the connections should be made with lugs, against which the caps of the binding posts are securely screwed. To the lugs are soldered the leads which go to the prongs of the jacks used on the new strip. Thus on those occasions when the set must be taken out of the cabinet the caps will be screwed off and the set removed. If the caps on the old strip are of the kind that can not come off, then the connections would have to be made with flexible wire, such as annunciator wire, looped around the screw of the binding post on the old strip. This is a departure from the honored rule about soldering all connections, but the object of soldering is to assure well-made connections, and the loop system accomplishes this, too, if properly done.

The chief objects of using the additional strip as suggested herewith is to render connections easily changeable, and permit of disconnections without having wires dangling around where they might cause trouble. Thus, the operations are simplified, because plugging in is all that is necessary. That explains how adding something to something else simplifies the something else, instead of complicating it.

## The Weekly Rebus

**R**ADIO fans are known for their cleverness. RADIO WORLD knows how clever they are. The ingenious devices and adaptation contained in the mail sent to the editor by readers of RADIO WORLD leave no doubt about it. Even if you can not read a diagram you should be able to read this rebus. Study the picture carefully and see if you cannot tell what piece of radio apparatus it represents.

After you have decided, send your answer to Rebus Editor, RADIO WORLD, 1493 Broadway, New York City. Mention Rebus No. 11. Be sure to give your full name and address. The names of all those sending in the correct answer will be published in RADIO WORLD.



REBUS NO. 11 represents the name of a publication.

# A Tube-and-Crystal Quality Set

By Neal Fitzalan

**H**ERE is an efficient receiver that gives wonderful quality.

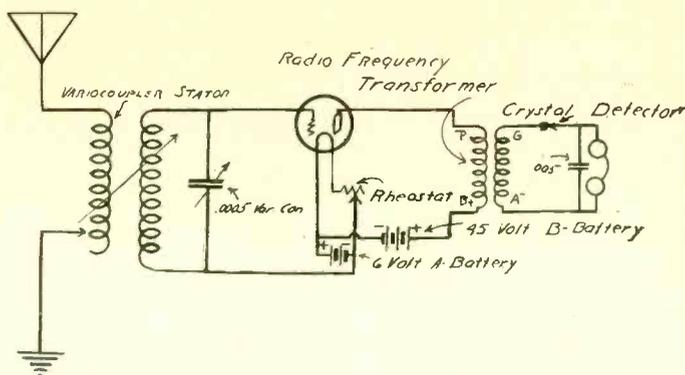
The apparatus required follows: crystal detector, radio-frequency transformer, variocoupler, variable condenser, fixed condenser, tube, socket, batteries. The crystal detector may be fixed or of the catwhisker type. The fixed kind requires no attention.

Fasten the radio-frequency transformer to the base, directly in back of the first socket, and about as close as possible. Connect the fixed detector to the G binding post of the transformer.

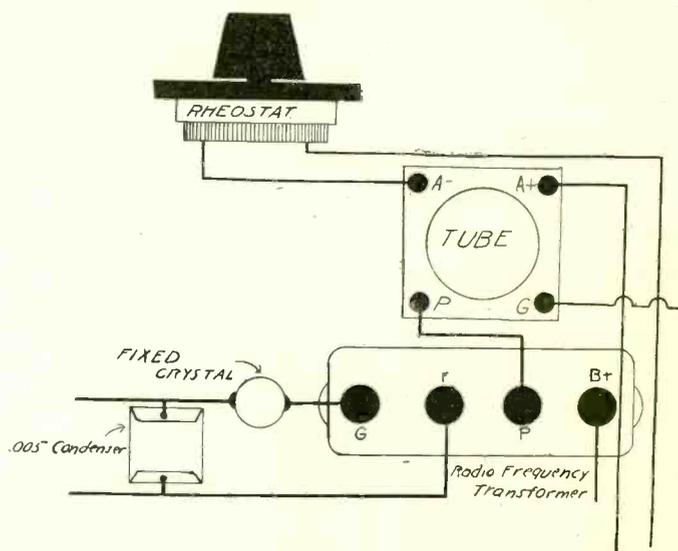
The rheostat is connected in the negative lead. No grid leak or condenser is used.

Connect the P of the tube socket to the P binding post of the transformer. Connect the B of the transformer to the B positive binding post. Connect the crystal detector to one side of the jack and the F of the transformer to the other side. Now solder the .005 fixed condenser to these two last wires as shown or better still, connect it directly across the jack, so that it may be left in position.

The action of this circuit, briefly, is as follows: The rotor or secondary of the transformer is tuned to the frequency of the incoming waves, by means of the variable condenser, and by means of varying the coupling between the primary and the rotor itself. The one signal which has in this way been selected is impressed on the grid of the tube. The grid acts like the trigger of a gun, and frees a current from the B battery, which is exactly the same as that impressed on the grid, except that it is much more powerful. This current flows through the primary of the radio frequency transformer. The voltage of the current is here stepped up again. Up to this point the current has been of radio or super-audible frequency. It now passes through the crystal, where it is rectified, so as to be of audible frequency. It is now passed through the phones, where it actuates the diaphragm of the receiver and makes a sound. This is the simplest possible action in any tube circuit, as here the tube acts merely as an amplifier, and the detection action is separated from it.



THE QUALITY of reception obtained from this circuit is excellent (Fig. 1). The stator of the variocoupler is connected to aerial and ground. A tap switch in the ground lead is necessary only if unusual conditions of interference exist. The variable condenser is .0005. The radio-frequency transformer may be of any good commercial make, so long as it covers the broadcast wavelength band. A transformer may be made by the constructor by winding 20 turns for the primary (P and B plus) and 60 turns for the secondary (G and A minus). The wire should be No. 24 single cotton covered, the two windings separated one-quarter of an inch. A tube requiring 6 volts of A battery is preferred, though others will work especially UV199 or equal.



CONSTRUCTIONAL arrangement for the one-tube-and-crystal quality set. (Fig. 2).

## Why You Use a Grid Leak and Condenser

**T**HE filament of a tube should not be burned at maximum brilliancy. It is the function of the filament to emit electrons when it is heated by current from the A battery. The more current turned on, the brighter the filament glows and the electron flow increases up to a certain point, and then no matter how much current is supplied there will be no further flow of electrons. This is known as the critical or saturation point. When the filament is burned brighter than the critical point the tube's life is shortened and the efficiency of the set is reduced. To burn the filament past the critical point merely reduces the life of the tube, decreases the efficiency of the set and consumes current from the A battery more rapidly. Burn the vacuum tubes just below the point of howling.

When the filament is heated it emits electrons or tiny particles of negative electricity. The electrons are attracted to the positively charged plate because unlike particles of electricity attract each other. When the

current on the grid is positive it aids the passage of electrons from the filament to the plate, but when it is negative it resists their passage. Like particles repel each other, and because the grid is negative and the electrons negative the flow stops. During the operation of the tube an excessive negative charge is likely to collect on the grid, which blocks up the operation of the tube. In order to prevent this a grid leak is used to provide a path for the excessive negative electricity to leak off the grid automatically. The grid circuit is usually completed at the positive side of the filament or A battery, so that the positive potential at the other side of the circuit attracts the negative charge off the grid through the grid leak. This is known as the grid return. The grid condenser is used across the grid leak to furnish a path for the incoming high-frequency currents across the high resistance of the grid leak. Otherwise you might not hear any signals.

# The Selectocoil Makes Any Set Tune Sharply and Adds to DX Record

**C**OIL Developed by RADIO WORLD can be made in fifteen minutes and costs not more than \$1.50 when very best material is used.

**I**NTERFERENCE by spark or conflict of stations eliminated by two inductances—Locals only fifteen meters apart easily separated.

By N. N. Bernstein

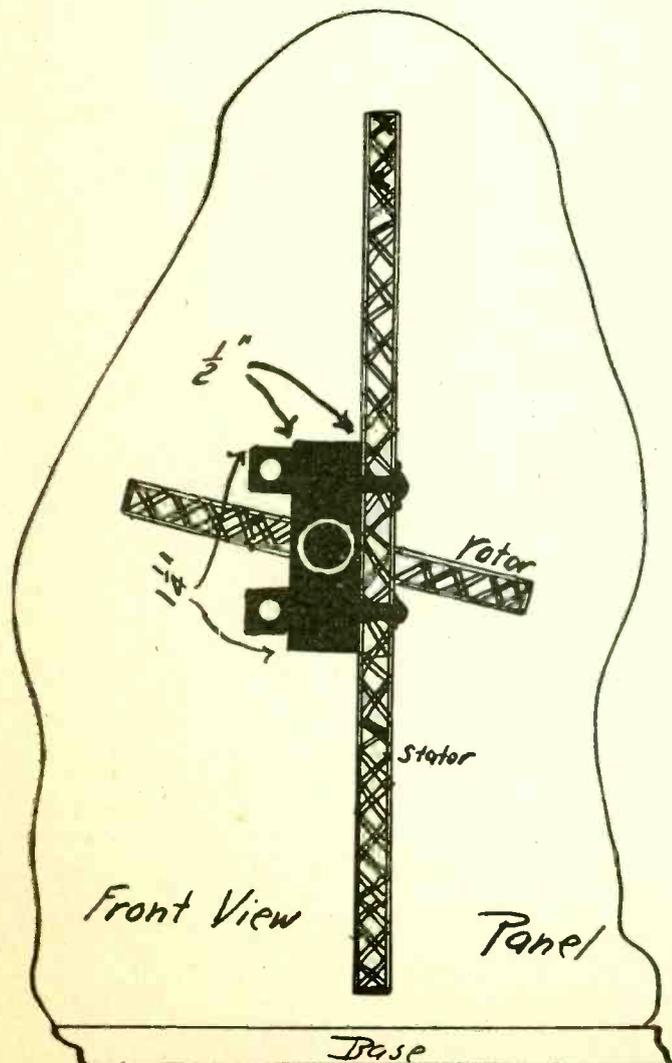
Technical Editor

**M**ANY complaints are voiced by set owners that they can not separate stations whose wavelengths are close together. However, they need worry no longer. Here is the solution—the Selectocoil, consists of two inductances. It can be made in fifteen minutes and costs not more than \$1.50, even when the best material is used. It dispenses with the costly idea of providing extra tubes to gain

## A Low-Loss Coupler

(Concluded from page 11)

just be enough to hold the coil together with desirable rigidity and afford permanency.



IF YOU could look through the panel this is what you would see when the low-loss coil is mounted.

the much-needed selectivity and may be used on any set, crystal or tube, reflex or anything else. The Selectocoil was developed by RADIO WORLD after considerable experimenting with different numbers of turns and sizes of wire, hence the constructor is admonished to follow directions faithfully.

Procure a bakelite tube 3" in diameter by 3" long. On this wind 50 turns of No. 22 double cotton covered wire, leaving 5" or 6" slack at beginning and end for connections. Directly on top of this winding place 15 turns of No. 18 flexible stranded rubber-covered fixture wire, leaving a few inches for connections. If desired, four small Fahnestock clips may be fastened, two at each edge of the coil, and the primary and secondary leads soldered thereto. Both coils are wound in the same direction, with no insulation separating them, other than the covering of the wire itself.

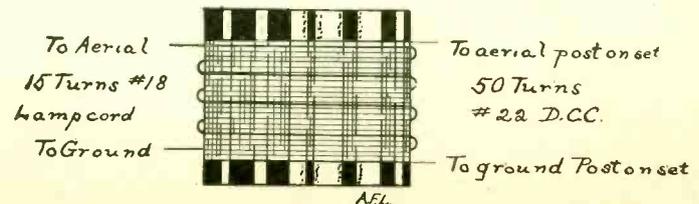
The antenna and ground are connected to the primary winding (the 15 turns), and the A and G posts on the receiver are connected to the secondary. The tuning of the set will be slightly changed, the dial readings being lower. The set will be sharp enough to separate local stations fifteen meters apart.

The large size wire on the primary winding provides a very low resistance path from antenna to ground, and there is a negligible loss in signal current from the primary of the Selectocoil to the tuner.

The Selectocoil may be placed inside the cabinet of your set, but be sure that it is not too close to your tuning inductance. This you can determine by experiment. However, it is not necessary to place the Selectocoil in the set. It may be put in a tiny cabinet by itself or may be placed "as is" on top of or behind the set. In fact, it worked splendidly when placed at the window where the lead-in enters, the connections to the primary being made and the leads from the secondary brought to the A and G posts of the set instead of the aerial and ground wires.

As DX depends on selectivity, the use of this coil will enhance the reaching-out powers of your set.

You will have to experiment with the effect of the Selectocoil on raising the wavelength. The dial settings on the condenser will read lower than at present. To avoid crowding out the low-wave radiocast stations, if that difficulty arises, remove four or five turns from your tuning inductance in your set, or use a lower capacity condenser, if you tune with a condenser. However, you may not have any such difficulty.



THE SELECTOCOIL consists of a 50-turn secondary, over which is wound a 15-turn primary. The aerial and ground are connected to the primary. The secondary leads go to the A and G posts of the set. The Selectocoil boosts the natural wavelength of the antenna.

# RADIOCAST PROGRAMS

Thursday, July 31

**WFBH, New York, 273m (1100k), E. S. D. S. T.**  
—New Hotel Majestic station, operating temporarily on the above call letters. Regular call letters will be assigned in the near future. 2 P. M., musical concert and artist performers until 8 P. M., daily. 11:30 P. M. to 2 A. M., three nights a week. All programs will consist chiefly of musical entertainment. Advance programs are being arranged, and will soon be published in RADIO WORLD.

**WNYC, New York, 526m (570k), E. S. D. S. T.**  
7:30 P. M., police reports and alarms. 8:30 P. M., musical program composed of band selections and vocal and instrumental numbers by artists. 10:30 P. M., police alarms.

**WLAG, Minneapolis, 417m (720k), C. S. T.**  
10:45 A. M., household hints. 2:10 P. M., women's hour, "French Cookery," Bernice Bell. 2:40 P. M., matinee program. 4 P. M., magazine reading. 6 P. M., baseball scores and dinner hour concert by Geo. Osborn's Nicollet Hotel orchestra. 7:30 P. M., farm lectures.

**WHAS, Louisville, Ky., 400m (750k), C. S. T.**  
4:50 P. M., local livestock, produce and grain market reports. 4:55 P. M., baseball scores. 5 P. M., Central Standard time announced. 7:30-9 P. M., concert under direction of Miss Mary Hunt, Louisville Conservatory of Music; four-minute digest of international Sunday school lesson; four-minute child welfare talk; late news bulletins; baseball scores; Central Standard time announced at 9 o'clock.

**KGO, Oakland, Cal., 312m (960k), P. T.**—4-5:30 P. M., concert orchestra of the Hotel St. Francis. 6:54 P. M., stock exchange and weather reports, and news items. 8 P. M., three-act drama, "The Great Divide," presented by KGO Players under direction of Wilda Wilson Church; music by Towler trio.

**WWJ, Detroit, 517m (580k), E. S. T.**—12 Noon, Detroit News orchestra. 3 P. M., concert by Schmemman's concert band. 3:50 P. M., weather forecast. 3:55 P. M., market reports and baseball scores. 5 P. M., baseball scores. 8:30 P. M., concert by Schmemman's concert band. 9:30 P. M., Detroit News orchestra. 10 P. M., dance music by Jean Goldkette's orchestra. 11 P. M., Detroit News orchestra.

**CKAC, Montreal, 425m (710k), C. S. T.**—4 P. M., weather, stock, news. 9 P. M., special entertainment.

**WOAW, Omaha, Neb., 526m (570k), C. S. T.**  
6 P. M., popular half hour. 6:30 P. M., dinner program by Yost's orchestra. 9 P. M., program arranged by Mrs. A. S. Harrington, Council Bluffs.

**WOO, Philadelphia, 509m (590k), E. S. D. S. T.**  
11 A. M., grand organ. 11:30 A. M., weather forecast. 12 Noon, luncheon music by the Tea Room orchestra. 12:35 P. M., Naval Observatory time signal. 4:45 P. M., grand organ and trumpets. 7:30 P. M., sports results and police reports.

