

AUGUST 16

1924

LOW  
LOSS

NEUTRODYNE

15 Cents

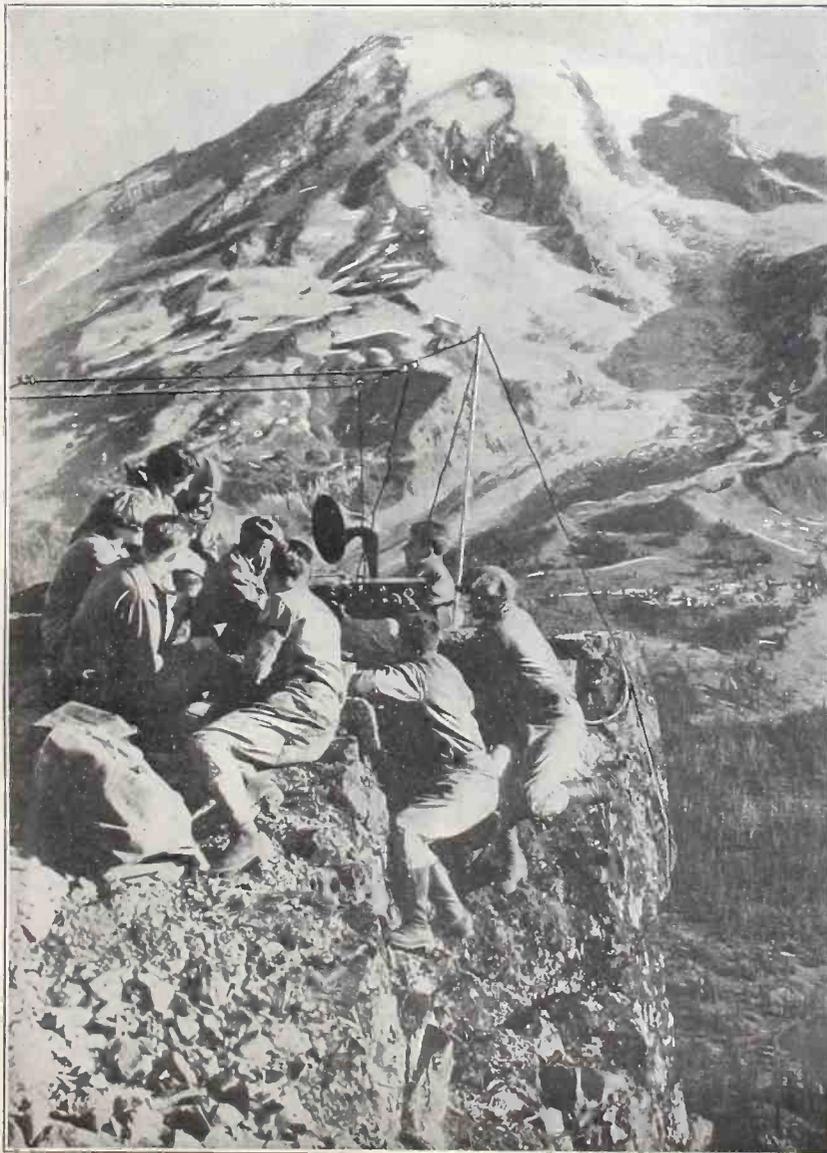
SUPERDYNE PRINCIPLE ON 3 TUBES

# RADIO WORLD

Title Reg. U. S. Pat. Off.

VOL. 5. NO. 21. 195-125 ILLUSTRATED

EVERY WEEK



## HOW TO BUILD

- An All-Around Portable, 3 Tubes.
- A Current Supply Unit So You Can Light Tubes from Electric Socket.
- All Your Receiving Apparatus in a Cabinet.

## IN THIS ISSUE—

*Brainard Foote*  
*Lester Hutter*  
*Herbert E. Hayden*  
*Brewster Lee*  
*Neal Fitzalan*  
*B. J. Bongart*  
*N. N. Bernstein*  
*Herman Bernard*

*They said it couldn't be done!*

**HERE**  
**it is at**

**\$60**

**A 5-TUBE SET**

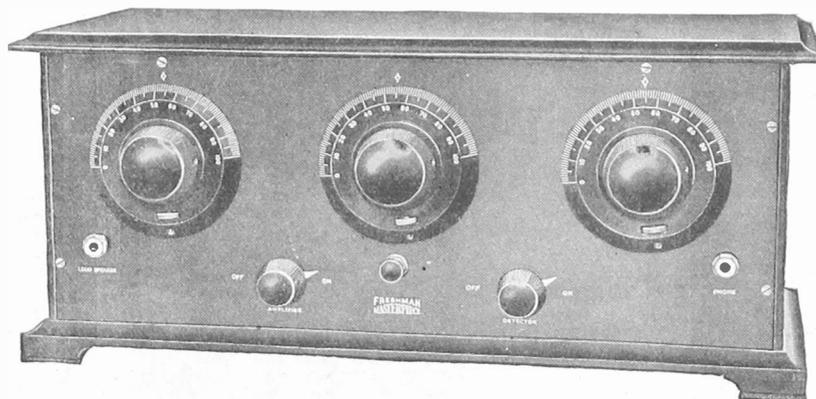
Clarity  
Beauty  
Volume  
Distance  
Selectivity

built of the finest low loss material and in a beautiful genuine solid mahogany cabinet at only *sixty dollars*.

*Ask your dealer for a free demonstration  
Complete literature gladly sent on request*

**FRESHMAN  
MASTERPIECE**

No neutralizing or balancing condensers to fuss with. Self-balanced—low loss.



*A Tuned Radio Frequency Receiver*

that will bring even the most distant stations to your home with surprising clarity and volume. So selective that you can pick up any station you want—night after night—at the same dial settings, and, what's more, it is the easiest set in the world to operate.

Chas. Freshman Co., Inc., 106 Seventh Ave., New York

# RADIO WORLD

[Entered as second-class matter, March 28, 1922, at the Post Office at New York, N. Y., under the Act of March 3, 1879]

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 & 2063.

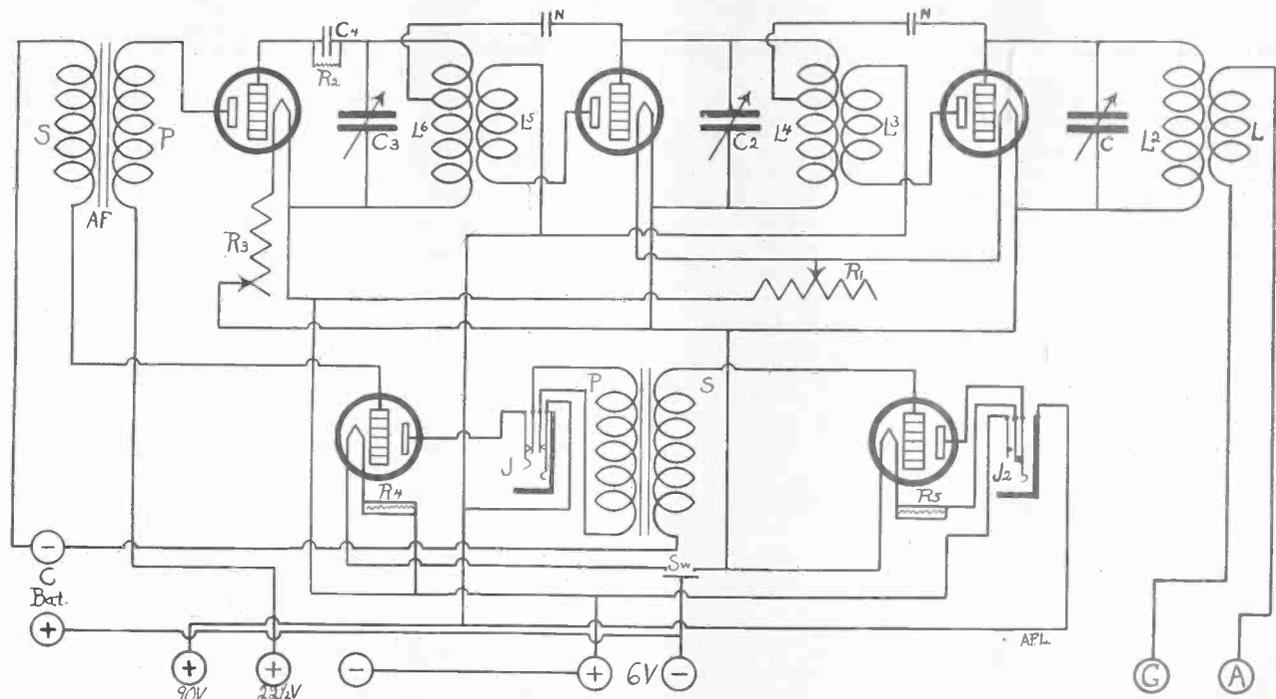
Vol. V. No. 21. Whole No. 125.