**WMAQ, Chicago, 447m (670k), C. S. D. S. T.**  
4 P. M., sports results. 6 P. M., Chicago Theatre organ recital. 6:30 Hotel LaSalle orchestra. 8 P. M., weekly talk by Rockwell R. Stephens, auto editor of The Daily News. 8:15 P. M., weekly talk for Boy Scouts. 8:45 P. M., weekly invest-

Friday, August 1

**WNYC, New York, 526m (570k), E. S. D. S. T.**  
7:30 P. M., police reports and alarms. 8:30 P. M., musical program composed of band selections and vocal and instrumental numbers by artists. 10:30 P. M., police alarms.

**WJZ, New York, 455m (660k), E. S. D. S. T.**  
4:30 P. M., Hotel Astor organ recital. 5:30 P. M., State and Federal agricultural reports; Farm and Home reports; closing quotations New York Stock Exchange; foreign exchange quotations; Evening Post news. 7 P. M., Ernie Golden's McAlpin Roof orchestra. 7:20 P. M., financial developments of the day. 8:15 P. M., "Humor," by Tom Masson. 8:30 P. M., New York Philharmonic orchestra. 10:15 P. M., time pop question game. 10:30 P. M., Harold Stern's Belleclair Towers orchestra.

**WJY, New York, 405m (740k), E. S. D. S. T.**  
7:30 P. M., Leonard Nelson's Knickerbocker Grill orchestra. 8:15 P. M., "The Supreme Court and Constitutional Government," Prof. Swenson of New York University.

**WDAR, Philadelphia, 395m (760k), E. S. D. S. T.**  
—2 P. M., Arcadia Cafe concert orchestra; artist recital. 4:30 P. M., dance program given. 5:45 P. M., baseball scores. 7:30 P. M., Dream Daddy with the boys and girls; Stanley features. 8 P. M., book review by Arnold Abbott; artist recital. 8:15 P. M., dance music from Young's Million Dollar Pier, Atlantic City. 8:30 P. M., world famous Emmett Welch minstrels, direct from summer home, Million Dollar Pier. 9:15 P. M., Benson Chicago orchestra, playing at the Million Dollar Pier ball room. 9:30 P. M., Charley Fry and his Million Dollar Pier orchestra. 10 P. M., Arcadia Cafe concert orchestra; Benson Chicago orchestra; Charley Fry and his Million Dollar Pier orchestra; recital of theatrical and star entertainers.

**WEAF, New York, 492m (610k), E. S. D. S. T.**  
11 to 12 A. M., musical program nad talks; market and weather reports. 4 to 5 P. M., Dorothy Jung, soprano; Harry Olsen, banjo player; children's hour. 6 to 10 P. M., dinner music from the Rose Room of the Hotel Waldorf-Astoria; Moses Levine, violinist; B. Fischer and company's "Astor Coffee" orchestra.

**WIP, Philadelphia, 509m (590k), E. S. D. S. T.**  
3:05 P. M., visiting artists and chats with celebrities, direct from the WIP control station on the Steel Pier, Atlantic City. 3:30 P. M., concert by Comfort's Philharmonic orchestra; soloists, Miss Ednah Cook Smith, contralto; Mr. F. Niccoletta, harpist. 6 P. M., weather forecast. 6:05 P. M., dinner music by Eddie Elkins' orchestra from the El Kadia Gardens. 6:45 P. M., Agriculture livestock and produce market reports. 7 P. M., Uncle Wip's bedtime stories and roll call for the children.

**WRC, Washington, 469m (640k), E. S. T.**  
3 P. M., fashion developments of the moment, prepared by "Women's Wear." 3:10 P. M., song recital by Arthur McCormick, baritone. 3:20 P. M., "Beauty and Personality," by Elsie Pierce. 3:25 P. M., current topics, editor of "The Review of Reviews." 3:35 P. M., piano recital by Ethel Grant. 3:50 P. M., Magazine of Wall Street. 4 P. M., song recital announced. 5:15 P. M., time signals and weather forecasts. 6 P. M., stories and songs for children by Peggy Albion and Mary Frances Glenn.

**WNAC, Boston, 278m (1080k), E. S. D. S. T.**  
10:30 A. M., WNAC women's club talk. 1 P. M., Shepard Colonial orchestra. 4 P. M., Shepard Colonial orchestra. 6 P. M., children's half-hour. 6:30 P. M., WNAC dinner dance, broadcast from Checker Inn. 8 P. M., program announced. 11:30 P. M., principals from Marjorie in a radio entertainment.

**CKAC, Montreal, 430m (700k), E. S. T.**—1:45 P. M., Mount Royal Hotel luncheon concert. 4 P. M., weather, stock reports, news.

**WOS, Jefferson City, Mo., 441m (580k), C. S. T.**  
—8 P. M., address, "The History of Shorthorn Cattle," by John Ashton, Missouri State Board of Agriculture. 8:20 P. M., address by George A. Pickens, General Secretary, Greater Missouri Association. 8:30 P. M., musical program by members of the Greenridge Baptist Church of Olean, Missouri; W. A. Bruce, pastor.

**KFI, San Francisco, 469m (640k), P. T.**—5 P. M., Evening Herald news bulletins. 5:30 P. M., Examiner news bulletins. 6:45 P. M., Aeolian organ recital. 8 P. M., Evening Herald-Carl Edward Hatch concert. 9 P. M., Examiner-Grace Eaton Dow concert. 10 P. M., pupils of Myra Belle Vickers in vocal recital. 11 P. M., Ambassador Hotel Cocoon Grove orchestra.

**WGI, Medford, Mass., 360m (830k), E. S. D. S. T.**  
—7:15 P. M., closing stock market reports; code practice; Boston police reports. 7:30 P. M., evening program, selected verses by Mr. Charles L. H. Wagner, radio poet. 7:45 P. M., musicale by the Avalon Serenaders.

**KHJ, Los Angeles, 395m (760k), P. T.**—12:30 P. M., program presenting C. J. Frank, baritone. 2:30 P. M., Hollywood Bowl program by Mrs. J. J. Carter; Bess Daniels, pianist. 6 P. M., Art Hickman's concert orchestra from Biltmore Hotel. 6:45 P. M., children's program presenting Prof. Walter Sylvester Hertzog; weekly visit of Richard Headrick, screen juvenile; bedtime story by Uncle John. 8 P. M., program, courtesy Hellman Commercial Trust and Savings Bank, arranged by A. K. Berkland. 10 P. M., Charlie Wellman, tenor, and Bill Hatch, pianist, "Music Makers."

**WHN, New York, 360m (830k), E. S. D. S. T.**  
3:45 P. M., Uncle Robert's chat with children. 4 P. M., Samuel Shankman, pianist; Joseffy Dispile. 4:15 P. M., vocal duets by Hermina West, soprano; Bertha Lansing Rodgers, contralto. 4:30 P. M., Jascha Bunchuk, concert cellist. 4:45 P. M., musical program announced. 6 to 7 P. M., Around the Alamac's Festive Board: overture by Olcott Vail's trio; jests by Toastmaster; talks and songs by renowned folk; dance music by Paul Specht's Alamac orchestra. 7 P. M., sport period by Thornton Fisher. 9:30 P. M., Charles Strickland's Palisades Park orchestra. 10 P. M., William B. Mahoney, baritone. 10:15 P. M., baseball statistics by Al. Munroe Elias. 10:30 P. M., Fletcher Henderson's Roseland orchestra. 11 P. M., Ross Fowler, baritone. 11:30 P. M., Club Alabama revue.

**WGR, Buffalo, N. Y., 319m (950k), E. S. D. S. T.**  
—6:30 P. M., dinner music, Vincent Lopez Hotel Statler dance orchestra. 7:30 P. M., digest of the day's news; baseball scores; Buffalo livestock market report. 9 to 11 P. M., musical program by Mr. J. P. Quinn. 11 P. M., supper music, Vincent Lopez Hotel Statler dance orchestra. 11:45 P. M., weather forecast.

**KDKA, Pittsburgh, 326m (920k), E. S. D. S. T.**  
—5 P. M., baseball scores. 5:30 P. M., organ recital by Paul Fleeger, from Cameo Motion Picture Theatre, Pittsburgh. 6 P. M., baseball scores. 6:30 P. M., the children's period, Uncle

Wiggeley. 6:45 P. M., news bulletins. 7 P. M., baseball scores. 7:40 P. M., Stockman market report. 8 P. M., concert by South Avenue Church mixed quartet; Corrine G. Bell, pianist and accompanist. 9:55 P. M., time signals; weather forecast; baseball scores.

**WBZ, Springfield, Mass., 337m (890k), E. S. T.**  
—12:55 P. M., time signals; weather reports. 6 P. M., dinner concert by the WBZ trio. 7 P. M., results of games, Eastern, American and National leagues. 7:05 P. M., "The Care of Carburetor," by E. B. Atmus, auspices Automobile Club of Springfield; current book review by Court Square Book Store. 7:30 P. M., bedtime story for the kiddies. 10 P. M., to be announced. 10:55 P. M., time signals; weather reports. 11 P. M., concert by WBZ trio; D. Gordon Graham, baritone; Mrs. Marion Graham, accompanist.

**KYW, Chicago, 536m (560k), C. S. D. S. T.**  
5 P. M., news; financial and final markets. 5:45 P. M., children's bedtime story. 6 P. M., dinner concert broadcast from Congress Hotel. 6:30 P. M., program broadcast from KYW's studio. 7:20 P. M., speeches, auspices American Farm Bureau Federation; announcement of radio essay educational trip winners and delivery of winning girl's prize essay by G. L. Noble, secretary; "The Agricultural Situation and the Farm Bureau Program," by R. A. Cowles. 8 to 11:30 P. M., midnight revue.

**WLW, Cincinnati, 423m (709k), C. S. D. S. T.**  
11 A. M., weather forecast and business reports. 1:30 P. M., market reports. 3 P. M., stock quotations. 4 P. M., special program.

**WOR, Newark, N. J., 405m (740k), E. S. D. S. T.**  
—6:15 P. M., Agnes Leonard in songs for the children. 6:30 P. M., "Man in the Moon" stories for the children by Josephine Lawrence and William F. B. McNeary. 7 P. M., the Neighborhood Trio, Jos. E. Furtner, zither; Harry F. Tice, steel guitar; Myron E. Colby, guitar. 7:20 P. M., resume of the day's sports with Jolly Bill Steinka.

Saturday, August 2

**WNYC, New York, 526m (570k), E. S. D. S. T.**  
7:30 P. M., police reports and alarms. 8:30 P. M., musical program composed of band selections and vocal and instrumental numbers by artists. 10:30 P. M., police alarms.

**WJZ, New York, 455m (660k), E. S. D. S. T.**  
1 P. M., Hotel Vanderbilt orchestra, direct. 4:30 P. M., Roger Wolfe's Biltmore Cascades orchestra. 5:30 P. M., State and Federal agricultural reports; Far mand Home reports; closing quotations, New York Stock Exchange; foreign exchange quotations; Evening Post news. 7 P. M., Waldorf-Astoria Roof orchestra. 8 P. M., Vincent De Sola, pianist. 8:30 P. M., "Making Radio Beautiful," by Dr. Alfred N. Goldsmith, Chief Broadcast Engineer, Radio Corporation of America. 8:45 P. M., Alexis Kudisch ensemble. 10:45 P. M., Hotel Astor dance orchestra.

**WEAF, New York, 492m (610k), E. S. D. S. T.**  
4 to 5 P. M., Bob Frikin's orchestra. 6 to 11 E. M., dinner music from the Rose Room of the Hotel Waldorf-Astoria; instrumental quintette from the S. S. President Wilson, with Vittorio Toso, baritone; Nancy McCord, soprano; Vincent Lopez and orchestra from Roof Garden, Hotel Pennsylvania.

**WIP, Philadelphia, 509m (590k), E. S. D. S. T.**  
3:30 P. M., concert by Comfort's Philharmonic orchestra; soloist, Miss Ednah Cook Smith, contralto. 6 P. M., weather forecast. 6:05 P. M., dinner music by the Kentucky Serenaders orchestra. 6:45 P. M., Agriculture livestock and produce market reports. 7 P. M., Uncle Wip's bedtime stories and roll call for the children. 8 P. M., concert by Comfort's philharmonic orchestra; soloist, Miss Ednah Cook Smith, contralto. 8:45 P. M., "What the Wild Waves are Saying," picked up by a microphone placed amidst the breaking waves under the Steel Pier, Atlantic City, N. J. 8:50 P. M., concert by Vessella's concert band; soloist, Miss Della Samoiloff, soprano. 10 P. M., dance music by Bob Leman's dance orchestra, broadcast from the WIP control station on the Steel Pier. 11:05 P. M., organ recital by Karl Bonawitz, from the Germantown Theatre.

**WRC, Washington, 469m (640k), E. S. T.**  
5:15 P. M., instruction in international code. 6 P. M., children's hour by Peggy Albion. 7:45 P. M., Bible talk auspices Men's Organized Bible Class Association. 8 P. M., musical program announced. 8:30 P. M., "Radio in the Home," by M. S. Stock, Radio Laboratory of the Bureau of Standards. 9 P. M., dance program by the dance orchestra, United States Army band. 9:55 P. M., time signals and weather forecasts.

**WNAC, Boston, 278m (1080k), E. S. D. S. T.**  
(Continued on page 18)

## Who Is America's Most Popular Radio Entertainer?

Everybody is interested in this query: Who is America's most popular radio entertainer? You have your favorite. Who is she or he? Let us know your choice, whether a comedian, an opera singer, a jazz band, or a story-teller.

RADIO WORLD wants to be able to tell the world the name of the entertainer who stands highest in the regard of listeners-in.

Use the accompanying blank and mail to Broadcasting Manager, RADIO WORLD, Cut off. Fill out. Mail today.

BROADCASTING MANAGER, RADIO WORLD, 1493 Broadway, New York City.

Dear Sir:

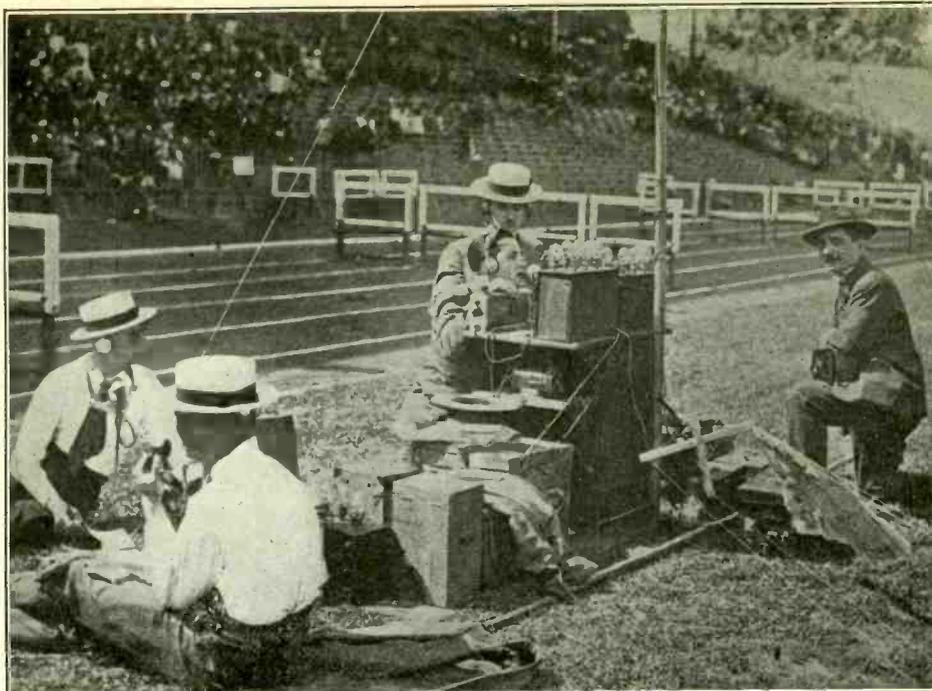
My favorite entertainer is..... Station.....

Name.....

Street Address.....

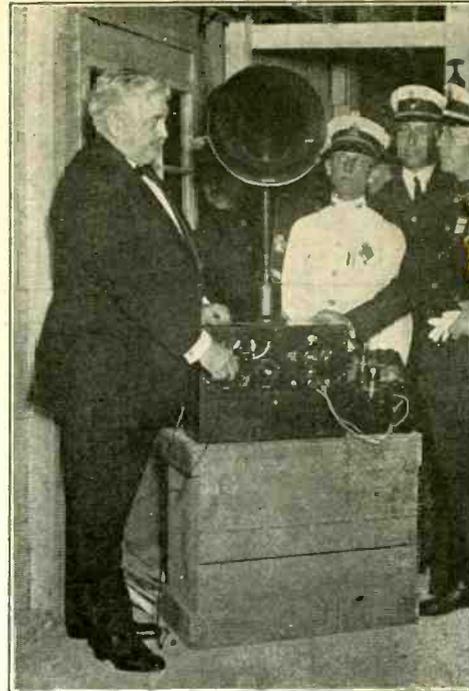
City and State.....

# Olympic Games On Air—Police He



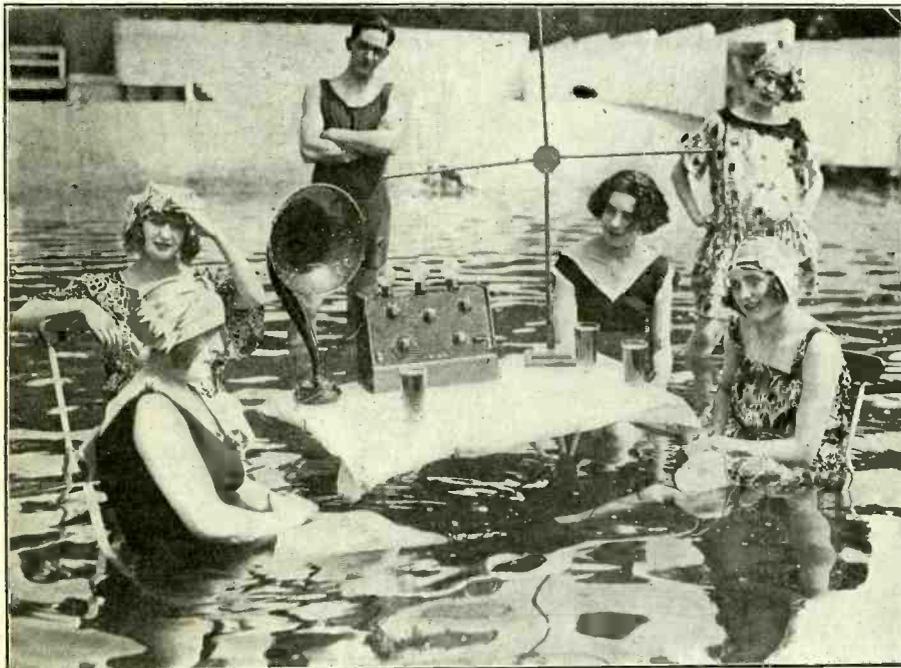
(Wide World)

A FRENCH RADIO CONCERN set up a field equipment at the recent Olympic Games to radiocast the results. Four years ago, when the Olympics were last held, the world had to wait for the telegraph and cable dispatches for the latest news. Now, however, announcement of winners is flashed at the same time the event is over, and heard by all listeners-in. The scene shows the announcer and stand at Colombes Stadium, where Uncle Sam swept the field. It became rather monotonous for foreigners to hear the results of the track meet, though it would have been a very joyous experience had any one been able to pick up the signals in the United States.



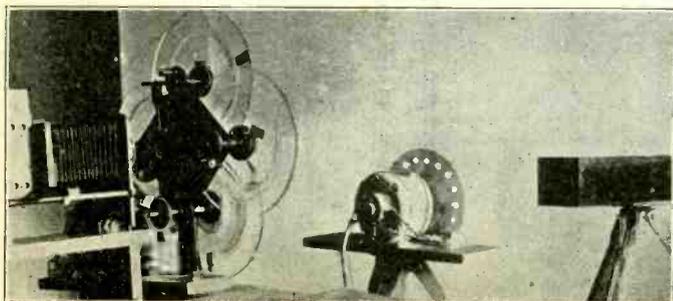
(Foto Topics)

WHEN the Police Reserves held their dance at Forest Hills, Commissioner Enright, guest of honor, suggested that the new Municipal Radiocast station of New York City be used to radiocast. Left to right they were: Police Commissioner Enright, commanding Medical Division, P. R., 371 2nd Street, Brooklyn, N. Y.; Major J. J. Rhoades, 3903 5th Avenue, Brooklyn, N. Y.; Major J. J. Rhoades, 3903 5th Avenue, Brooklyn, N. Y.; Captain Joseph Rhoades, Aviation Division; Captain Belljos, Aviation Division; Engineer of the Marine Division, P. R., 1985 Amsterdam Avenue, New York City. The radio set is a Moon, owned by Lieutenant Peter V. O'Rourke, P. R., whose article on "An Auxiliary Terminal Strip" appears on page 12 of this issue.



(Gilliams)

THIS FAMILY wanted to get the dinner music in comfort at their summer home, so the kitchen table was set up in the cool waters and the family radio set put on it. Let no one jar the table, now, 'cause the coils are not waterproof.



(Gilliams)

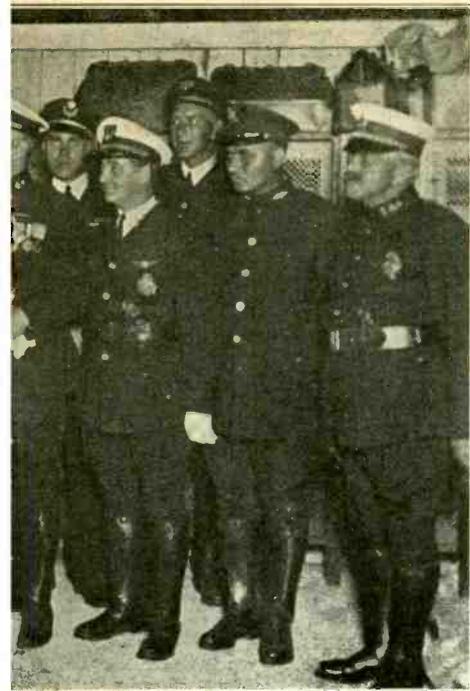
APPARATUS used by C. Francis Jenkins to send photographs through the air. The projecting machine at the left of photo throws the light rays from the picture through the four prismatic rings to the light sensitive cell in the box at the right. The sensations received by this cell are magnified thousands of times by audio amplifiers.



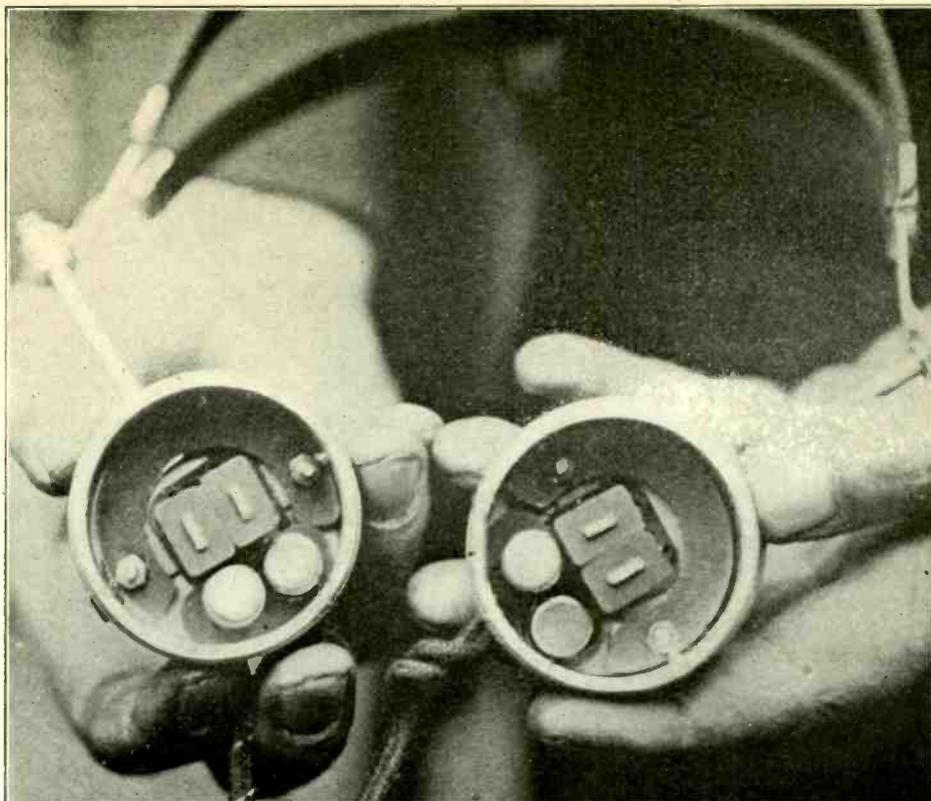
(Kadel & Herbert)

H. GRINDELL MATTHEWS, inventor of the "Death Ray," who recently arrived in America, is here to prove to skeptics they are wrong about his invention. It is natural for Mr. Matthews to be interested in radio and all its branches, as his invention utilizes short waves to transmit deadly energy. He is shown studying the construction of an everyday American radio vacuum tube. He is going blind as a result of his experiments.

# Ear Alarms—Set Made in Earphones

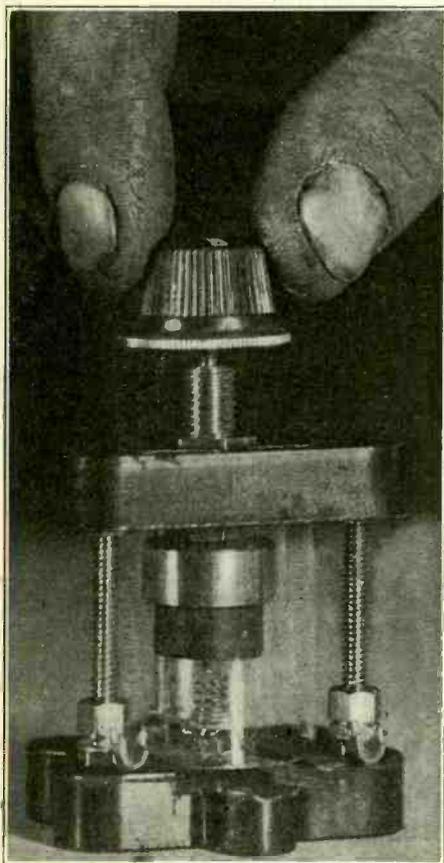


...rt Hamilton, New York City, and the band wasn't  
sted the radio, and forthwith tuned in WYNC, the  
e. The group also heard the nightly police alarms  
sioner Richard E. Enright; Col. John W. Edwards,  
Brooklyn, N. Y.; Major Frederick Klein, Aviation  
Walter Spiegel, commanding Marine Division, P. R.,  
L.; Private Garay, Aviation Division, Shore Road  
J. Ross, Aviation Division; Lieutenant "Smoky"  
tion Division; Lieutenant John P. Hellwig, Chief



(United)

A. L. FERRIS, of East Boston, Mass., has invented a pair of earphones that also contain a fixed tuning device and fixed crystal detector. All that is necessary to hear the radiocast programs is to connect one phone cord tip to the antenna and the other to the ground. A tall man could walk around with an antenna on his hat, and a ground lead down to his shoes and have a real portable set. It should be turned off, however, when crossing a busy thoroughfare. It is a one-station, no knob set.



(Foto Topics)

A NEW STYLE of crystal detector has recently appeared on the market for use in all circuits requiring crystal rectification. This unit is mounted and encased in glass, protecting the crystal from air and dirt. An automatic loop and contact insure tension, and to get the right spot you simply turn the knob on top. The crystal itself has a concave surface which guides the catwhisker revolving on the knob shaft. When it is placed on the panel, one turns the knob, like a rheostat.



(Wide World)

MUSIC for the bathers has just been adopted at the popular Wardman Park swimming pool in Washington, D. C., where a radio has been set up in the center of the pool. This is fine if nobody splashes water around. The proper thing to do, of course, under these circumstances, is to provide swimming lessons by radio, and in fact a number of stations throughout the country are doing that very thing. It must be rather exasperating, however, for someone out in the desert with just water to drink to tune onto a swimming instruction program.

(Fotograms)

THESE young winners of a baby beauty contest are all radio fans, as can be easily discerned at first glance. Left to right, they are: Harry Raymond Sparling of 4555 A, Swan St., St. Louis, Mo.; William Boyer, Jr., of Boston, Mass.; Joseph Gandy, of Richmond, Indiana; Virginia Lee Boyer, of Boston, Mass.; and Anna Clinton Gardy, of Richmond, Indiana. Note end of horn at right of photo and two arms of loop at left.



# The Radio University

A Question and Answer Department conducted by RADIO WORLD for its Readers by its Staff of Experts. Address Letters to Radio University Department, RADIO WORLD, 1493 Broadway, New York City.

In regard to the tuned-untuned receiver by Charles H. M. White in RADIO WORLD for March 22, I have built same and get good results. I have added two stages of audio-frequency amplification, making five tubes in all. Would it be advisable to add another stage of RF, untuned?—T. L. Finch, Lookefa, Okla.

You would not be repaid with another step of untuned RF, but results will be improved if the added stage is tuned.

What are the best coils for the Superdyne, as I do not wish to make them myself?—Henry E. Muir, Box 15, Cove, Ore.

Refer you to our advertising columns where you will find several firms advertising the Superdyne coils. They are reliable and the coils may be used successfully.

Can you publish a diagram of a circuit using no antenna or loop? I live in an apartment house where space is limited, and only have room for a two or three tube set for local work.—Wm. J. Henry, 464a West 4th St., New York City.

Fig. 26 is the hook-up of a 2-tube phantom cir-

the dry cell to one phone cord tip. Touch the other end of the battery to one of the primary posts on the transformer, and the other phone tip to the other primary post. If a click is heard the winding is OK. Do the same with the secondary. If no click is heard on either side, then the transformer is burnt out and a new one must be used.

I want to let you know how well pleased I am with the hook-up and results I obtained from Herman Bernard's article entitled "A 1-Tube Set You Can Log," published in RADIO WORLD for July 12. I started construction on the set at 3 o'clock Saturday, and had it completed at 6:30, including one stage of audio-frequency amplification. Although it was raining hard, and still broad daylight I was able to pick up KDKA (about 250 miles away). Between 7:30 and 11:30 P. M. I brought in and logged the following: KDKA, WLS, WGY, WIAM and WGN, with very little static and no body capacity. You will note that these stations are between the wavelengths of 326 and 390 meters. To get these stations I used 50 turns in L1, and 75 in L2, with a 15-plate variable condenser as

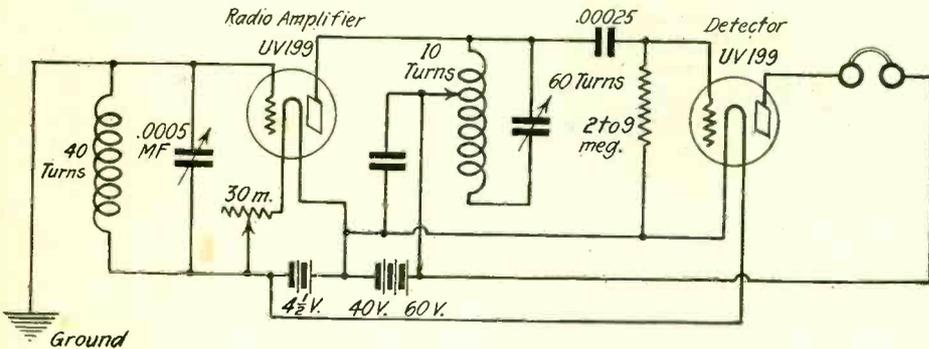


FIG. 26—Diagram of a 2-tube phantom circuit that operates with no aerial, asked for by Wm. J. Henry.

cut. The first tube has its grid grounded, and no aerial is used. There is a small condenser effect between the radio set and its batteries with respect to the ground. In the circuit shown only a few turns of the tuned second grid input coil are included in the plate output circuit of the first tube to avoid self oscillation. A phantom input is ordinarily as effective as a good loop and permits sharp tuning without directional selection.