August 16, 1924

15c. per copy, \$6.00 a year

## A Low-Loss Neutrodyne

**T**he Magnadyne, RADIO WORLD'S Improved 5-tube Receiver, Comprises Two Stages Tuned Radio Frequency, Neutralized for Lower Wavelengths, Detector and Two Stages Audio-Frequency Amplification



**WIRING DIAGRAM (Fig. 1)** of the Magnadyne. Contrary to the general design of circuits, this one presents the wiring to the builder as it appears in looking down at the set from the rear, reading right to left, in which position it is customary and convenient to do the wiring. The binding posts are arranged from right to left instead of vice-versa. The jacks are placed near the two audio-frequency tubes for convenience, as is the switch in the negative A battery lead. These three parts are of course located on the panel, as are also the two rheostats. The C battery is wired to both audio-frequency stages, thus utilizing one battery for both. When no C battery is used the binding posts provided for that battery are connected with a piece of wire to complete the circuit. The last jack has a filament control connection so that when listening in on the first stage the fifth tube is automatically turned off. The small neutralizing condensers are located underneath the first and second tuning condensers. Once adjusted for the lower wavelengths these need not be changed. Many detector tubes do not require a grid leak. This must be decided by the builder, who after completing the set should try the tube with and without the leak. One rheostat controls the two RF tubes, and the other controls the detector tube. Two fixed resistances control the two AF tubes. The feature of this set are the low-loss home-made coils. Full directions for winding them will be published next week.

By **N. N. Bernstein**

Technical Editor

Construction Designs by **A. F. Lapierre**

### PART I.

**C**OUNTLESS thousands are continually asking authorities on radio a most vital question pertaining to sets, a question answered in a most satisfactory manner by a report on a questionnaire inquiring which was the most popular set. The figures showed that fully 52 per cent. of the total favored tuned radio-frequency sets. The result of this questionnaire, the report of which was published in RADIO WORLD, issue of August 9, clearly shows that sets of the 5-tube Neutrodyne type have become a popular fixture with the American public. This is because of the very good sensitivity of the outfit, combined with the ease of tuning and good quality of reception afforded.

There have been many types presented, all more or less satisfactory, but there was room for improvement and I purpose to describe the accomplishment. The most important part of the circuit, that relating to the two stages of tuned radio-frequency amplification, perhaps has not received all the serious attention due it.

# Panel for Bernstein's Set

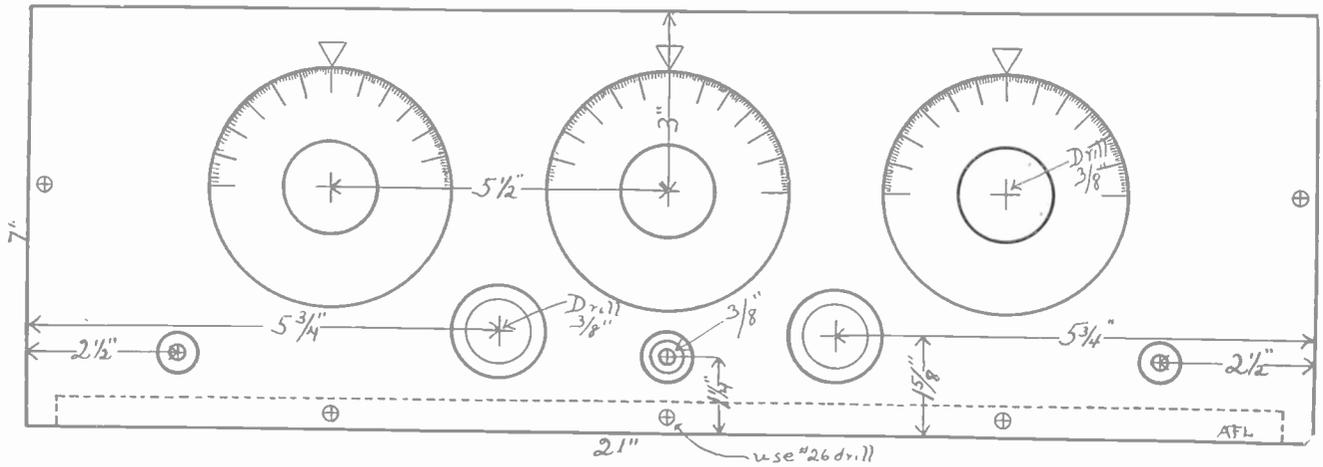


FIG. 2—Drilling dimensions are all given above so that all the constructor need do is to lay out the lines on the panel or on a template with the assurance that the holes will positively be in their proper places. For a dull finish, rub the panel with emery cloth or sandpaper till the gloss disappears, and polish with an oily rag.

In this article I will pay particular and strict attention to the construction of the radio-frequency transformers, which are the low-loss Dynocoils, first described in RADIO WORLD, issue of August 9, in the article on the Dynoflex. The wiring, which is standard for tuned radio-frequency, incorporates several important improvements, simplifying the wiring to an appreciable extent. The use of fixed filament resistance in the audio-frequency stages, which anyway do not require fine rheostat adjustment, greatly simplifies the wiring and controls. In many sets one rheostat is employed to control four tubes—the two radio-frequency tubes and the two audio-frequency tubes. But experiments have proved that the two AF tubes are not critical, whereas the two RF tubes are better controlled by a separate rheostat. Minute adjustment is not necessary unless increased volume is desired on distant stations, when the RF tube filaments are lit a bit brighter, increasing the electronic emission to the plate. The detector tube of course is controlled by a separate rheostat. It was found that the 201A type tube, consuming low current, made an excellent detector, and also that the filament current for this type of tube is not critical, thereby further simplifying the operation of the set. The fixed resistances used to control the AF filament current should match the type of tube used.

The elimination of the double-circuit jack usually employed at the detector tube is another feature of the circuit. Listeners-in on 5-tube sets almost always plug in the first AF stage to tune in DX sharply, then plug the loud speaker on the second AF stage. Seldom is the detector jack used, even on 3-tube sets. **The absence of this useless jack therefore means one less part to buy and four less connections to make.** A double-circuit jack is used after the first AF stage for listening in at such time when the loud speaker cannot be used, and to tune in new stations. For the last stage a single-circuit filament control jack is used so that when you plug in on the first AF stage the last tube is automatically extinguished. **This not only saves the A battery but also materially reduces the drain on the B battery.** As long as a tube filament is lit, and there is a high potential on the plate, some current is drawn from the B battery, even if the tube is not in use. The moment the filament is not heated no current is drawn from the plate.

In addition to this means of conserving energy, provision for a C battery is made for both AF stages.

It is well-known that the C battery is an immense improvement in the AF stages of any circuit because it irons out many of the undesirable battery and stray noises in the amplifiers and improves the modulation of the received wave to a great extent. It is also well known that the C battery practically cuts the drain from the B battery in half, thus prolonging the life of the B battery in many cases 100 per cent. This is an important factor when considering the operating cost of a radio receiver.

It is not necessary to neutralize the two RF tubes except for the lower wavelengths, because it was found that the construction and placement of the Dynocoils caused no intercircuit coupling and that the only time the RF tubes would oscillate was on the very low wavelengths, if at all. The method of neutralizing the circuit in this manner will be described in detail.