Please publish the Improved Grimes Duplex Circuit. I would like to construct this set and use a fixed coupler so as to employ my outside antenna. How could this be hooked up? I also have a 23-plate variable condenser. Will this be able to tune over the whole radiocast wave length range?—Harry Kenaga, 117 1/2 South Rock Island Avenue, El Reno, Okla.

The circuit you desire was published in RADIO WORLD for June 21 in the University Department, and also shows how to use an outdoor antenna with a coupler. Also, in RADIO WORLD for July 26 appears a diagram and constructional data on how to build a fixed coil to use instead of a variocoupler, complete with hook-up. These articles will give you all the information you desire.

I have a 2-stage audio amplifier that worked very well until recently. Now when I plug in on the first stage the signals are fine, but when I plug in on the last stage there is no increase in volume. The signals are of the same strength as when using only one stage of AF. What is my trouble and how may I fix it?—C. H. Baurichter, Wright City, Mo.

Either the wiring after the first AF jack has broken somewhere or the second AF transformer has burnt out. First, go over all the wiring carefully for breaks. If it is all right, and all soldering is OK, then take out the second transformer and test it for an open circuit by using a dry-cell battery and ear phones. Connect one end of

C 2. Please advise what coils or what size condenser I can use to bring the higher wave lengths.—H. T. Hadden, P. O. Box 621, Bluefield, W. Va.

Very glad to hear of your success with the 1-tube set. Results will be greatly improved in cool weather. To bring the wavelength, you can inset a 75-turn honeycomb coil as L2, or if that is not high enough, use a 100-turn coil. A good stunt would be to have a coil mounting on the hard rubber strip so that you may change coils conveniently. Do not change the condenser.

Please publish the hook-up for three stages of AF amplification, using resistance-coupled amplification. I would like to build this as a separate unit so that I can hook on some of the various tuning units, to find out which ones work best. If you have a better system than straight resistance coupled amplification, it will be just as well for me.—Werner Stetler, RR 2, Fountain City, Wis.

A diagram of just what you appeared in RADIO WORLD for July 26 in the article entitled "AF That Gives Great Volume and Quality." The AF unit is composed of one stage transformer-coupled and two stages of impedance-coupled amplification. It can be built into a separate cabinet with convenient binding posts for connecting to any detector circuit.

I have a 2-tube Rasla reflex and I get very weak signals on it. There is always a lot of noise present which is so loud that I can't keep my ear phones on. Can you tell me what the trouble is?—Rudolf Herr, Box 185, Squan Road, Toms River, N. J.

The wiring of your set is defective. Take off all the wiring, and arrange the RF and AF transformers at right angles, then re-wire the set using the shortest possible leads, and avoiding parallel grid and plate wires. A little careful work will result in the successful functioning of the circuit.

# Programs

(Saturday, August 2, continued from page 15)

6:30 P. M., WNAC dinner dance, broadcast from Hotel Westminster Roof Garden. 8:15 P. M., dance music, State Ballroom orchestra. 9:15 P. M., dance music, Hotel Westminster Roof Garden. 10:15 P. M., dance music, from Copley Plaza Hotel, Copley Plaza orchestra; popular songs, Ted and Dick Waterson with Don Ramsay at the piano.

CKAC, Montreal, 430m (700k), E. S. T.—7 P. M., kiddies' stories in French and English. 7:30 P. M., Rex Battle and his Mount Royal Hotel concert orchestra, featuring Benj. Scherzer, violinist. 8:30 P. M., "La Presse" specials. 10:30 P. M., Joseph C. Smith and his Mount Royal Hotel Roof Garden Merry-Makers.

KFI, San Francisco, 469m (640k), P. T.—5 P. M., Evening Herald news bulletins. 5:50 P. M., Examiner news bulletins. 6:45 P. M., Hennessy's Paramount Players. 8 P. M., Los Feliz trio. 9 P. M., Examiner-Ida May Walls program. 10 P. M., popular song program. 11 P. M., Ambassador Hotel Cocoanut Grove orchestra.

WGI, Medford, Mass., 360m (830k), E. S. D. S. T.—7:15 P. M., code practice; weather forecast; New England crop notes. 7:30 P. M., talk on current events by David M. Cheney; musicale; weather report and time.

KHJ, Los Angeles, 395m (760k), P. T.—12:30 P. M., program of music and news items. 6 P. M., Art Hickman's concert orchestra. 6:45 P. M., children's program presenting Prof. Walter Sylvester Hertzog; bedtime story by Uncle John. 8 P. M., program, courtesy Martin Music Co., arranged by J. Howard Johnson. 10 to 11 P. M., Art Hickman's dance orchestra from the Biltmore Hotel.

WHN, New York, 360m (830k), E. S. D. S. T.—6 to 7 P. M., Around the Alamac's Festive Board; overture by Olcott Vail's trio; jests by Toastmaster; talks and songs by renowned folk; dance music by Paul Specht's Alamac orchestra. 7:30 P. M., Honey's bedtime stories by Bernard J. McOwen. 7:45 P. M., music. 8:30 P. M., Jimmy Flynn, tenor, popular songs. 8:45 P. M., Ellen Montague Cross presents the Perfet Harmony Four. 9:15 P. M., Jack Fox and his orchestra. 9:45 P. M., baseball statistics by Munroe Elias. 10 P. M., Frank Leforese, operatic baritone. 10:15 P. M., Fitzpatrick Brothers, old-time melodies. 10:30 P. M., music. 11:30 P. M., Jimmy Clarke and his entertainers.

WGR, Buffalo, N. Y., 319m (950k), E. S. D. S. T.—11:45 P. M., weather forecast issued by the U. S. Weather Bureau for Marine and Aviation interests. 12:30 P. M., organ, dining room, Hotel Statler, George Albert Bouchard, request program. 11:45 P. M., weather forecast.

KDKA, Pittsburgh, 326m (920k), E. S. D. S. T.—5:30 P. M., dinner concert by the Westinghouse band. 6:30 P. M., the children's period, "The Little Steam Engine." 6:45 P. M., last minute helps to teachers of adult and secondary classes, by Carman Cover Johnson. 7 P. M., baseball scores; sport review by James J. Long. 8 P. M., concert by the Westinghouse band. 9:55 P. M., time signals; weather forecast; baseball scores.

WBZ, Springfield, Mass., 337m (890k), E. S. T.—12:55 P. M., time signals; weather reports; Boston market report. 3 P. M., broadcast of the Springfield-New Haven baseball game from Springfield League Park. 6 P. M., Leo Reisman Hotel Lenox ensemble. 6:30 P. M., Leo Reisman and his Hotel Brunswick orchestra. 7 P. M., results of games, Eastern, American and National leagues. 7:30 P. M., bedtime story for the kiddies. 7:40 P. M., concert by the Hotel Kimball trio; Jan Geerts, violinist and director; Angela Goddard Loneragan, cellist; Paul Lawrence, pianist. 9 P. M., to be announced. 10:55 P. M., time signals; weather reports.

KYW, Chicago, 536m (560k), C. S. D. S. T.—5:02 to 5:18 P. M., news, financial and final markets. 6 P. M., dinner concert broadcast from Congress Hotel. 7 P. M., musical program: Mrs. Susannah Pepper, soprano; Adelle Pepper, alto; Homer Pepper, flute; Lucy Dougherty, contralto. 8 P. M., talk by Vivette Gorman, Home Economics Dept. 8:05 P. M., short stories, articles and humorous sketches. 8:20 P. M., continuation of musical program.

WLW, Cincinnati, 423m (709k), C. S. D. S. T.—11 A. M., weather forecast and business reports. 1:30 P. M., market reports.

WOR, Newark, N. J., 405m (740k), E. S. D. S. T.—6:15 P. M., "Music While You Dine," Ernie Krickett's Cinderella orchestra. 7:20 P. M., resume of the day's sports with Jolly Bill Steinke. 8 P. M., program by the S. S. President Roosevelt orchestra. 8:50 P. M., talk by Captain Geo. Fri of the S. S. President Roosevelt. 9 P. M., Edward Anthony, author and editor of sports, talking on "The Humorous Treatment of Sports," also reading some of his "Barnyard Ballads." 9:15 P. M., concert by the Margulies trio, David Margulies, violinist; L. V. Arbagast, cellist; Michel Marochowski, pianist. 9:45 P. M., Frederick Tedesco, piano accordionian.

## Sunday, August 3

WGY, Schenectady, 340m (790k), E. S. T.—9:30 A. M., service of Albany Street Methodist Episcopal Church, Schenectady. 7:30 P. M., concert by New York Philharmonic orchestra, Willem Van Hoogstraten, conductor, broadcast from Lewishon Stadium, New York.

WCAE, Pittsburgh, 462m (650k), E. S. D. S. T.—3:30 P. M., People's Radio Church services. 7 P. M., dinner concert from William Penn Hotel.

WIP, Philadelphia, 593m (590k), E. S. D. S. T.—3:35 P. M., special Sunday afternoon concert by Comfort's Philharmonic orchestra. 7:30 P. M., (Continued on next page)

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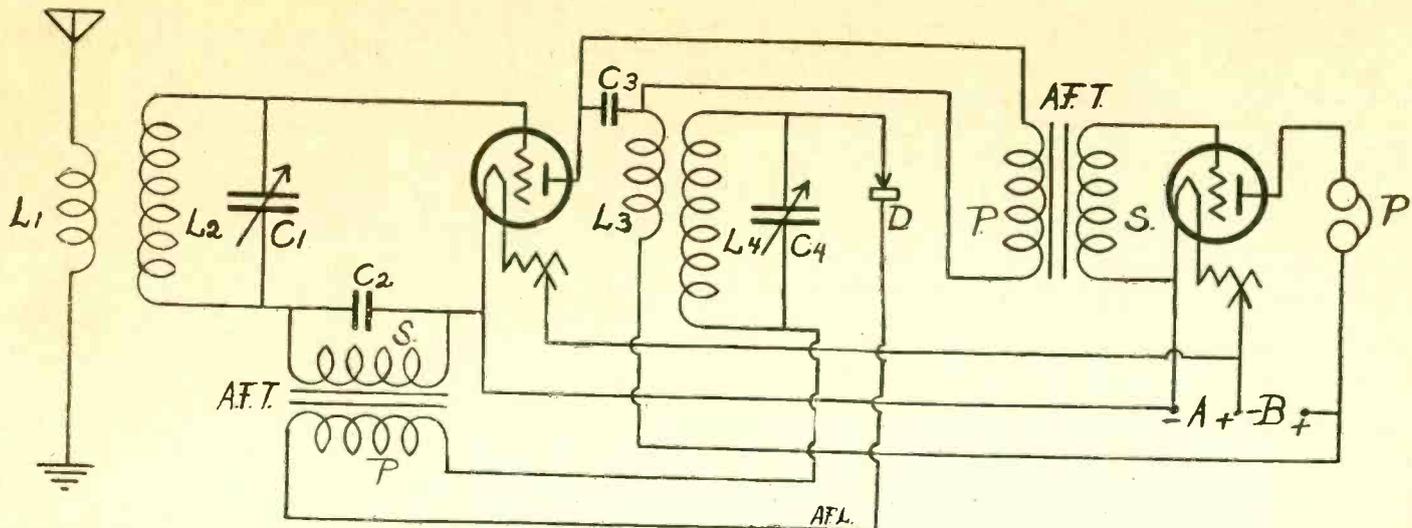
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# A Set That Fits in a Camera



WIRING DIAGRAM for set that may be put in a camera (which won't take pictures any more). One stage of RF, crystal detector and two stages of AF (one reflexed) are used. This works a loud speaker.

## Programs

### Sunday, August 3 (continued from preceding page)

evening service broadcast from Holy Trinity Church, Rittenhouse Square, Philadelphia; Rev. Floyd W. Tomkins, D.D., rector. 9:30 P. M., Sunday evening concert, with prominent soloists, from the WIP control station on the Steel Pier, Atlantic City, New Jersey.

KGO, Oakland, Cal., 312m (960k), P. T.—3:30 P. M., concert by KGO Little Symphony orchestra and soloists. Carl Rhodehamel conducting.

WOS, Jefferson City, Mo., 441m (680k), C. S. T.—7:30 P. M., Union open air religious services radiocast from the Capitol lawn; music by the Missouri State Prison concert band.

KPO, San Francisco, 423m (710k), P. T.—11 to 12 noon, undenominational and non-sectarian church services, speaker, Rev. A. W. Farlander, Evangelical Lutheran; soloist, Fanny E. Ryan; organ selections by Theodore J. Irwin. 8:30 to 10 P. M., concert by Rudy Seiger's Fairmont Hotel orchestra.

WGI, Medford, Mass., 360m (830k), E. S. D. S. T.—5 P. M., twilight program, "Adventure Hour" conducted by the Youth's Companion; musicale; talk, auspices Greater Boston Federation of Churches, by Rev. Henry I. Bailey, First M. E. Church, Boston.

KGW, Portland, Ore., 492m (610k), P. T.—6 P. M., church services.

WMAF, South Dartmouth, Mass., 364m (820k), E. S. T.—7:15 P. M., the Mark Strand Theatre, New York City, special musical programs direct from theatre, overture Mark Strand symphony orchestra of fifty; soloists, male quartette and musical novelties, and special concert follows in theatre studio.

KYW, Chicago, 536m (560k), C. S. D. S. T.—10 A. M., Sunday morning service broadcast from St. Chrysostom's Episcopal Church. 1:30 P. M., studio chapel service radiocast from studio in the Commonwealth Edison Building, Chicago Church Federation will conduct this service.

WHAS, Louisville, Ky., 400m (750k), C. S. T.—9:57 A. M., organ music. 10 A. M., church service, auspices Fourth Avenue Presbyterian Church; the Rev. Dr. Charles W. Welch, pastor; William E. Conen, organist and choir director; Miss Esther Metz, soprano; Miss Virginia Shafer Herrick, contralto; Williams Layne Vick, tenor; P. A. Kelleher, baritone. 4 to 5 P. M., sacred concert by St. Peter's Evangelical Church choir.

WDAF, Kansas City, Mo., 411m (730k), C. S. T.—baseball scores at 3:30, 4, 4:30 and 5 o'clock. 4 P. M., program broadcast from the Newman Theatre.

### Monday, August 4

WNYC, New York, 526m (570k), E. S. D. S. T.—7:30 P. M., police reports and alarms. 8:30 P. M., musical program composed of band selections and vocal and instrumental numbers by artists. 10:30 P. M., police alarms.

WGY, Schenectady, 380m (790k), E. S. T.—11:30 A. M., stock market report. 11:40 A. M., produce market report. 11:45 A. M., weather report. 11:50 A. M., report on farm movement of lettuce, from New York State Dept. of Farms and Markets. 11:55 A. M., Naval Observatory time signals. 1 P. M., music and talk, "Some Facts About Mahogany." 5 P. M., produce and stock market quotations; news bulletins; baseball results. 5:15 P. M., review of weeks' sports, Joe Haubner.

WFAA, Dallas, Tex., 476m (620k), C. S. T.—12:30 P. M., address, Dr. J. D. Boon, professor of astronomy, Southern Methodist University, on "Fixed Stars and Variables." 8:30 P. M., musical recital by Old Fiddlers from Farmers Branch.

ON the front cover of this issue is the photograph of an extremely compact 2-tube reflex receiver built into a kodak camera case. The circuit embodies one stage of radio-frequency amplification, crystal detector, and two stages of audio frequency amplifications, one reflexed. Using UV199 tubes and the small size A and B batteries, the whole may be easily placed in a very small space, such as the large size Kodak case or similar container.

The actual placing of the parts depends largely on what type of container is to be used. If desired, the picture on the front cover may be used as a general guide in designing the set. To accommodate the coils to a small space, 2-inch tubing is used, and the correct number of turns of wire designated.

Coils L1 and L2 are the same dimensions as L3 and L4, therefore the winding directions for one are the same as the other. Procure two 3-inch lengths of bakelite or cardboard tubing 2 inches in diameter. First, wind the secondary L2, consisting of 80 turns of No. 24 DSC wire, leaving at least six inches of wire at either end for connections. Over this winding wrap one layer of a good grade of writing paper and glue only the edge. Over the center of the secondary wind 18 turns No. 24 DSC wire, which will be the primary. For convenience in fastening, place a small drop of sealing wax at each end of the winding to keep it firmly in place. Use as little of this as possible.

The audio-frequency transformers may be of any good make, the one in the first stage having a ratio of 5 to 1, and that in the second stage 3 to 1. The first audio stage in the diagram is represented by the AFT at the left. The crystal detector preferably should be of the fixed type. The UV199s may be heated by two 4½-volt C batteries wired in parallel.

As the regulation phone jack takes up too much room, the small phone tip jacks, procurable in any radio supply shop, may be used. The rheostat goes where the winding key was.

### LIST OF PARTS

- ¼-lb. No. 24 DSC wire.
- Two 3-inch lengths tubing, 2 inches in diameter.
- C1, .0005 variable condenser.
- C2, .001 mfd. fixed condenser.
- C3, .001 mfd. fixed condenser.
- C4, .0005 mfd. variable condenser.
- Two audio-frequency transformers, 5-1 and 3-1 ratio.
- Two UV199 tubes.
- Two UV199 sockets.
- Two rheostats.
- One fixed crystal detector.
- Seven phone tip jacks.
- ½ dozen connection clips.
- Two 22½-volt small size B batteries.
- Two 4½-volt C batteries for tube filaments.
- Connection wire and small hardware as necessary.

## New Radiocasters

Call	Station	CLASS A	Kcy	Meters	Watts
WEBJ	Third Avenue Railway Co., New York, N. Y.	1100	273	500	
WFBH	Concourse Radio Corp., New York, N. Y.	1100	273	500	
KFCL	Leslie E. Rice, Los Angeles, Cal.	1.270	236	500	
KFLW	Missoula Elec. Supply Co., Missoula, Mont.	1280	234	5	
KFQS	Dickenson, Henry Radio Lab., Manitou, Col.	1220	246	10	
KFQT	Texas National Guard, Denison, Texas	1190	252	10	
KFQU	W. Riker, Holy City, Cal.	1280	234	100	
KFQV	Omaha Grain Exchange, (Portable), Nebraska	1300	231	100	
KFQW	C. F. Krierim, North Bend, Wash.	1210	248	50	
WDBY	North Shore Congregational Church, Chicago	1160	258	500	
WEBE	Roy W. Waller, Cambridge, Ohio	1210	248	10	
KFQX	Alfred M. Hubbard, Seattle, Wash.	1290	233	250	

Call	Station	Kcy	Meters	Watts
WOAR	Lundskow, Henry P., Kenosha, Wis.	1310	239	50
NEW CLASS B STATION				
WNYC	Dept. of Plant and Structures, New York City	570	526	100
TRANSFERRED FROM CLASS C TO CLASS A				
WAAW	Omaha Grain Exchange, Omaha, Neb.	1050	286	500
WBAA	Purdue University, West Lafayette, Ind.	1060	283	250
WLAP	Wm. V. Jordan, Louisville, Ky.	1050	286	20
WPAM	Auerbach and Guettel, Topeka, Kansas	1090	275	100
WCAJ	Nebraska Wesleyan Univ., Univ. Place, Nebraska	1060	283	500
WEAU	Davidson Bros., Co., Sioux City, Iowa	1090	275	100
TRANSFERRED FROM CLASS C TO CLASS B				
WGN	The Tribune Co., Chicago	810	270	100

WCAE, Pittsburgh, 462m (650k), E. S. D. S. T.—4:30 P. M., stock market reports; the Sunshine Girl; Pittsburgh livestock quotations. 6:30 P. M., dinner concert from William Penn Hotel. 7:30 P. M., Uncle Kaybee. 7:45 P. M., baseball scores. 9 P. M., radio ukulele lesson by C. Martin McGee. 9:30 P. M., musical program by Billy Cramer's orchestra. 11 P. M., late concert by the St. Clair entertainers and the Greenwich serenaders.

WWJ, Detroit, 517m (580k), E. S. T.—8 A. M., setting-up exercises by R. J. Horton, physical director, Detroit Y. M. C. A. 9:30 A. M., "Tonight's dinner" and a special talk by the woman's editor. 9:45 A. M., public health service bulletins and talks of general interest. 19:25 A. M., weather forecast. 11:55 A. M., time relayed by the Western Union. 12 noon, Detroit News (Continued on page 26)

**A THOUGHT FOR THE WEEK**—*In my hours of depression my radio, like a true friend, is my source of solace and cheer.*

# RADIO WORLD

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AUGUST 2, 1924

### Low Losses for High Efficiency

CONSIDERABLE progress is being made in the improvement of reception by the reduction of losses. The low-loss variable condenser gave this forward movement a splendid impetus. Following the same line of advancement the low-loss inductance appeared. Excessive insulation is harmful to reception. By eliminating all unnecessary insulation a step is taken that should mean much to radio. It is surprising to those having their first experience with low-loss parts to find that the improvement is so considerable. The comparative ratings of variable condensers, as to the number of plates and the maximum capacity are shuffled up considerably, as fewer plates go a longer way, and the range, from minimum to maximum capacity is lengthened.

The home constructor can make a low-loss tuning coil quite easily, as Byrt C. Caldwell explains in this issue.

## Marching Onward

A 3-TUBE Super-Heterodyne" will be described by A. F. Lapiere in next week's RADIO WORLD, issue of August 9, out August 6. Full constructional data will be given and the parts used will be identified by their trade names. A circuit diagram will be printed, of course; also an assembly plan and other diagrams. Many fans desirous of building a set make up their minds that it must be nothing less than a Super-Heterodyne, yet when they consider the initial cost and upkeep of the conventional Super-Heterodyne they hesitate. "From six to eight tubes!" they exclaim. Now a Super-Heterodyne that works a loud speaker with fine quality and great volume is at their disposal—the first time, so far as we know, that this has been accomplished with only three tubes. And from present indications it will be a long, long time before it will ever be possible to devise a Super-Heterodyne, with two stages of AF, that works on two tubes. The only way to accomplish that, from the present outlook, would be by the use of a crystal oscillator.

Impossible? Crystals do not amplify and do not oscillate?

Well, read the profusely illustrated article in the same issue of RADIO WORLD—"Crys-

tals Used as Amplifiers and Oscillators, A New Discovery." The crystal is a voltage-operated device in this system and results obtained are fully discussed.

"A Study in Potentials" is a valuable contribution to the lore of radio by Neal Fatzalan, Consulting Engineer. By reading this article you may be able to rid your set of howls and squeals due to conflict of potentials. The remedy is easy but vital.

"A 1-Tube Crystal Reflex That Works a Loud Speaker" is Brewster Lee's contribution to this noteworthy number of RADIO WORLD. The laughs that in other days greeted the linking of a 1-tube set with a speaker are being supplanted by serious expressions of joy.

Herman Bernard will tell how to build a single-knob set that is decidedly selective and costs only \$17.50 complete, including batteries, all wire, earphones, tube, panel, cabinet and everything else. In this week's RADIO WORLD Mr. Lapiere brings out "The Ford of Radio," a resistance-controlled circuit, so Mr. Bernard, thinking he has gone Mr. Lapiere one better in point of economy, entitles his own article "The Kiddie Kar of Radio." The circuit uses the regeneration principle in a novel manner that prevents any radiation.

In the August 16 issue, out August 13, Lester Hutter, noted radio authority, will contribute an important article, "The Superdyne Principle in a 3-Tube Set." Brainard Foote, one of the leading radio experts in the country, will describe "How

to Build a Unit for Lighting Your Amplifier Tubes With AC Current." You simply plug into your lighting main—and you get no hum. See next week's RADIO WORLD or announcement of other valuable features to be published.

## RADIO WORLD

Vol. 5, No. 19.

15 CENTS Illustrated ISSUE OF AUGUST 2, 1924

A Weekly Paper Published Every Wednesday and Dated Saturday, by Hennessy Radio Publications Corporation from Publication Office, 1493 Broadway, New York, N. Y. Phones: Lackawanna 6976 and 2063.

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### WFBH's Radio Press Dinner

AT a dinner given in honor of the radio press, Thursday night, July 24, at the Hotel Majestic, 72nd Street and Central Park West, New York City, Edouard Panchar, the vice-president, and incidentally father of the first hotel radio broadcast station in New York, made it plain that the "Voice of Central Park" has entered the field to give the radio public the best in entertainment and music. Mr. Panchar said: "WFBH is not 'just another station.' The staff

of the station has labored day and night to put it across, and we mean to give the public what they want."

WFBH plans to feature public medical advice, educational topics, features for children, playlets and operettas, military training by radio, and dinner music besides their late night entertainment. The hotel has its own fourteen piece band.

The station is a 500-watter, operating on a wavelength of 273 meters, and may be classed among the best stations in New York. It is on the air from 2 to 7 or 9 P. M., and from 11:30 P. M. until about 2 A. M. daily, and from 9 to 11 A. M., and 5 to 8 P. M., Sundays. An outing is planned for next week.

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CALL at your dealer's today and ask him to show you a Magnavox M4 Reproducer.

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for every receiving set**

*Reproducers*

- M4—the latest Magnavox achievement: requires no battery . . . \$25.00
- M1—also constructed on the semi-dynamic principle, requiring no battery \$30.00
- R3—famous electro-dynamic type: new model with Volume Control . . . \$35.00
- R2—same as R3 but larger size: new model with Volume Control. . . \$50.00

*Combination Sets*

- A1-R and A2-R—the only instruments combining electro-dynamic Reproducer and Power Amplifier in one unit . . . \$59.00, \$85.00

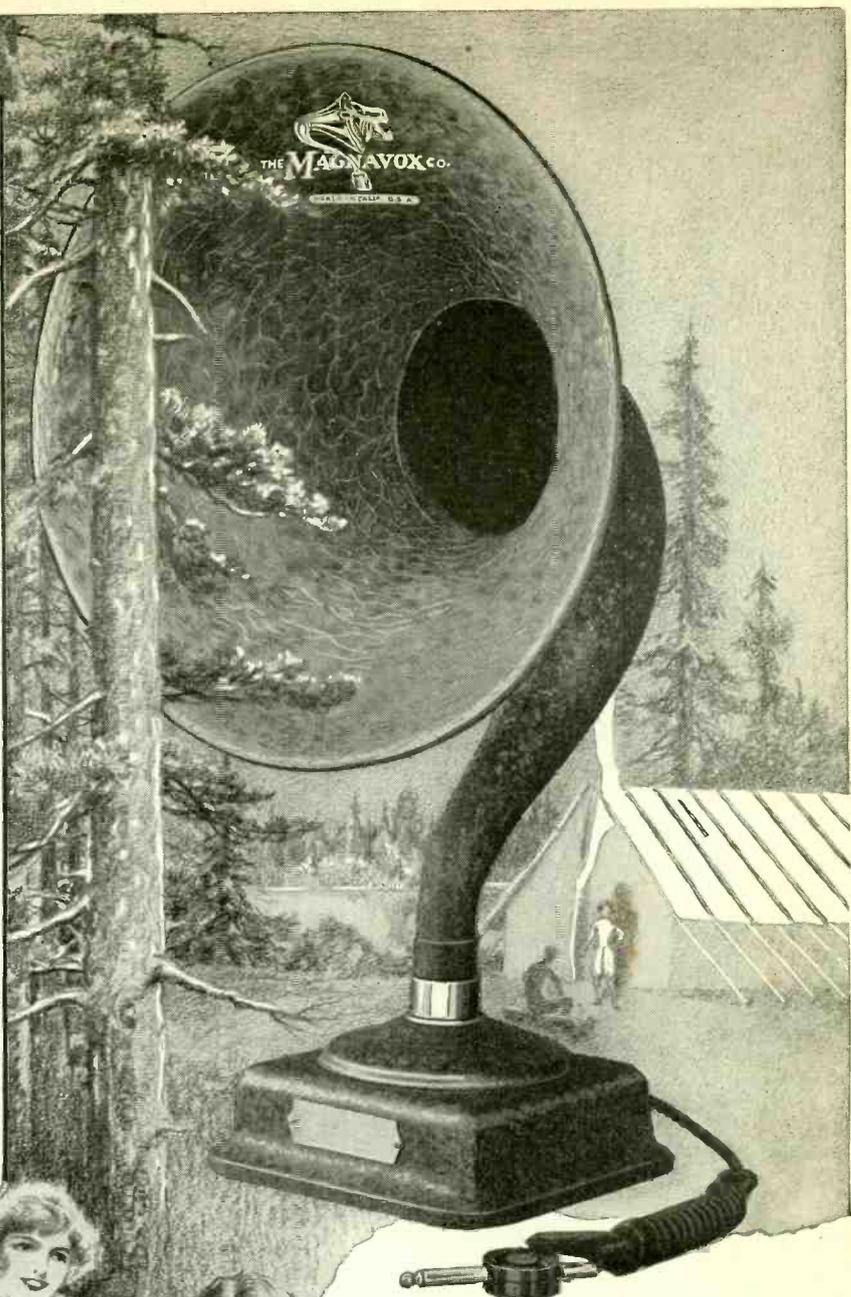
*Power Amplifiers*

- A1, AC-2-C, AC-3-C—the most efficient audio-frequency Amplifiers: one, two & three stage . . . \$27.50 to \$60.00

To obtain the fullest enjoyment from your receiving set, equip it with the Magnavox—for sale at good dealers everywhere.

**THE MAGNAVOX CO.**  
OAKLAND, CALIFORNIA  
New York Office:  
350 WEST 31st STREET

Canadian Distributors:  
Perkins Electric Limited, Toronto.  
Montreal, Winnipeg



**M4**  
**\$ 25<sup>00</sup>**

**MAGNAVOX**  
*Radio*



CR

# Schickerling Tube Incorporates for \$1,100,000

## NEW INCORPORATIONS

Schickerling Products Corp., manufacture radio vacuum tubes. \$1,100,000. Basil W. Matthews, Charles J. Holland, James S. Way, by Corporation Service Co.

Norwalk Radio Corp., New York City, 1,000 shares common stock, no par value. A. J. Norwalk, F. Topel, S. Falk. Attorney, Falk and Orleans, 165 Broadway.

Cosmopolitan Radio Appliance Co., New York City, \$5,000. J. J. Dooley, J. S. Gershman, J. R. Auslander. Attorneys, Hackenbush and Schwartz, 51 Chambers St.

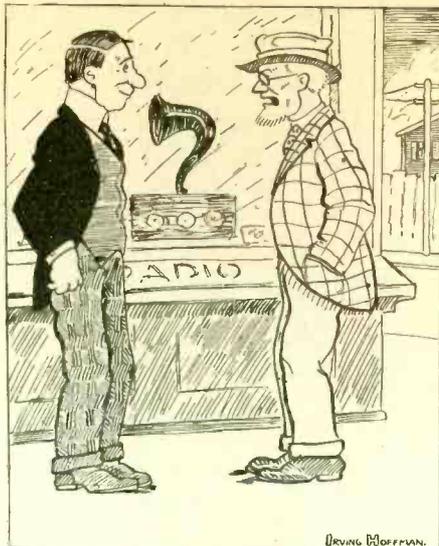
Ultra Radio Corp., New York City, \$10,000. L. Rudd, S. Goldstein, W. S. Marcus. Attorney, S. L. Marcus, 277 Broadway.

Ideal Service Co., (radio), New York City, \$10,000. M. Harris, I. Finkel, I. Shmunis. Attorney I. Josephson, 1,482 Broadway.

Masterola Mfg. Co., radio, \$50,000. New York City. R. Coen, B. Goldman, H. Sandler. Attorney, J. Z. Stein, 67 Wall St., New York.