As in all other similar type sets the tuning is accomplished by three 23-plate variable condensers. **It is essential for best results that these should be of the low-loss type.** The slightest loss in the RF unit due to insulation losses causes a highly detrimental effect in both volume and sharpness in tuning. Verniers are not needed if a 4-inch dial with a large turning knob is used, as these dials will tune fine. Many fans tune their condensers by placing their fingers at the outer edge of the dials, thereby obtaining the vernier effect.

The AF transformers must come in for their share of consideration, as they are a very important part of the circuit, directly affecting the quality of reception. Using the C battery, both AF transformers may be 4 1/2 or 5-to-1 ratio. This even combination can give volume even exceeding desire on local and nearby stations. Be sure to use a reliable make of transformer to avoid future regrets. You are safe in using any of the brands advertised in this publication, as they have all stood the test.

There are two jacks, as before mentioned, one double-circuit jack and one single-circuit filament control jack. A chain is as strong as its weakest link, says the old proverb. This saying applies especially to radio. Untold trouble and failure have been caused by poorly-built jacks and bad insulation. Don't fall down here just because you have to pay a few cents more for a good jack. Rather play safe and get the best one you can. And don't forget that in soldering to the jack not to allow the slightest bit of flux to run down the leaves to the insulation, for the best jack

(Concluded on page 12)

# Super-Audible Wave Brought Nearer by the 3-Tube Super-Heterodyne

*Scientists try to devise practical way to transmit on audible waves so that no tubes or coils will be needed to hear signals—3-tube Super-Heterodyne developed on long-wave principle and functions without any detector.*

See Log *4-1-35* Issue 124

[Full constructional diagrams and data for building the 3-tube Super-Heterodyne appeared in RADIO WORLD, issue of August 9. The set, complete, was built at a cost of \$55, including tubes, but not storage battery. Dry cells may be used.]

By B. J. Bongart

THE 3-tube Super-Heterodyne described in RADIO WORLD, issue of August 9, was developed by combining two construction principles—the common heterodyne and the long-wave receiver. We have in the first half of the heterodyne, i.e., 1 stage of radio-frequency and the oscillator which produces by heterodyning any wavelength desired. In most receivers of this type a wave of from 1,800 to 10,000 meters is produced. The object is to stabilize the radio-frequency stages, as it is well-known that long waves (low frequencies) are most stable and easier to control than short waves (high frequencies). If radiocasting on waves of 25,000 meters and over were possible, our receivers would be far simpler than they are today.

Fig. 1 shows a long-wave receiving hook-up. If radiocasters were using waves of 30,000 meters and over, this hook-up would be the simplest and most desirable one, but since radiocasting is done on short waves only, what good is a long-wave hook-up? Fig. 1 is simply an audio-frequency receiver, using two transformers, two tubes and a variable condenser. There is no tuner necessary, no detector tube, no coils—it works with a condenser only. That is simplicity indeed! But where are the long waves on which this type of receiver works?

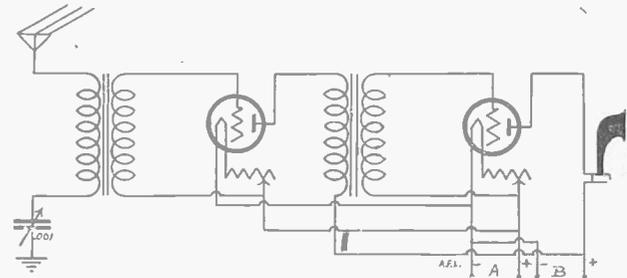
Now in the 3-tube Super-Heterodyne we have the two hook-ups, heterodyne and long-wave receiver in one. As we can produce any wavelength by heterodyning, why confine ourselves to waves of from 1,800 to 10,000 meters, as is done in most Super-Heterodynes? Why not use a wavelength long enough to permit employing the long-wave hook-up? 50,000 meters is about as long a wave as can be handled with equipment now available and it permits the discarding of the detector tube, cascaded stages of RF, etc.

A wave of 400 meters has a frequency of 750,000 vibrations per second, but no human ear can possibly hear this, not even as noise. Now if we heterodyne a 400-meter wave into a wave of say 10,000 meters we automatically reduce the frequencies of from 750,000 to 30,000 per second. But even these comparatively "few" frequencies we cannot possibly hear. From 15,000 vibrations per second down, we hear something.

Long-wave reproduction is desirable. It is more natural and brings out tone qualities better, since the detector tube is unnecessary. The detector tube is merely a rectifier, making inaudible harmonics audible, but does so by artificial means, which spoils the faithfulness.

Prof. Van Coussenz says:

"Give us a wavelength long enough and we can re-

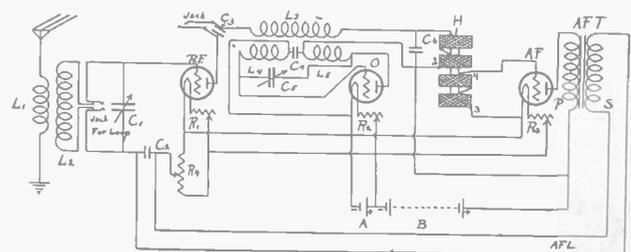


JUST your standard two stages of transformer-coupled audio-frequency amplification, plus a 43-plate variable condenser (Fig. 1), gives fine reception IF stations are radiocasting on a 30,000-meter wave. There is no tuner, no detector tube. The long-wave principle is used in the 3-Tube Super-Heterodyne, the incoming wave being heterodyned to 50,000 meters; hence the third tube. Honeycomb coils in series, functioning as an RF and AF transformer combined, with a 1-to-1 ratio, are used.

ceive radiocasting by merely attaching the phone or loud-speaker directly to an aerial."

By this is meant that we could discard all tubes, transformers and all paraphernalia, if only the wavelength was long enough to make direct hearing possible. It is the super-audible wave that many are now working on.

## Circuit Constants



Circuit Network of the 3-Tube Super-Heterodyne.

THE actual assembly of the 3-Tube Super-Heterodyne, which operates on a loop for local stations, but requires an aerial for DX, is not difficult. The disposition of the parts, however, is important, and a plan solving this in the best way was published last week. The constants are L1L2, fixed coupler, 15 and 65 turns respectively; L3, pick-up coil, is 10 turns; L4, 35 turns, and L5, 35 turns; L3, L4 and L5 being the oscillator coil, on one tube; C1 is .00025 or 17 plates; C2, .001 fixed; C3, .001 or .002—try both; C4, .001; C5, .001 variable, or 43 plates; C6, .001; R1, R2, R3, rheostats; R4, potentiometer; H, four 1,500-turn honeycomb coils.

It is important that the honeycomb coils be connected as shown, otherwise the set may not work. The outside of the top coil H is connected to the inside of the next. The same procedure is followed in the next two series-connected coils.

# An All-Around Portable for Home or Outdoor Use

By Herbert E. Hayden

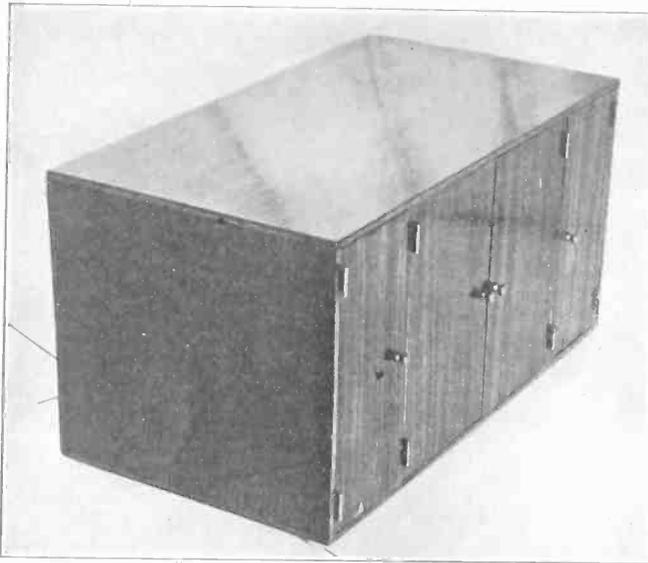


FIG. 1—The cabinet for the Hayden All-Around Portable Set measures 15 $\frac{1}{4}$  inches long, 8 inches high, by 8 $\frac{1}{2}$  inches deep. It is constructed of three-ply veneer mahogany. Not only is the set useful about the home, where it can be carried with ease to any room, but it is so neat and compact that a small leather carrying strap may be belted about it and carried with you to the courtly, lake or seashore when you go on your Labor Day vacation. The beautiful mahogany cabinet makes the set a suitable piece of furniture for any room in the home.