D. Reingold & Co., radio, New York City, 100 shares common stock, no par value. D. and M. Reingold, M. Greenleaf. Attorney, M. A. Edelman, 233 Broadway.

# A Fiend for Variety



PROSPECTIVE CUSTOMER—Hey, when are you going to get in some radios that play a fiddle or anything else besides a horn?

# Big Opportunity Offered by Radio Week

INTERNATIONAL Radio Week, originally put forward by RADIO WORLD, gives promise of being a greater success this year than last. The date is November 24 to 30, inclusive. The event should not be overlooked by manufacturers in planning their advertising campaigns. When the entire trade is looking towards radio sales and the radio listeners looking to the special radiocasting events, advertising often brings quick returns. In the 1923 Radio Week activities more than fifty newspapers used the special advertising service furnished by the Radio Week Committee, while this year the number is expected to be even larger, as a more elaborate program of co-operation with the papers is planned.

National advertising timed to appear during Radio Week will also be quite an advantage in tying up the tremendous publicity given radio with the advertising of the individual manufacturer. National Radio Week this year again includes Thanksgiving Day, the opening of the biggest holiday buying season of the year.

## TRADE LOGIC

No sale is ever made without advertising.

To sell anything, a buyer must be informed *what* is for sale, *where* it is for sale, and *how much* it is.

To give this information, no matter how, is advertising.

To tell the people of the whole United States who buy Radio goods, what you have to sell—where it is for sale and how much—can be done quicker, more effectively, and at less cost, by advertising in RADIO WORLD—the national illustrated Radio weekly—than in any other known way.

Twenty-eight and seven-eighth cents per agate line on contract is all it costs to tell radio buyers nationally what you have for sale, where it can be bought, and its cost.

Now is the time. Send your advertisement right now while you are thinking about it to

**RADIO WORLD**  
1493 Broadway, New York, N. Y.

The reason 75,000 would rather pay 15c a copy for RADIO WORLD than 5c for the Saturday Evening Post is because RADIO WORLD tells them how to select, buy, or make, the radio set they want—and how to improve, take care of and enjoy theceiver they have. This is why the results from advertising in RADIO WORLD are out of all proportion to the number of its readers.

## Business Opportunities Radio and Electrical

Rates: 40c a line; Minimum 3 lines.

RADIO ACCESSORIES manufacture agency wanted for Canada; best lines; good connections, salesrooms and force; references. Box 11, Radio World.

WANTED—Successful concern or party to finance valuable radio-controlled clock and automatic weather signal, radio controlled; basically new and patent allowed; large market. Box 22, Radio World.

ESTABLISHED radio distributing house; sell part or entire interest. Box 33, Radio World.

MANUFACTURER well-known radio equipment wishes to raise working capital, temporary needs; offering marketable finished goods, high quality, as collateral. Box 44, Radio World.

# The Radio Trade

## Hazeltine Corporation Suit Against Freed-Eisemann Awaits Decision

THE taking of testimony in the suit brought in the United States District Court in Brooklyn before Judge Robert A. Inch by the Hazeltine Research Corporation and the Radio Manufacturers' Corporation to abrogate an agreement with the Freed-Eisemann Radio Corporation was concluded. An adjournment was taken and counsel for both sides summed up and the case was given to Judge Inch for his consideration. It is expected that the Judge will take six or eight weeks to examine the testimony.

The complainants contended that the Freed-Eisemann Corporation by failure to pay royalties on time and by refusing to submit its books for inspection by owners of patent rights under which royalties are due automatically cancelled the contracts under which it was permitted to manufacture radio sets. The Freed-Eisemann Corporation denied all the charges of the complainants and deposited \$160,000 with the Court to compensate the complainants if they establish their claims.

## EAGLE SALES PLAN FOLLOWS LICENSE METHOD OF AUTO INDUSTRY

THE Eagle Neutrodyne Radio Company of Newark, N. J., have appointed the Lake-States Corporation distributors for Illinois, Indiana, Michigan and Ohio. The Lake-States Corporation is officered by men well-known in Chicago's business affairs, and its headquarters are at 2447 Michigan avenue, Chicago. Offices are being opened in Cleveland, Columbus and Indianapolis. Patterened after the merchandising principles of the automobile industry, Eagle Neutrodyne dealers will be given an exclusive franchise for a definite territory. They will be guaranteed a stated number of receivers at specified times and will be protected from price-cutting. The officers of the Lake-States Corporation are W. A. Hitchcock, president; C. McK. Tennant, treasurer, and Vandorf Gray, secretary.

## FILKO ARRESTER BACKED UP BY A MONEY GUARANTEE

A LIGHTNING arrester is somewhat like a life-preserver in that it is only called upon to work in an emergency. The D. X. Instrument Co., Inc., of Harrisburg, Pa., makers of Filko parts for radio, supply with each Filko Lightning Arrester a special guarantee that should lightning strike an aerial to which a Filko Lightning Arrester is attached and damage the radio receiver, they will repair the set or pay the purchaser of the arrester \$100.

The body of the arrester is made of polished Bakelite, shielded by a polished aluminum "umbrella" that keeps dust, water and other con-

ductive matter from causing leakage losses in that part of the antenna circuit.

## WORKRIGHT OPENS BRANCH FACTORY IN LOS ANGELES

TO take care of the demand for WorkRite sets on the Pacific Coast, the WorkRite Manufacturing Company of Cleveland recently opened a branch in Los Angeles, where they will manufacture WorkRite 5-tube Super-Neutrodyne sets. The Pacific Coast factory is under the direction of Emmet R. Patterson, well known to the Western trade. With the establishment of this Pacific Coast factory branch, the WorkRite Company have also opened a western sales office in Los Angeles, at 239 Los Angeles street. This branch of the business is managed by J. A. Hymer. Mr. Hymer has just completed a trip over the entire western territory.

## Literature Wanted

THE names of readers of RADIO WORLD who desire literature from radio jobbers and dealers, are published in RADIO WORLD, on request of the reader. The blank below may be used, or a post card or letter will do instead.

Service Editor,  
Radio World,  
1493 Broadway, New York City.

I desire to receive radio literature.

Name .....

City or town .....

State .....

- John A. Wallers, Nappanee, Ind.
- D. F. McManus, 21 Pintaro Ave., New Rochelle, N. Y.
- M. A. Magarieta, 2031 Seventh Ave., New York City.
- Roy Jones, 583 Leo Ave., Portland, Ore.
- Jack Schwartz, 2558 E. 59th St., Cleveland, O.
- E. H. Farancey, Smith's Ferry, Pa.
- Roy C. Frankhouser, 3245 West Park Ave., Chicago, Ill.
- P. V. Hine, 313 Third Ave., Milwaukee, Wis.
- Frank P. Eisinger, 25 Broadway, Room 1801, New York City.
- Henry J. Seyden, 1207 33rd Ave., San Francisco, Cal.
- Allen B. Conroy, 103 Fern Ave., Mill Valley, Cal.
- Ramon Quesada, 36 Angeles St., Havana, Cuba.
- E. G. Kotsch, 515 North Ave., Wilkinsburg, Pa.
- Robert Kelly, 140 Bridgeport Ave., Devore, Conn.
- G. E. Worthington, 3705 Van Dyke Ave., East San Diego, Calif.
- Fred W. Riepe, Metropolis, Ill.
- J. B. Epperson, Charleston, Tenn.
- A. F. Morton, dealer, 120 Highland Place, Brooklyn, N. Y.
- Hub Specialties, dealer, 1714 West 56th St., Chicago, Ill.
- L. G. Miller, 627 L St., College View, Neb.
- Herman B. Pettit, E. Side Square, Greensburg, Ind.
- C. R. Dobeibower, Bartlesville, Okla.

# New Method of Talking Across Atlantic

SCIENCE is making elaborate efforts to talk across the ocean, says the Engineering Foundation, outlining in a research narrative the progress made in trans-Atlantic wireless telephony. A new system of transmission, saving two-thirds of the power, was described. The statement set forth:

"Hitherto, with the ordinary method of transmission, three bands of electrical waves are radiated through the ether. That is to say, the power given out may be considered in three parts: (1) A central band of power at a wavelength or number of waves per second known to radio engineers as the carrier frequency; (2) power in a side band of frequencies extending from the carrier frequency upward and having a width equal to the frequencies appearing in the telephone waves; (3) power in another side band extending from the carrier downward. The power at the carrier frequency is more than two-thirds of the total.

"In this trans-Atlantic investigation a new method of transmission, radiating only one side band without the carrier, is being employed. It possesses important advantages; all the power radiated is effected in conveying the message. In the ordinary method most of the power is not thus effective. Stability of transmission is improved. The frequency band required for transmission is reduced, thus conserving wavelength space in the ether and simplifying the transmitting antenna problem.

"The importance of conserving frequency range will be appreciated when it is realized that the total range available for trans-Atlantic telephony is distinctly limited. The most suitable range has not been accurately determined. Its upper limit may be 60,000 cycles a second (5,000 meters wavelength) because of the large attenuation suffered during the daylight hours by frequencies higher than this. Trans-Atlantic telegraphy pre-empts frequencies below 30,000 cycles (10,000 meters). Therefore, for the present at least, these trans-Atlantic telephone experiments are limited to a range of some 30,000 cycles.

"Transmission of speech requires as a minimum for good quality a single-side band about 3,000 cycles wide. Allowing for variations and for clearances between channels in the ether, it is doubtful whether channels could be made to average closer than one every 4,000 cycles for single-side-band transmission and one every 7,000 cycles for the ordinary double-side-band transmission. Were the whole range from 30,000 to 60,000 cycles devoted to telephony to the exclusion of telegraphy, only about four channels could be obtained by the older methods and seven by the new. Hence, the new system increases the capacity of the available region in the ether by 75 per cent.

"The new system also saves two-thirds of the power. This is an important economy in the large quantities of high-frequency power demanded for trans-oceanic telephoning. Water-cooled vacuum tubes have proved admirably suited for use in high-power radio service.

"A new type of radio, telephone system has been developed. It has important advantages for trans-oceanic telephony. It has been put into successful experimental operation across the Atlantic. Sustained one-way telephonic transmission across this ocean has been attained for the first time by means of this system."

## SEEKS PACIFIC CONNECTIONS

WM. A. BRENNAN, in New York City, at the Hotel McAlpin, to August 5, would be very pleased to hear from any good, reputable manufacturer who is desirous of opening up the Pacific Coast territory for their product or in view of increasing their sales in this section.

## Radio Waves Travel at Rate of 186,000 Miles a Second and Here's the Proof

The fact that radio waves can be made to go "there and back in nothing flat" was demonstrated at WTAM, radio station of the Willard Storage Battery Company, broadcasting from the Cleveland Plain Dealer studio.

A late dance concert of request numbers was being put on the air when a fan called the studio by long distance telephone from St. Thomas, Ont., placed his loud speaker to the telephone and sent back over the wire the same music that was being sent out by wireless fifteen feet away.

The speed of the round trip of the signals was so great the music came back from Canada at the same instant that it was going into the microphone in the next room.

To complete the circuit of sound, telephone wires carried the signals from the studio to the transmitting set, seven miles away. From there the ether carried them to St. Thomas, about 100 miles away, straight across Lake Erie. From St. Thomas they were put on the wire again, going about 400 miles around the lake to get back to the studio. And the return was instantaneous with the start.

## INVENTOR OF BAKELITE GETS BELGIAN MEDAL

KING ALBERT of Belgium has conferred the Commander of the Order of Leopold medal on Dr. L. H. Baekeland, of Yonkers, N. Y., according to a cablegram. The distinguished inventor has already received the Legion of Honor of France and Officer of the Crown of Belgium. At the present time he is president of the American Chemical Society and honorary professor of chemical engineering in Columbia University.

As the inventor of Bakelite, one of the most important insulation materials of radio and wireless telegraphy used in panels, frames and bases for working parts, Dr. Baekeland achieved international prominence.

## LEGO PRODUCES FIXED CRYSTAL

AFTER experimenting six months several well-known radio engineers have produced the Lego Fixed Detector. This detector is 100 percent sensitive and practically everlasting. There are no parts to wear out and it is designed to withstand high voltage. The Lego Fixed Detector is unconditionally guaranteed. The radio fan going in for reflex sets will find the Lego detector excellent. It is manufactured by the Lego Corp., 225 West 77th Street, N. Y. C.

## RADIOGRAMS

:-: The March of Events

JOHN W. DAVIS decided to wage his campaign by radio, making most speeches from his home at Locust Valley, L. I., though a few on a short tour. He lauded radio as the greatest invention. President Coolidge has decided to use the radio almost exclusively. Radio thus becomes the biggest single factor in the Presidential campaign, aside from the two leading candidates themselves.

PASSENGERS on German railroad trains will be able next Autumn to telephone to any telephone number in Germany and also may be reached by telephone from any point in Germany, as well as send and receive telegrams, by means of a wireless outfit which will be installed on the railroads.

ARRANGEMENTS were completed by P. A. Greene, manager of station WSAI, for the delivery of the first of the

## Sounds and Scenes of Convention Filmed by DeForest Reproduced

DR. LEE DEFOREST, inventor of the Daudion tube, which makes possible radio broadcasting and receiving, as well as talking motion pictures, has just invented a long-distance synchronizing device by which two cameras, one photographing sound and the other action, may be operated simultaneously, and the resultant product afterwards amalgamated in synchronization.

The Democratic National Convention afforded the opportunity for DeForest to test out his new invention. A regulation motion picture camera was set up in the Garden, where the scenes of the convention were photographed. At the same time a DeForest Phonofilm camera was in action in the studio of Dr. DeForest on East Forty-eighth street. These two cameras were connected by radio, the one in the Garden photographing the action and the one in the studio the sound. From the two negatives thus produced, positive prints were made which contain both the sound and the action. The result was a photographic reproduction of the convention.

## A SUCCESSFUL HOOK-UP

E LAINE PANDIA RALLI, daughter of Mrs. Constantina Ralli of Willowbrook Lane, Stamford, Conn., was married at the Little Church Around the Corner, New York City, to Thomas Smith Leoser, of 61 Altamont Terrace, Morris-town, New Jersey. The bride is a medical student finishing her course at Bellevue Hospital. The bridegroom is a graduate of Lehigh University, 1916. He spent two years in the service during the war. Mr. Leoser is chief engineer of the Eagle Radio Company, 16 Boyden Place, Newark, N. J., and is the designer of the Eagle Neutrodyne receiver.

## Coming Events

AUG. 16 TO 21, INCLUSIVE—Pacific Radio Exposition, Civic Auditorium, San Francisco, under auspices of Pacific Radio Trade Association, Herbert E. Metcalf, Magnavox Co., Oakland, Cal., president. A. S. Lindstrom is chairman of the exposition executive committee, assisted by C. C. Langevin, H. W. Dickow, F. J. Cramm and P. L. Jensen.

SEPT. 22-28—First Annual International Radio Show, Madison Square Garden, New York City.

OCT. 2-11—Exposition, Grand Central Palace, New York City, under auspices of American Radio Exposition Co.

NOV. 3-8—Third Annual National Radio Show, Grand Central Palace. S. L. Rothafel (Roxy) and "his gang" will broadcast from the convention.

NOVEMBER 24 TO 30, INCLUSIVE—International Radio Week.

DECEMBER 1 TO 6 INCLUSIVE—Boston Radio Exposition, Mechanics Building, Boston.

latest type transmitter. The new set will have a maximum output of five kilowatts, and will include arrangements whereby it will be possible to handle two and one-half and one kilowatt output. Arrangements made with the new Cincinnati station, WMH, will change radio-casting time for WSAI. The new schedule follows: Monday, 10:10-12:00; Tuesday, 7:00-10:00 P. M.; Thursday, 10:00-12:00 P. M.; Saturday, 8:00-10:00 P. M. and midnight.

## S-U-P-E-R-D-Y-N-E

### SPECIALISTS

Our Own Coils—guaranteed..... \$6.50  
Kit (Fluwellling Condensers, Coils and Di-gram)..... 19.50  
Complete Parts, Assembled with Diagram..... 65.00  
Superdyne Advice Free. Mail Orders Solicited.