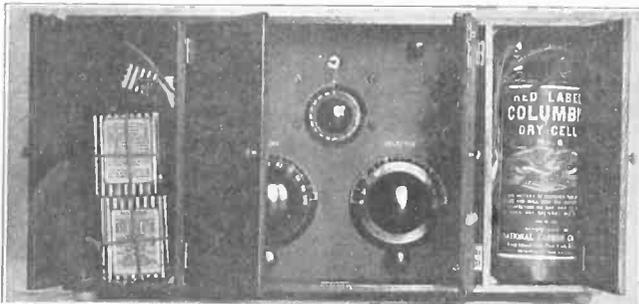


FIG. 2—Showing all doors open and compartments for A and B batteries. The C battery is also shown. The doors are provided with push button catches, the same as are used on phonographs. The No. 6 dry-cells are placed in the right hand compartment and the small size B batteries at the left.

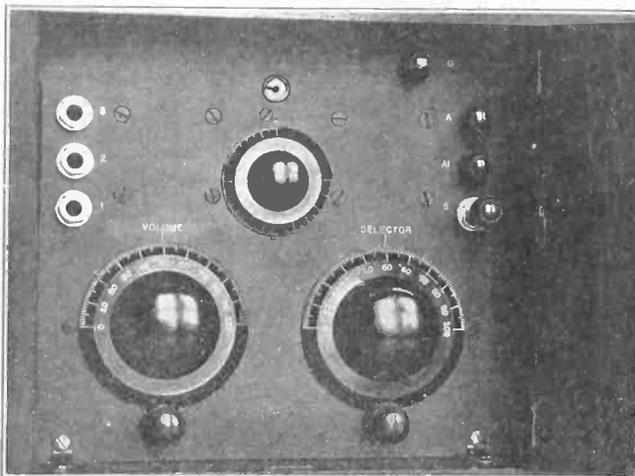


FIG. 3—Close-up of panel on which the entire apparatus is mounted. Panel measures 7 $\frac{3}{4}$  x 8 $\frac{3}{4}$  inches. Attention is directed to the lock on at the top of the panel which permits quick removal of the entire unit from the cabinet.

HERE is a long-distance, selective 3-tube set that is worth making. It is a set that will operate equally well in the living room or camp as it is entirely self-contained.

Two types of circuits are available, a single circuit and a special selective circuit that tunes very sharp and under some conditions is very desirable and necessary.

Fig. 1 shows the case, which is constructed of  $\frac{1}{4}$ " mahogany veneer and measures outside, 15 x  $\frac{3}{4}$ ", 8" high, and 8 $\frac{1}{2}$ " deep. Four rubber feet are provided.

Fig. 2 gives a view of the battery compartments and the central space for the unit. The doors are provided with push-button catches as used on phonographs.

Fig. 3 gives a close-up of the  $\frac{1}{8}$ " bakelite panel, which measures 7 $\frac{3}{4}$ " x 8 $\frac{3}{4}$ ". The entire apparatus is mounted on the rear of this panel. The 3" dial and rheostat dial are those of the Kursch-Kasch Co.; vernier knobs by Fleron Co.

Fig. 4 shows the ease with which the entire unit is removed from the case, as it will be seen that it is only necessary to insert a key in the lock at the top of the panel, tilt the panel forward, and lift the unit clear of the cabinet. The two "pins" or "feet" on the bottom of the panel drop into little slots in the base of the case when the panel is locked into position.

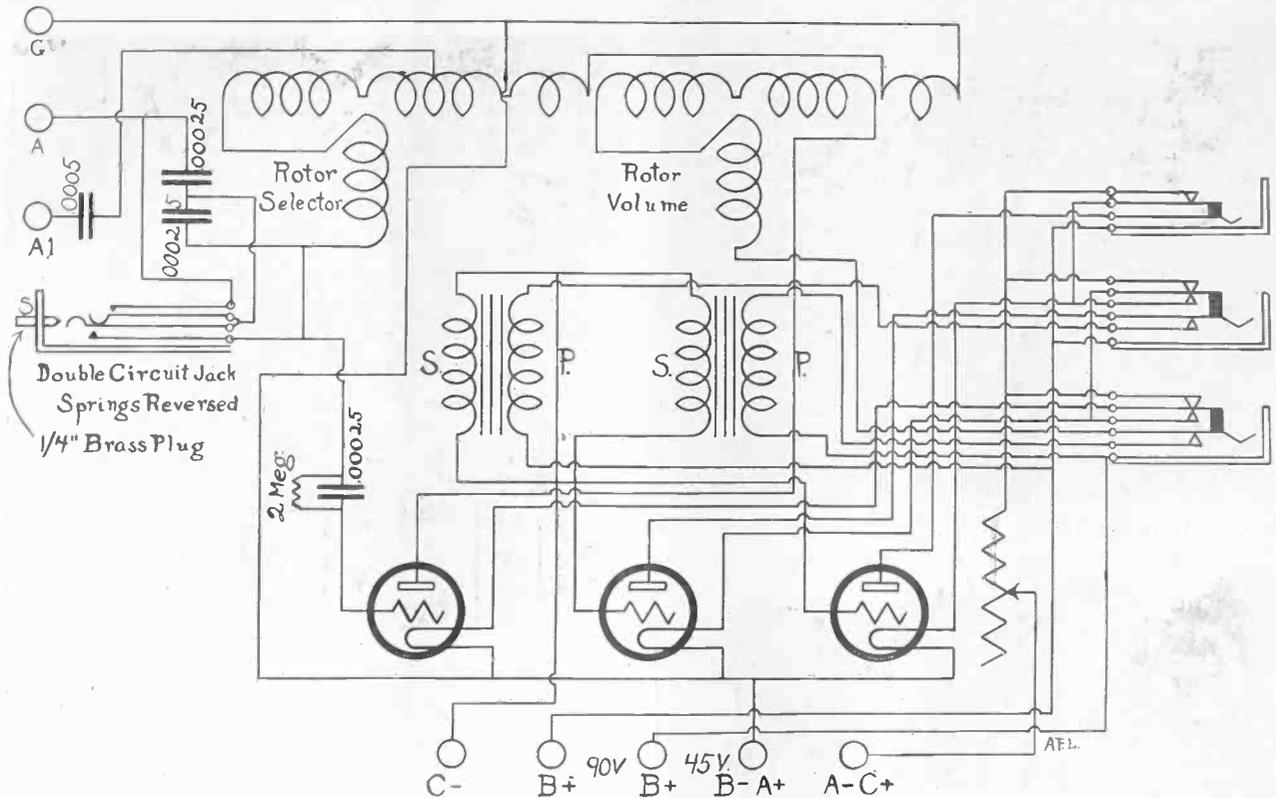
Fig. 5 gives a rear view of the unit and it should be carefully noted that the connecting wires, No. 14 H.D. copper, are used not only for the purpose of electrical connection, but also to hold the tubes suspended in a shock-absorbing fashion which eliminates tube noises. This also makes for compactness. The shield in front of the tuner is aluminum  $\frac{1}{32}$ " thick and measures 7 $\frac{1}{2}$ " x 3 $\frac{1}{2}$ ". If desired, copper or tin foil may be used. Flexible leads connect the unit with the A, B and C batteries.