WALLACE RADIO COMPANY, Inc.  
135 LIBERTY STREET NEW YORK CITY

# Radio's Advance in the Past Six Years

THE invention of the vacuum tube or audion formed the revolution in radio. It was invented in 1906 and placed on the market in 1912. The vacuum tube made radio reception dependable, and it is the basis of the present radiocasting stations.

There are hundreds of hook-ups or wiring diagrams which can be used with the vacuum tube, but they are all based on the original circuit. Since the advent of radiocasting two new circuits have been invented, and they involve basic principles

which were well known before the dawn of radiocasting in 1920. Consequently it is easy to understand that revolutionary developments are as rare in radio as they are in the automobile and aviation industries.

The two circuit inventions made since radiocasting started are the Super-Regenerative and Neutrodyne. The former is based upon the phenomenon of regeneration, and the latter has removed the difficulties which previously prevented the successful application of radio-frequency amplification. Another startling thing in this connection is that of the two inventions produced during the past three years only one has been developed commercially. Both have been employed by radio followers, but the Super-Regenerative system still requires a large amount of experimental development before it can be brought to practical use.

Radio engineers have long recognized that radio-frequency is one of the soundest principles of radio receiving, especially in reception of long-distance stations. This is due to two factors: first, that the maximum degree of sensitivity is obtained without a great loss in selectivity, and, secondly, five tubes of amplification can be used efficiently. The main feature of the Neutrodyne circuit is the elimination of capacity feed-back and magnetic coupling between the stages of amplification. This means that in a properly built Neutrodyne there is no regeneration or heterodyning, and no squeals or radiation.

In addition to the Super-Regenerative circuit and the Neutrodyne there has been an improvement on the Super-Heterodyne.

This type of receiver was invented in 1918, and originally involved the use of eight tubes. The latest invention on this circuit has reduced the number of tubes to six.

The analysis therefore shows that during the last six years three new systems have been evolved: the Super-Heterodyne in 1918, the Super-Regenerative in 1922, and the Neutrodyne in 1923.



**WORLD BATTERY**  
Saves You 50%

Famous Guaranteed Quality and Service—Backed by Years of Successful Manufacture and Thousands of Satisfied Users.

**Prices That Save and Satisfy**

Auto Batteries	Radio Batteries
6-Volt 11 Plate, \$12.25	6-Volt 60 Amps. \$ 8.50
6-Volt 13 Plate, 14.25	6-Volt 80 Amps. 10.00
12-Volt 7 Plate, 17.00	6-Volt 100 Amps. 12.50
	6-Volt 120 Amps. 14.50
	6-Volt 140 Amps. 16.00

Special 2-Volt Storage Battery for W.D.11 and 12 tubes. Will run 200 hours on one charge. Rechargeable. \$5.00.  
Special 4-Volt Storage Battery for U.V.199 tubes. Same features as 2 Volt. \$8.00.  
Shipment express C.O.D. subject to examination. 5% Discount for cash in full with order.

**2-Yr. Guarantee Bond in Writing With Each World Storage Battery**  
proves satisfactory World performance. Mail this ad with your name and address and we will ship battery day order is received; and give you a 45-Volt "B" Battery and Hydrometer Free with each battery purchased. Write today.

World Battery Company  
Dept. 17, 1219 S. Wabash Ave.  
CHICAGO, ILL.

**FREE**  
45 V. B-BATTERY and HYDROMETER

**RADIO CRYSTALS**  
MOUNTED, UNMOUNTED, BULK  
Packed under your own label if desired.  
Dealers and Jobbers—Write us for lowest prices on Quality Crystals.  
MELODIAN CO. OF AMERICA  
INDEPENDENCE, MISSOURI

The Ultimate Radio Receiver  
**THE FLEX-O-DYNE CO.**  
1674 Broadway (At 52nd St.)  
New York, N. Y.  
Circle 4589

**PRE-AMPLIFIER**  
A Radio Frequency Amplifier of  
**TREMENDOUS POWER**  
Gets distance, volume, less static.  
Attachable to any receiving set.  
Price complete with tube, \$25.00.  
Send for Circular  
**S. A. TWITCHELL**  
1930 Western Avenue Minneapolis, Minn.

**TELEDYNE**  
The most satisfactory radio circuit yet developed.  
M-V Teledyne Kit consisting of:  
1 tuning inductance mounted on .0025 variable inductance.  
1 variable unit comprising the R. F. Plate coil, detector grid coil and regeneration coil.

**Price \$9.00**  
Satisfaction guaranteed.  
Send for free circular.  
Jobbers—Dealers Write for discounts.  
**Mississippi Valley Radio Co.**  
203 Pine St., St. Louis, Mo.

Latest Developments in the  
**SUPERDYNE CIRCUIT**  
In Text and Diagrams

RADIO WORLD dated May 17, 24 and 31 contains a series of three articles covering all the angles of the famous Superdyne Circuit. The original Superdyne Circuit articles appeared in Radio World last December, and the three issues in which they appeared are now completely out of print. That is the reason why we have published the Superdyne series in the May 17, 24 and 31 issues. 15c. per copy, three for 45c., or start your subscription with any number.

**SPECIAL SUBSCRIPTION:** Send \$6.00 for one year's subscription and we will send you our issues of May 17, 24 and 31 as a premium.

RADIO WORLD, 1493 Broadway, N. Y. City

**Free Mailing Lists**  
Will help you increase sales  
Send for FREE catalog giving counts and prices on thousands of classified names of your best prospective customers—National, State and Local—Individuals, Professions, Business Concerns.

**99% Guaranteed 5¢ each**  
by refund of 5¢ each

**ROSS-Gould Co.**  
315 N. 10th St. St. Louis

A mid-summer subscription offer

## Subscribe NOW and Receive Another Radio Publication Without Extra Cost

- Radio World has made arrangements
- to offer a year's subscription for
  - any one of the following publications
  - with one year's subscription for
  - RADIO WORLD;
  - RADIO NEWS or
  - POPULAR RADIO or
  - RADIO BROADCAST or
  - WIRELESS AGE or
  - RADIO DEALER or
  - RADIO (San Francisco).
- This is the way to get two publications
- for the price of one;
  - Send \$6.00 today for RADIO WORLD
  - for one year (regular price
  - for 52 numbers)
  - and select any one of the other
  - six publications for twelve months—
  - Add \$1.00 a year extra for
  - Canadian or Foreign postage.
  - Present RADIO WORLD subscribers
  - can take advantage of this offer by
  - extending subscriptions one year NOW.
  - Or order thru your newsdealer.

**RADIO WORLD'S SPECIAL TWO-FOR-PRICE-OF-ONE SUBSCRIPTION BLANK**

RADIO WORLD, 1493 Broadway, New York City.

Enclosed find \$6.00, for which send me RADIO WORLD for twelve months (52 numbers, beginning ..... and also without additional cost, Radio News, or Popular Radio, or Radio Broadcast, or Wireless Age, or Radio Dealer, or Radio for twelve months, beginning ..... Put a circle around the other publication you want.

Indicate if renewal ..... Name .....

This Offer Good ..... Street Address .....

Until ..... City and State .....

August 20, 1924



**TOWER'S Scientific**  
 WEIGHS ONLY 8OZ  
 Perfect Tone Mates  
**\$2.95**  
 plus a few cents postage



**OUR \$200,000.00 COMPANY STANDS SQUARELY BACK OF EVERY HEADSET**

**WORLD'S GREATEST HEADSET VALUE**

now \$2.95, with Notable Improvements  
 Longer Cord (full 5 feet), Stronger Magnets, Higher Resistance, Increase of Sensitivity, Perfect Tone Mates  
 EVERY SET TESTED BY LICENSED RADIO OPERATORS

*Send no money - Order on a Post-Card*

THE TOWER MFG. CO., Dept. D. 98 BROOKLINE AVENUE, BOSTON, MASS.



A Manufacturers' International Exposition  
 Under the Direction of James F. Kerr  
 A MAMMOTH SPECTACLE OF SCIENTIFIC ACHIEVEMENT

*The FIRST*  
**RADIO WORLD'S FAIR**  
*Madison Square Garden*  
**SEPT. 22 to 28** Monday to Sunday Night  
 INCLUSIVE  
 1 P.M. UNTIL 11 P.M.

**Extraordinary Features Daily!**

**A MANUFACTURERS' EXPOSITION**

WHICH WILL BE ATTENDED BY THE PRINCIPAL RADIO JOBBERS AND DEALERS OF THE UNIVERSE

De Luxe Exhibits by Nationally Known American Manufacturers

Representative Displays by the Famous Manufacturers of ENGLAND, FRANCE, BELGIUM, ITALY, SWITZERLAND AND AUSTRIA

Business Office:  
 Hotel Prince George, New York City

Direction of  
 U. J. Herrmann and James F. Kerr

# Programs

Monday, August 4 (continued from page 19)

orchestra. 3 P. M., Detroit News orchestra. 3:50 P. M., weather forecast. 3:55 P. M., market reports and baseball scores. 7 P. M., Detroit News orchestra. 7:30 P. M., concert by Schmeman's concert band broadcast from Belle Isle Park.

KGO, Oakland, Cal., 312m (960k), P. T.—3 P. M., studio musical program. 4 P. M., Henry Halstead's Hotel St. Francis dance orchestra. 6:45 P. M., stock exchange and weather reports; news items. 8 P. M., educational program, with musical numbers; courses in agriculture, Spanish, music, economics and literature.

## \$15 Set Gets 2,000 Miles

The Essex Radio Special, the receiving set with a conscience, gets you more distant stations clearer and sweeter than sets costing ten times its price. \$15 Set complete with cabinet, without tube or batteries. \$20 Set complete with cabinet, tube and batteries.

### ESSEX RADIO SERVICE

617 West 125th St. New York  
Detailed information on request.

## BRISTOL AUDIOPHONE

MORE THAN A LOUD SPEAKER

Bristol Audiophone, Sr., 15-in. Horn...\$34.00  
Bristol Audiophone, Jr., 11-in. Horn...\$22.50  
Bristol Single Stage Power Amplifier...\$25.00

Write for Bulletin 3006-W  
**The Bristol Company**  
Waterbury, Conn.

For Maximum Amplification Without Distortion and Tube Noise

use the well known Como Duplex Transformers Push-Pull

Send for literature.

**COMO APPARATUS COMPANY**

446 Tremont St. Boston, Mass.

## AMPLEX

# GRID-DENSER

## GETS 'EM!

ANY Set—Cockaday, Super Heterodyne, Superdyne, or Neutrodyne—works better when equipped with GRID-DENSERS, the semi-variable-fixed condenser, for

Just by turning its knob you get the exact necessary capacity for maximum efficiency. So say: Cockaday, Haynes, Greiff, Crosby and others.

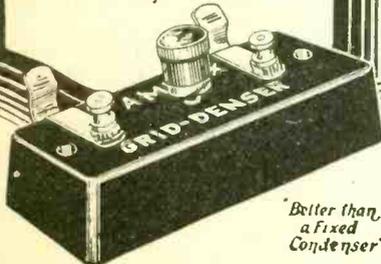
Replace your fixed condensers with GRID-DENSERS and hear those DX stations come tumbling in.

Sizes: .005, .001, Plain or with Gridleak Clips

**\$1.25**

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WHAZ, Troy, N. Y., 380m (760k), E. S. T.—9 P. M., Imperial orchestra of Kingston, N. Y., William V. Diamond, manager, with assisting soloists; address on "Right Thinking," by Mrs. Harriet Bishop Waters Christie.

WMAQ, Chicago, 448m (670k), C. S. D. S. T.—4 P. M., sport results. 6 P. M., Chicago Theatre organ recital. 6:30 P. M., Hotel LaSalle orchestra. CKAC, Montreal, 430m (700k), E. S. T.—1:45 P. M., Mount Royal Hotel luncheon concert. 4 P. M., weather, news, stocks.

WOS, Jefferson City, 411m (680k), C. S. T.—8 P. M., address, "Arrow Rock State Tavern," by Mrs. W. W. Graves of Jefferson City. 8:15 P. M., talks, "Parasites to Fight Parasites" and "Your Extension Service," by Arthur T. Nelson, State Marketing Commissioner. 8:30 P. M., program by Missouri State Prison concert band, and supplementary program of piano solos by Harry M. Snodgrass; original poem, "Midsummer in the Ozarks," Clyde Edwin Tuck.

KPO, San Francisco, 423m (710k), P. T.—4:30 P. M., Rudy Seiger's Fairmont Hotel orchestra. 5:30 P. M., children's hour stories by Big Brother of KPO. 7 P. M., Rudy Seiger's Fairmont Hotel orchestra. 8 P. M., organ recital by Theodore J. Irwin. 9 P. M., program by Etta Wilson, soprano; Walter Wenzel, pianist; Norman Simon, baritone; Festo G. Aspre, violinist. 10 P. M., E. Max Bradfield's versatile band.

KGW, Portland, Ore., 492m (610k), P. T.—11:30 A. M., weather forecast. 3:30 P. M., literary program by Portland Library Association. 7:15 P. M., police reports. 7:30 P. M., baseball scores; weather forecast; market reports.

WHAS, Louisville, Ky., 400m (750k), C. S. T.—4 to 5 P. M., selections by the Alamo Theatre orchestra; police bulletins; weather forecast for Kentucky, Indiana and Tennessee; "Just Among Home Folks," daily humorous column; selections by Dick Quinlan's Golden Derby orchestra; late news bulletins. 4:50 P. M., local livestock, produce and grain market reports. 4:55 P. M., baseball scores. 5 P. M., Central Standard time.

WDAF, Kansas City, Mo., 411m (730k), C. S. T.—6 P. M., school of the air; address, Clay Harvey, fifth of a series of talks on education; address, speaker from the University of Kansas; the Tell-Me-a-Story Lady; music, Carl Nordberg's Plantation Players, Hotel Muehlebach. 8 P. M., program by the Star's radio orchestra and the WDAF minstrels.

## Tuesday, August 5

WNYC, New York, 526m (570k), E. S. D. S. T.—7:30 P. M., police reports and alarms. 8:30 P. M., musical program composed of band selections and vocal and instrumental numbers by artists. 10:30 P. M., police alarms.

WGY, Schenectady, 380m (790k), E. S. T.—11:30 P. M., stock market report. 11:40 A. M., produce market report. 11:50 A. M., report on farm movement of lettuce, from the New York State Dept. of Farms and Markets. 11:55 A. M., U. S. Naval Observatory time signals. 1 P. M., music, excerpts from "Pinafore," WGY Light Opera Group. 5 P. M., produce and stock market quotations; news bulletins; baseball results. 6 P. M., dinner music by Joseph A. Chickene and his Clover Club orchestra. 7:40 P. M., baseball scores. 7:45 P. M., musical program.

WFAA, Dallas, Tex., 476m (620k), C. S. T.—12:30 P. M., address, DeWitt McMurray, in a medley of humor, pathos and wisdom. 8:30 P. M., musical recital by orchestra and singers from Second Avenue Baptist Church. 11 P. M., MacDowell Sisters in Hawaiian music program.

WCAE, Pittsburgh, 462m (650k), E. S. D. S. T.—3:30 P. M., baseball scores. 4:30 P. M., stock market reports; the Sunshine Girl; Pittsburgh livestock quotations. 6:30 P. M., dinner concert from William Penn Hotel. 7:30 P. M., Uncle Kaybee. 7:45 P. M., baseball scores. 9:30 P. M., musical program by the Central Four.

KGO, Oakland, Cal., 312m (960k), P. T.—4 P. M., concert orchestra of the Hotel St. Francis, San Francisco. 6:45 P. M., stock exchange and weather reports; news items. 8 P. M., Boys' band, American Legion, Post No. 83. 10 P. M.