The top view of the apparatus as shown in Fig. 6 gives the location of the parts, such as the transformers, rheostat, WD11 tubes and Dubilier condensers. The close-up of the tuner (Fig. 7) gives the reader some idea of the simplicity of the tuning element construction. It is in effect two specially constructed, loosely-coupled variometers, the operation of which is extremely satisfactory. The volume on head sets or loud speaker is remarkable. The tube is cardboard 3 $\frac{1}{2}$ " in diameter, 7 $\frac{1}{2}$ " long with a  $\frac{1}{8}$ " wall. The two rotors are also made from cardboard tubing 2 $\frac{1}{2}$ " in diameter and 1 $\frac{3}{8}$ " wide. If desired, bakelite tubing can be used. The stator winding of the aerial tuning inductance (surrounding the selector rotor windings; see circuit diagram) is composed of 20 turns of No. 26 DSC magnet wire. A space of  $\frac{3}{4}$ " is left to make room for the shaft and another 20 turns wound with a tap at the 10th turn. This is shown in the diagram connected through a .0005 Dubilier to S 1. Continue the winding, leaving a space of about 2" and wind 6 turns, then leave another space of about 3" and wind 6 turns more.

The stator winding for the plate variometer also consists of 20 turns each side, leaving a space of about  $\frac{1}{8}$ " between the 6 turns of the aerial inductance which surrounds the plate stator winding on each side, but is not connected to it. Both of the aforementioned rotors

(Concluded on page 8)

# Circuit Network of Selective Set



ABOVE—Wiring diagram for Hayden's unique portable radio receiver. It looks complicated, but when the actual work is being done it resolves itself into simplicity itself. You can solder flexible leads onto the jack leaves before mounting them on the panel, so that after mounting the rest of the wiring will be that much easier to do. One rheostat controls all three tubes. If the standard single circuit is desired the aerial is connected to post A and the ground to post G. If this does not prove selective enough connect the aerial to A-1, and the ground to G and A. The push-pull switch is manipulated in each case.

AT LEFT—Detail of how to connect antenna and ground for broad and sharp tuning, as described above. When the aerial and ground wires are on A and C, and jack switch plug pushed in, the set will respond to the highest wavelength. When the switch is pulled out, one .00025 mfd. fixed condenser is placed in series with the ground, thereby reducing the effective wavelength of the antenna. When more selective tuning is desired, and the ground placed on G and A, and the antenna on A-1, the .005 mfd. condenser is placed in series with the antenna and the tap on the first coupler stator winding. The double-circuit jack used as the switch must be taken apart and the springs reversed as shown in the diagram above, on the left side. The contact point leaves are transposed to the outside and the long leaves to the inside. These two long leaves, now in the center, are soldered together at the tips.

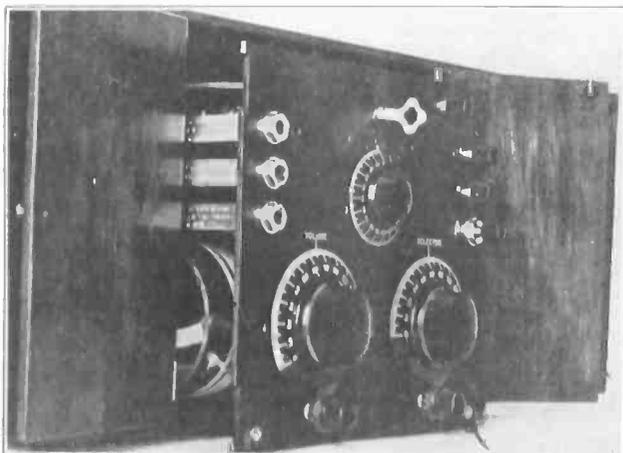
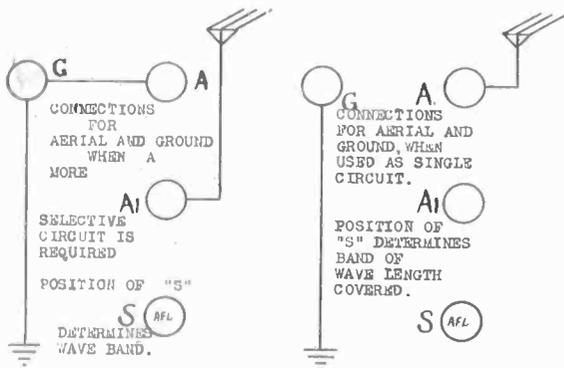


FIG. 4—Unit partly removed from the case. The two pins or feet on the bottom drop into a recess in the base of the cabinet when the panel is locked into position.

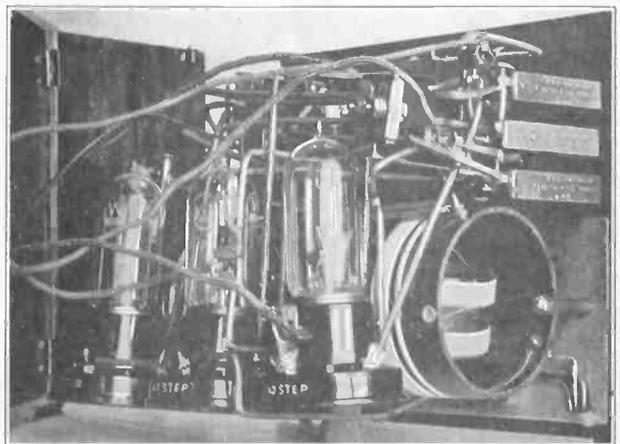


FIG. 5—Rear view of the completed set. As can be easily seen from the photo all leads and wiring must be well insulated. The wiring looks to be all jammed in close together, and it is, but the location of the parts enables very short leads. The tuner, lower right, is shielded from the panel by a copper plate or heavy foil. Flexible leads run from the battery connections through the sides of the center compartment partitions to the spaces provided for the dry-cell A and B batteries. Notice how all the negative A battery leads are soldered to the shield at the extreme lower right-hand corner.

# Push-Pull Switch Aids Operation

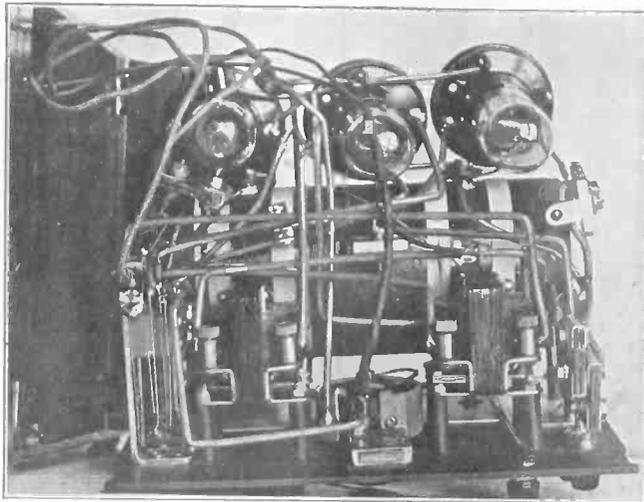


FIG. 6—Top view of the portable. Good workmanship is necessary in such close quarters.

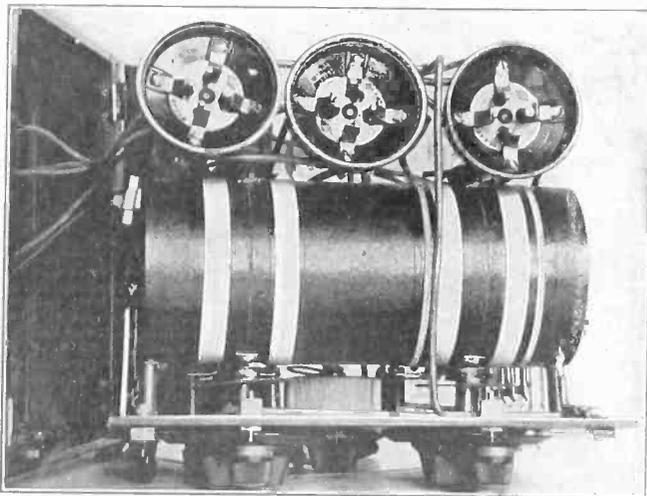


FIG. 7—Bottom view, showing arrangement of the tuning element and WD tube sockets. All connections are soldered.

(Concluded from page 6)

are carefully wound with 34 turns of No. 26 DSC. that is, 17 turns each side of the shaft space. The connections of these moving elements are made through the use of split shafts and braided copper "pig-tail" connections. As for the push-pull switch this is

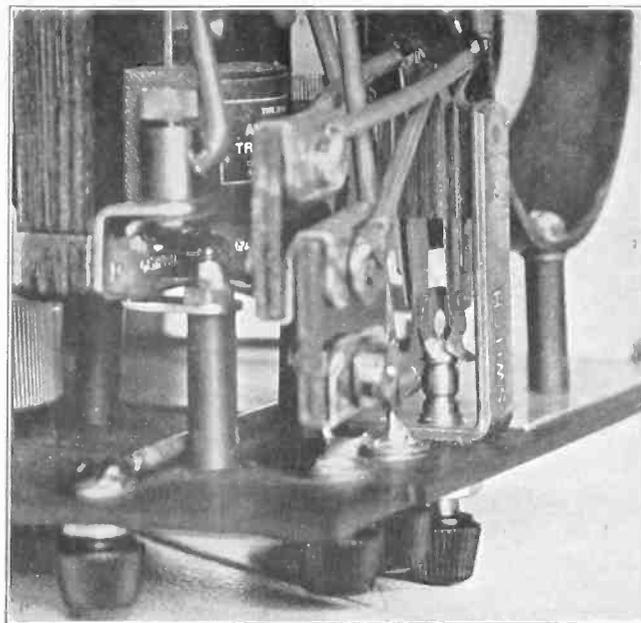


FIG. 8—Close-up of the push-pull switch. The plug part is made from a short length of  $\frac{1}{4}$ -inch brass rod with insulated knob taken from a rubber-headed binding post. The brass washer prevents the plug from being pulled out of the panel altogether, as it is soldered to the end of the rod. The position of the push-pull switch determines the wavelength band covered by the tuner. For higher wavelengths the switch is pushed in. The jack makes an efficient switch on account of its contact points being silver.

shown in Fig. 8, it is to be made from an ordinary double-circuit jack with the springs reversed. This makes an efficient switch because the contacts are silver. The plug is made from a piece of  $\frac{1}{4}$ " brass rod with a binding post knob fitted on the panel side. The brass washer is soldered to the plug so the plug cannot be withdrawn from the panel entirely. The connections for this switch are shown in the diagram. The set works on almost any kind of an aerial, inside or outside, and the tuning is very simple.

As will be seen in the diagram, if the standard single circuit is desired the aerial will be connected to post A and the ground to post G. If this does not prove selective enough, remove aerial and ground connections, replacing aerial on A1, and G on G and A. In each case the push-pull switch should be moved in or out (depending on the length of aerial) and the set tuned to the desired wave. Filament-control jacks are used.

## How to Use Filament Control Jacks

**F**ILAMENT control jacks are automatic devices which switch the A-battery current on to the filaments when the phones are plugged into the jacks. When the plug is in the detector circuit only the detector tube is lighted. When the first audio amplifier is plugged in, the detector and first amplifier light, but not the second audio amplifier. When the phones are plugged in the last stage of amplification all the tubes light. If the phone plug is not inserted in any jack no tube will light, although the rheostats may be turned on full. A standard detector and two-stage audio-frequency amplifier require two-six-contact filament control jacks used in with the first two tubes.

## Radiation Compared with Re-Radiation

**S**OME vacuum tube receiving sets produce high frequency oscillations and act as small transmitters. The energy sent out by such sets causes howls in the neighboring receivers and is called radiation. When a passing Hertzian wave strikes the antenna it causes an excitation in the electrical system and the intercepted energy is re-radiated. Signals are not re-radiated only from antennae but from other metallic structures such as guy wires, buildings, bridges and masts. The re-radiated signal may be on a different wave length than that of the transmitting station, because the metal body from which the re-radiation takes place has a natural wave length of its own.

# The Superdyne Principle In a 3-Tube Set

*Variocoupler - 2 variometer regenerative set easily converted into quality DX-getter, or the set may be newly constructed from Lester Hutter's expert exposition—Superdyne method of suppressing oscillations most efficient of all, he says*

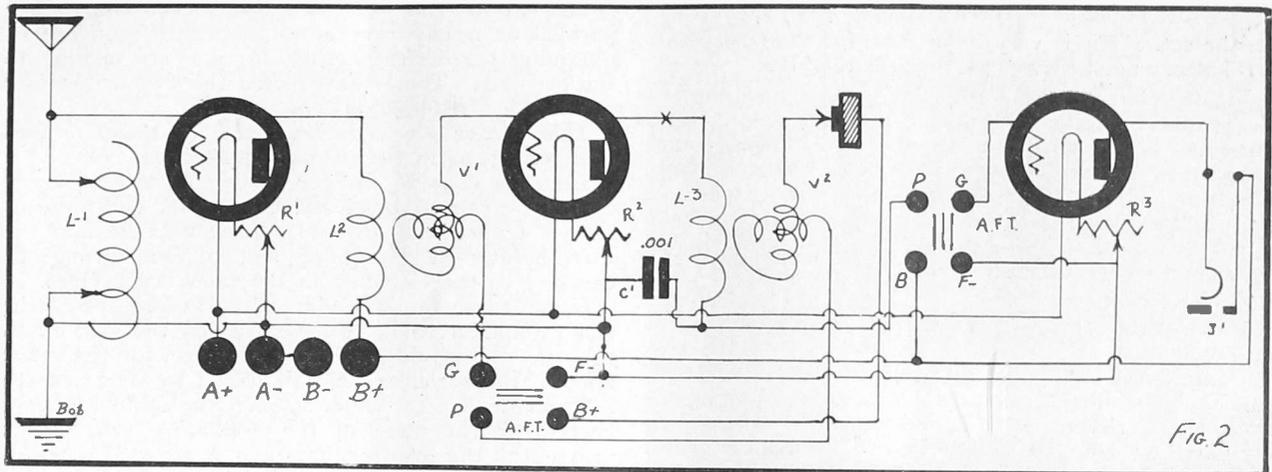


FIG. 2—A circuit employing two stages of tuned RF, a detector, and two audio stages is shown above. The constants are: L1, tapped stator of variocoupler; L2, 15-turn coil; L3, 20 turns on 3½-inch form; V1 and V2, variometers; R1, R2 and R3, 20-ohm rheostats for UV201A; C1, .001 mfd. fixed condenser; A.F.T., audio-frequency transformer; J1, single-circuit jack.

## By Lester Hutter

**N**OWADAYS we want tuned radio-frequency and reflex. In a few hours, at practically no expense, you can rewire your regenerative variocoupler and 2 variometer set so that it will not squeal or radiate. In fact, it will have two stages of tuned radio-frequency, a detector and two stages of audio as compared to your oscillating detector and two stages of audio.

Since two stages of radio-frequency of the tuned type are employed one can easily see that the receiver is very sensitive. The crystal detector insures quality, while the two stages of audio account for the volume.

I revamped a regenerator and after a few minor adjustments the receiver more than came up to expectations. Local stations came in very well—clear and loud. So did DX. Chicago, 800 miles away, was audible anywhere in the house. This was in the cold weather.

The receiver has one big advantage, and that is that a loop can be substituted for the inductance L-1. In this instance it was necessary to shunt a 23-plate (.0005 mfd.) condenser across the two ends of the loop aerial. With the loop as the collector, locals came in with about the same volume as they did on the set when it was regenerative using an outdoor aerial. Occasionally a little DX would be heard on the loud speaker, but it was nothing to brag about. The receiver was operated next to a large steel building in a thickly populated section of New York.

Get these parts: One fixed crystal detector; one .001 mfd. fixed condenser; 6 inches of 3½" diameter tubing; ¼ lb. No. 22 DSC wire; bus-bar and angle brass.

The above may cost a couple dollars.

Take the old set out of the cabinet, after disconnecting the A and B batteries as well as the aerial and ground. Then start in destroying—but carefully. A soldering iron will loosen all the soldered connections and a pair of cutting pliers will take the wires apart.