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WWJ, Detroit, 517m (580k), E. S. T.—10:25 A. M., weather forecast. 11:55 A. M., Arlington time. 12 noon, Detroit News orchestra. 3 P. M., concert by Schmeman's concert band broadcast from Belle Isle Park. 3:50 P. M., official weather (Continued on page 30)

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# Bee Line Wiring Best

Only Exception Is for Avoiding Parallel Leads

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GRANTING that you have drilled a panel and mounted coupler, condensers, etc., thereon, mount the baseboard next.

Following that, mount the sockets and transformers on the baseboard. Then remove the baseboard and wire your A battery leads. Always wire these before you complete any other wired connections. As all A battery wiring is the same (excepting whether A+ or A- goes through the rheostat) you should have no trouble here. Do not be afraid to use the bee-line system of wiring. The shortest distance between two points is a straight line. That axiom is just as valuable in radio as anywhere else. Disregard any advice no matter from whom, against the use of the bee-line method. One argument used against it is that it makes the wiring hard to follow on trouble-shooting expeditions. Perhaps straight leads will necessitate less such disappointed efforts. However, if you will slide 1/4 inch of colored spaghetti over a wire, that should identify it as well as any Bertillon system. Use the same colors for the same leads and your wires will be like pigeons wearing identification circles.

Always, however, avoid parallel leads, and if you must bend wire, do not bend it at right angles, but in a semi-circle.

Drill for rheostats after the location of the sockets on the baseboard is determined.

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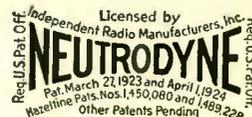
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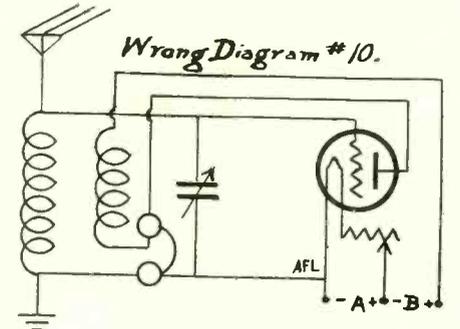
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THE wiring in the accompanying diagram is wrong. If you find what you think is the error, write to Wrong Diagram



Editor, RADIO WORLD, 1493 Broadway, New York City. Mention Wrong Diagram No. 10. The names and addresses of those sending in the right answer will be published. The following sent in the correct answers:

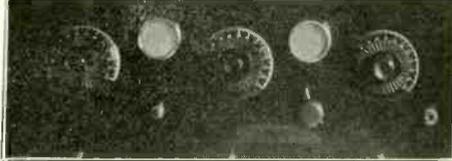
### WRONG DIAGRAM NO. 9

- John A. Rose, 190 West End Ave., N. Y. City.
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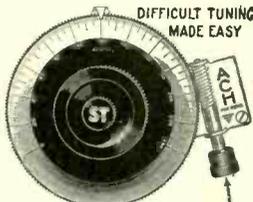
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All vacuum tube filaments should be operated at the lowest temperature that will give satisfactory results. The proper operating temperature of WD12 filaments is such that a dull red color, usually invisible in daylight and frequently barely visible in darkness, is produced. Excessive filament current will greatly shorten the life of the filament.

Care should be taken that the plate voltage is not accidentally applied to the filament as it will instantly destroy the filament. It is advisable to remove tubes when changing connections.

It is preferable to mount tubes vertically. They should also be mounted on cushioned supports to prevent undue noise from vibration. This applies particularly to tubes used as detectors.

The characteristics of the WD12 are such that it works best as a detector when the grid return is connected to the positive end of the filament. Normal plate voltage for detection is 20. In some circuits it may be necessary to use more than 20 volts. A grid condenser of .00025 microfarad and a grid leak of not less than 3 megohms are recommended. The grid leak used should be of such a value that the set will go into and out of oscillation smoothly, that is, without a plop and without hangover.

For use as an amplifier, the grid return should be connected to the negative end of the filament, or better still, to the negative end of the battery with the rheostat in the negative lead. With plate voltages up to 50 no further bias will be necessary.

For higher plate voltages, a separate bias battery is advisable.

A potentiometer is not necessary but offers a means of controlling the bias. If it is not used, the positive side of the bias battery should be connected to the negative side of the filament battery. For plate voltages between 50 and 75, 1½ volts bias should be used. For plate voltages between 75 and 100, 3 volts bias should be used.

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# Programs

## Tuesday, August 5 (continued from page 26)

forecast. 3:55 P. M., market reports and base-

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\$100.00 reward if you can blow your tubes with this protector in your street according to our instructions. SUPER ULTRADYNE Transformers, complete set including blue print. . . . \$16.00  
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ball scores. 5 P. M., baseball scores. 7 P. M., Detroit News orchestra. 7:30 P. M., concert by Schmemman's concert band.

WMAQ, Chicago, 448m (670k), C. S. D. S. T.—4 P. M., sport results. 6 P. M., Chicago Theatre organ recital. 6:30 P. M., Hotel LaSalle orchestra. 8 P. M., Harry Hansen, literary editor. 8:20 P. M., Babson report. 8:30 P. M., Miss Clara E. Loughlin, travel talk. 9 P. M., talks by the United States civil service commission. 9:15 P. M., to be announced.

CKAC, Montreal, 430m (700k), E. S. T.—4 P. M., weather, news, stocks. 7 P. M., kiddies' stories in French and English. 7:30 P. M., dinner concert from Mount Royal Hotel featuring Rex Battle. 8:30 P. M., White Star Line S. S. orchestra. 10:30 P. M., Mount Royal Hotel Roof Garden dance orchestra.

KPO, San Francisco, 423m (710k), P. T.—2:30 P. M., organ recital by Theodore J. Irwin. 4:30 P. M., Rudy Seiger's Fairmont Hotel orchestra. 5:30 P. M., children's hour stories. 6 P. M., Rudy Seiger's Fairmont Hotel orchestra. 8 P. M., U. S. Army Third Coast Artillery band, "Guardians of the Golden Gate." 10 P. M., E. Max Bradford's Versatile band.

KGW, Portland, Ore., 492m (610k), P. T.—11:30 A. M., weather forecast. 3:30 P. M., children's program. 7:15 P. M., police reports. 7:30 P. M., baseball scores; weather forecast; market reports. 8 P. M., concert arranged by Seiberling-Lucas Music Co.

WNYC, New York, 526m (570k), E. S. D. S. T.—7:30 P. M., police reports and alarms. 8:30 P. M., musical program composed of band selections and vocal and instrumental numbers by artists. 10:30 P. M., police alarms.

WHAS, Louisville, Ky., 400m (750k), C. S. T.—4 P. M., selections by Dick Quinlan's Golden Derby orchestra of the Walnut Theatre; police bulletins; weather forecast; "Just Among Home Folks," daily humorous column; selections by the Alamo Theatre orchestra; late news bulletins. 4:50 P. M., baseball scores. 5 P. M., baseball scores. 5 P. M., Central Standard time. 7:30 P. M., concert by the Zur Schmiede Harmony Diggers; late important news bulletins; baseball scores; Central Standard time.

WDAF, Kansas City, Mo., 411m (730k), C. S. T.—6 P. M., school of the air; address, eighth of a series of piano lessons by Miss Mandellen Little (Concluded on next page)

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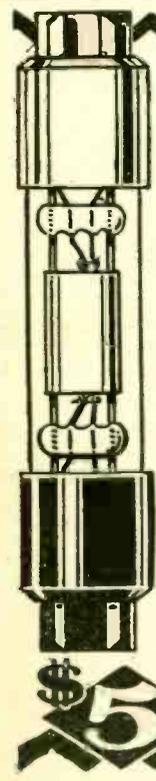


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- An Ultra-Sensitive 3-Tube Reflex. By Byrt C. Caldwell.
- June 14—A Sensitive Double Superdyne. By Fennimore Keene.
- How to Build a Set Like King George's. By Chas. H. M. White.
- A Super-Power 4-Tube Reflex. By Byrt C. Caldwell.
- June 28—Nineteen Ways to Erect an Antenna. By P. E. Edelman.
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Wednesday, August 6

(Concluded from preceding page)

field; address Clerin Zumwalt, author and lecturer, eleventh of a series of educational lectures; the Tell-Me-a-Story Lady; music, Carl Nordberg's Plantation Players, Hotel Muehlebach. 11:45 P. M., Nighthawk Frolic, the Riley-Ehrhart Winnwood Beach orchestra.

WGY, Schenectady, 380m (790k), E. S. T.—11:30 A. M., stock market report. 11:40 A. M., produce market report. 11:45 A. M., weather report. 11:50 A. M., report on farm movement of lettuce, from the New York State Dept. of Farms and Markets. 11:55 A. M., time signals. 5 P. M., produce and stock market quotations; news bulletins; baseball results. 5:30 P. M., "Adventure Story."

WFAA, Dallas, Tex., 476m (620k), C. S. T.—12:30 P. M., musical recital, presenting the Red-Head Girl of the Dallas Journal.

WCAE, Pittsburgh, 462m (650k), E. S. D. S. T.—3 P. M., piano recital by Fred Rosenfeld, exclusive WCAE artist. 3:30 P. M., baseball scores. 4:30 P. M., stock market reports; Uncle Kaybee; Pittsburgh livestock quotations. 6:30 P. M., dinner concert from William Penn Hotel. 7:30 P. M., the Sunshine Girl. 7:45 P. M., baseball scores. 9:30 P. M., musical program.

WWJ, Detroit, 517m (580k), E. S. T.—10:25 A. M., weather forecast. 11:55 A. M., Arlington time. 12 noon, Detroit News orchestra. 3 P. M., concert by Schmeman's concert band broadcast from Belle Isle Park. 3:50 P. M., weather forecast. 3:55 P. M., market reports and baseball scores. 5 P. M., baseball scores. 7 P. M., Detroit News orchestra. 7:30 P. M., concert by Schmeman's concert band.

KGO, Oakland, Cal., 312m (960k), P. T.—3 P. M., musical program; speaker, courtesy Cora L. Williams Institute, Berkeley. 4 P. M., concert orchestra of the Hotel St. Francis, San Francisco. 6:45 P. M., stock exchange and weather reports; news.

WMAQ, Chicago, 448m (670k), C. S. D. S. T.—4 P. M., sports results. 6 P. M., Chicago Theatre organ recital. 6:30 P. M., stories for children by Miss Clara E. Laughlin. 8 P. M., weekly Northwestern University lecture. 9 P. M., talk from one of the Chicago charities. 9:15 P. M., Carl Craven, tenor.

CKAC, Montreal, 430m (700k), E. S. T.—1:45 P. M., Mount Royal Hotel classic concert. 4 P. M., weather, stocks, news.

WOS, Jefferson City, Mo., 441m (680k), C. S. T.—8 P. M., address, "Inoculation for Legumes," by William A. Albrecht. 8:15 P. M., address, "The State Fair Egg Show" (conducted by the Studio Light Opera Group. 5 P. M., produce and stock market quotations; news bulletins; baseball Marketing Bureau), by D. C. Rogers. 8:30 P. M., musical program of old time barn dance tunes by trio, direction of D. B. Jones of Stephens.

KPO, San Francisco, 423m (710k), P. T.—2:30 P. M., musical matinee. 4:30 P. M., Rudy Seiger's Fairmont Hotel orchestra. 5:30 P. M., children's hour stories. 7 P. M., Rudy Seiger's Fairmont Hotel orchestra. 8 P. M., E. Max Bradford's Versatile band.

KGW, Portland, Ore., 492m (610k), P. T.—11:30 A. M., weather forecast. 3:30 P. M., talk by Jean-

ette P. Cramer, home economics editor. 7:15 P. M., police reports. 7:30 P. M., baseball scores; weather forecast; market reports. 8 P. M., concert. 10 P. M., dance music by George Olsen's Metropolitan orchestra of Hotel Portland.

Golden Derby orchestra; late important news bulletins. 5:40 P. M., local livestock, produce and grain market reports. 4:55 P. M., baseball scores. 5 P. M., Central Standard time. 7:30 P. M., concert, direction of Mrs. Jane Webster Murrell; late news bulletins; baseball scores; Central Standard time.

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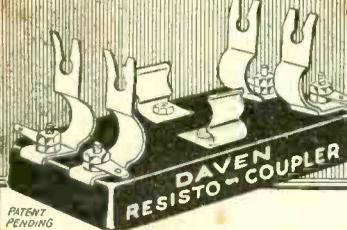
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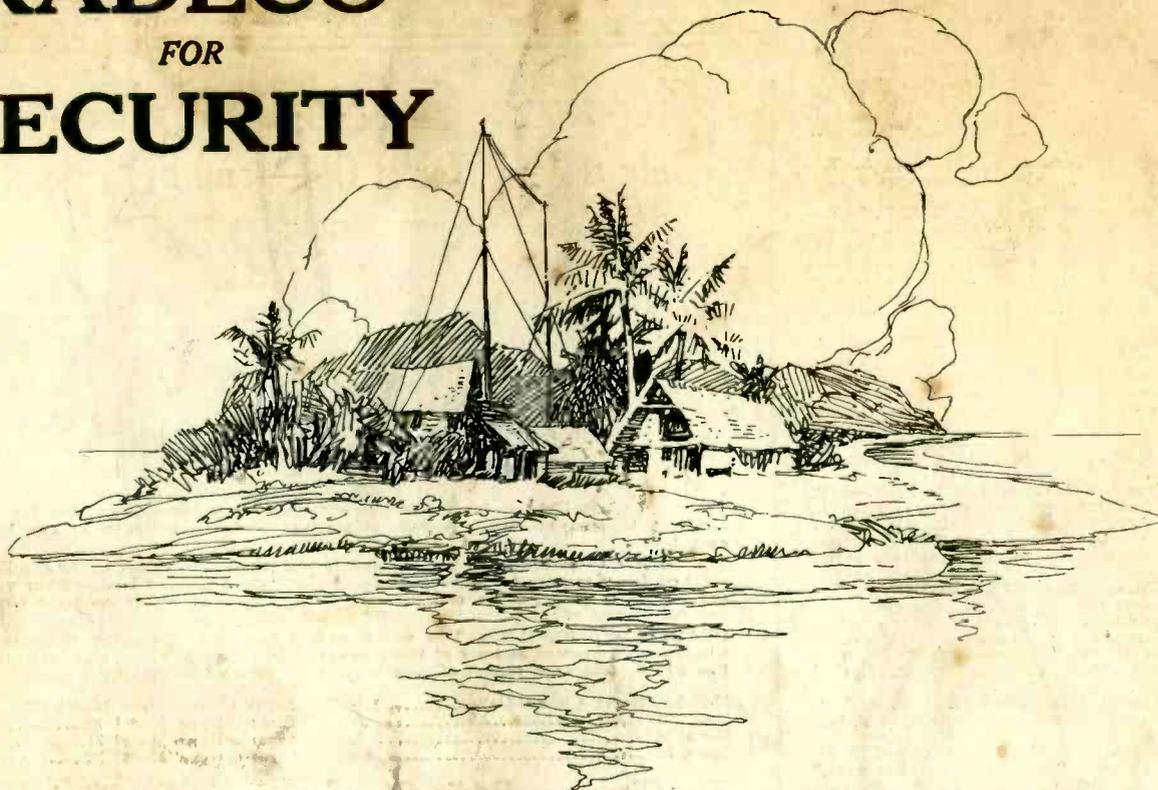
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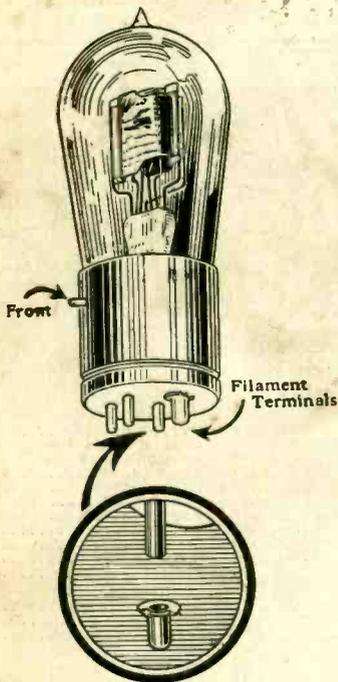
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