After you have dismantled the set, so far as the bus-bar wiring is concerned, check over the connections to the various contact points, making sure that none of them is short-circuited. You've now got a set devoid of all wiring save the leads from the stator of the variocoupler to the two sets of contact points.

Now loosen the screws that hold your transformer that acted as the first stage of amplification before, and mount the transformer nearer to the second tube so that there will be shorter grid connections.

Remove the two variometers. Then wind 10 turns of the No. 22 wire on a little piece of cardboard tubing about ½" long. Mount the 10-turn coil close to the variometer windings as shown in Fig. 1. If it is found next to impossible to mount the coil close to the variometer, then increase the number of turns so say 15. The variometer-coil combination which you have just completed is the inductance L-2 and V-1 shown in the schematic diagram.

Wind 20 turns of the same size wire on a piece of cardboard tubing 1" long and mount the coil close to the variometer. When winding the coil make sure that the wires go in the same direction as those on the variometer. This is very important. If they go in the wrong direction failure awaits you.

Remount the two variometers in the very same places as they were before.

First wire the filament circuit as shown in the schematic diagram, Fig. 2. Check this up, so that there will be no trouble later. Then start in wiring the antenna circuit—then the grid, and finally the plate and B battery circuits.

Connect the A battery and make sure that the tubes light properly. If they do not, then go no further, for you may burn the filaments out when you connect the B batteries. Probably the reason that the tubes failed to light was a short or open circuit. Now that the tubes are lighting properly, connect your B batteries. Make sure that you maintain proper polarity. Negative of the battery goes to the minus post on the set and the positive of the battery goes to the plus B post

(Concluded on next page)

# Locals Come In Well on a Loop

*Two stages of tuned radio-frequency amplification, crystal detector and two audio stages make a splendid circuit—Why the second tube is reflexed instead of the first.*

*(Concluded from preceding page)*

on the set. This is very important, for the positive of a B battery must always go towards the plate.

Finally connect the aerial and ground and plug in the speaker. Before attempting to tune, tap the various tubes lightly with your fingers. If a ringing sound is heard in the receivers you may be sure that the sets are functioning. If a ringing sound is not heard at all, probably your B battery is reversed. If you hear a ringing noise faintly, then your A polarity is incorrect; to cure this, simply transpose (reverse) the two A leads.

Now set the switch levers so that 35 or 40 turns will be included in the primary. Then tune with the two variometers, keeping the dial settings the same at all times. You should hear a local station. But sometimes the station is accompanied by oscillations. Then try moving the coils L2 and L3 a greater distance from the variometer. You will find one point where the set will almost oscillate. This is the point where you want to keep the coils, for it is that point which is most efficient for operation.

Two stages of tuned radio-frequency amplification, a crystal detector and two stages of audio amplification

If oscillations should be strongest when the rotor is parallel or nearly parallel to the stator, you are not obtaining the desired action, for you are making the set oscillate. Therefore reverse the two rotor leads and the desired effect will be obtained.

**This tickler gives the reversed, or negative feedback effect, as in the popular Superdyne.**

Since the coupling between coils L2 and L3 are very close to variometers V1 and V2, the set will naturally have a tendency to oscillate. Let alone the fact that there is inter-stage coupling, and coupling through the capacity of the elements in the tubes themselves.

If the current in the plate circuit of the oscillating radio amplifier could be impressed on the grid on the tube the set would oscillate still more, for the resistance of the secondary circuit would be very near the zero point. On the other hand if the radio frequency current in the plate of the oscillating tube be impressed on the grid on that tube at *reversed* potential, then the resistance of the grid circuit would be greater and the set below the oscillating point. We therefore might consider this coil a device for varying the resistance and potential in the grid circuit, a potentiometer-like device—a stabilizer. That is just what the tickler coil is—a stabilizing coil—a compensator.

This method of preventing or suppressing oscillations is more efficient than the Hazeltine, Rice, Farrant and McCall methods of preventing oscillation, as the receiver can be readily adjusted so that it is just on the point of oscillation.

If you are troubled with hand capacity when you turn the rotor dial, then insert the tickler coil in series with the coil L3 at the lower end of the inductance.

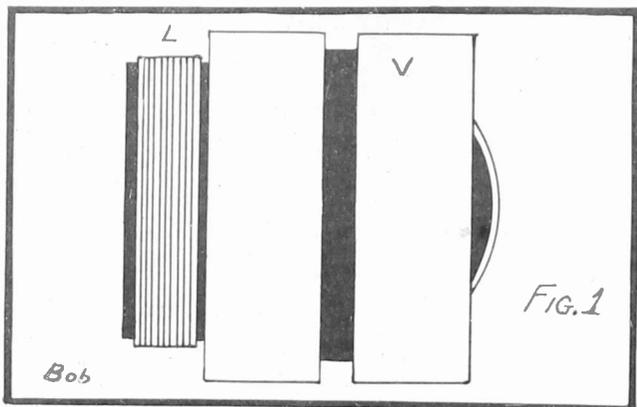


FIG. 1—The inductance L is placed alongside the variometer with the turns going in the same direction as those on the variometer.

are incorporated on three tubes and only one tube is reflexed, the second tube. No variable condensers are employed, and that there are really two tuning controls, for the contact point switches need seldom be varied.

A glance at the diagram of Fig. 2 will show that the first tube is a straight radio amplifier, while the second tube is an audio and radio amplifier. Perhaps you may think it best that the first tube be reflexed since it has weaker RF currents passing through it. This supposition is more or less correct, as the set would be a little louder if the first tube were reflexed and the second left blank, but the set would not be nearly so sensitive to DX stations.

If you be of the real experimental class of "fan," it might prove interesting to try a few tricks with the set that will take but a few moments.

Connect the rotor of the variocoupler in series with the plate of the second tube at the point marked X.

## Use a Scriber

**H**OLES in cardboard tubes are best made by simply pushing them through with a sharply pointed scriber. If a regular drill is used the cardboard usually is crushed and the holes are not at all clean ones. But bakelite or hard rubber may be drilled.

## Clips Handy for Making Temporary Contacts

**K**EEP a supply of small test clips on hand in a small box. They are very useful in experimental work in making temporary connections, as they can be snapped off and on in an instant.

## Use Flux Sparingly; Rosin Core Good

**D**ON'T waste soldering paste. A pinch of it is just as effective as a big splotch and it will cause less trouble from runovers. If properly used a small can of flux will last for several years. But self-fluxing rosin-core solder is usually best.

# How to Build a Current Supply Unit So You Can Light Your Amplifier Tubes on AC

By *Brainard Foote*

**T**HE question of getting your A current out of the 110 volt AC lighting socket is much discussed. Although there are some methods of rectifying the A current, so far it is impracticable to employ rectified AC for filament lighting because of the difficulty of getting sufficient DC without considerable expense for the necessary transformer and large size rectifier tube. Hence some method of eliminating the "hum" from the line is essential.

Lighting the detector tube is ruled out from the start, so if we use AC for the filaments of our amplifier tubes, a dry battery with a dry cell tube is required for the detector. The grid return leads of the amplifiers are brought to the center of filament resistance. As it is physically impossible to make a connection to the middle of the filament wire in the bulb itself, this point is found by shunting a potentiometer across the filament and connecting the grid return lead to the movable contact.

## C Battery

Then, further to prevent any flow of current to the grid, which would result in a hum, a C battery of  $4\frac{1}{2}$  volts is inserted also.

Tubes of different kinds act differently when lighted on alternating current. Most successful of all is the WD12 or WD11 tube, for no hum whatsoever can be heard on the speaker and just the faintest sound on the headphones. Of course such tubes don't deliver quite as much volume as the 201A or 301A tubes, but a 2-step audio amplifier will give sufficient amplification for the ordinary room. With the larger tubes of the A type the hum is barely audible and there is a very slight "modulation" effect in the case of a solo on high voice or violin, which some persons notice. However, it isn't very serious and the great saving in labor and expense recommend the AC lighting nevertheless. On orchestral music no one could tell whether AC or DC was being used.

The necessary parts are neither costly nor numerous. First of all is the transformer by which the 110 volts is stepped down to a voltage between 2 and 7 for the filament circuit. This is known as a toy transformer and is intended to be used for running toy electric trains or other electrical toys which operate on about three to fifteen volts. The type chosen should have a switch lever or some other suitable arrangement, such as different sets of binding posts, so that various voltages about 2 to 3 volts apart and from about 2 to 7 volts range may be obtained at the output terminals. Such a transformer can be had at any large electrical supply house or department store selling electric trains.

Assuming that one already has a 1-bulb dry cell tube receiving set and intends to add a 2-step amplifier which may be lighted without a storage battery the required parts for the amplifier itself will be: two audio transformers, two tube sockets, two tubes, one  $4\frac{1}{2}$  volt C battery, one double jack, one single jack, panel about 7"-12", seven binding posts and a suitable base-

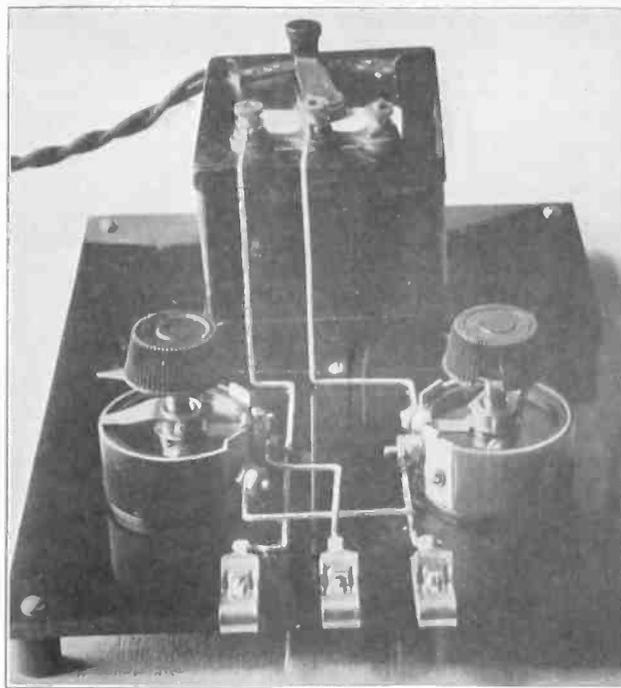


FIG. 1—A simple current supply unit for tapping the lighting socket for A current for lighting amplifier tubes.

board. No rheostats are necessary as the filament control is regulated by a rheostat on the supply panel.

## Transformer Mounting

Fig. 1 shows a photo of current supply unit, involving the toy transformer already discussed, a 30-ohm rheostat and a potentiometer of 200 to 400 ohms resistance. The parts may be mounted on a wooden base or a regular 7" x 10" panel as in the photo. Three output binding posts are provided, two for the corresponding A posts on the amplifier panel and the middle one for the contact arm of the potentiometer, which the amplifier connects to the C battery and the grid return wires.

Observe in Fig. 2 that the rheostat is placed in series with one of the A leads, and the potentiometer is bridged across the output side of the rheostat. Were the potentiometer across the output posts of the transformer a readjustment of the potentiometer would be required each time the rheostat were changed. Terminals marked "Po" are for the potentiometer and grid return connections. A wire to the ground should be connected to the "Po" terminal as well, this being necessary to ground out inductive "pick-up" from the AC lines.

The amplifier connections appear in Fig. 3. There are no connections between the set and the amplifier except those from the phone binding posts of the receiving set, which go to the "In" posts at the left end of the amplifier. A phone plug may be inserted in the left hand jack for using the set alone with phones, or for the loud speaker, another plug is used and in-

# Foote's Method Eliminates Hum

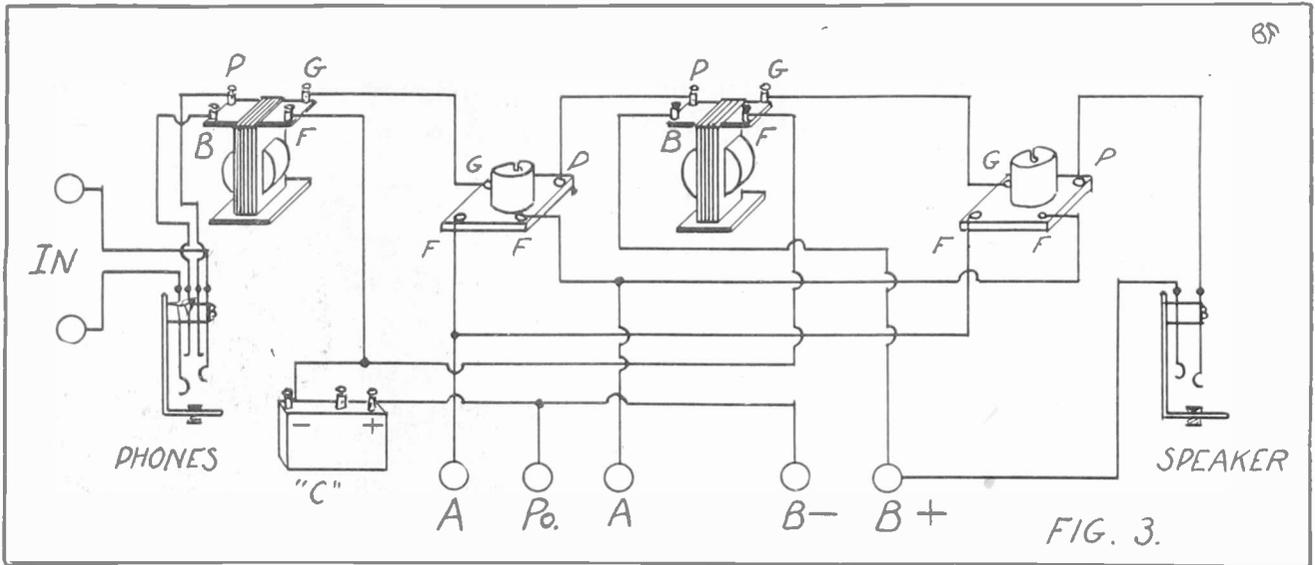


FIG. 3—The audio amplifier arranged for filament lighting from the 110-volt AC source.

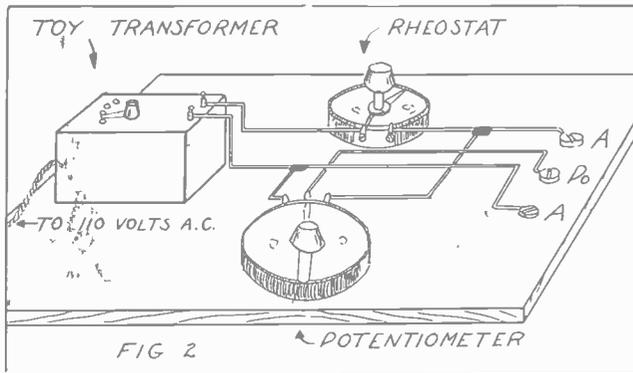


FIG. 2—The wiring diagram for the current supply unit, showing a potentiometer and a rheostat.

serted in the right hand jack. You will find that in operation the toy transformer switches are adjusted to supply the minimum voltage necessary for

lighting the tubes, and the plug of the transformer inserted in a lighting socket. Then the 30-ohm rheostat is adjusted to light the tubes at their normal brilliancy. About 90 volts of the B battery will be needed for the amplifier and the tubes should be turned up until a loud hum is heard in the speaker. Then the potentiometer contact is moved, and at about the middle of its winding a "dead spot" will be found where the hum disappears.

The tubes should not be lighted more brilliantly than necessary for plenty of volume, for this not only wastes the current and shortens the life of the tubes, but also increases interference by the 60-cycle supply current. Using the house alternating current in this way is very simple and extremely economical, for the expense is only a couple of dollars a year, even if you use the set almost every day for two or three hours. The current supply never fails and doesn't need recharging. The rheostat is always set at the proper point for the amplifier tubes and the plug inserted in the lighting socket whenever "juice" is wanted.

## Neutrodyne

(Concluded from page 4)

will be ruined should this happen. Improved jacks are excellent and require no soldering.

The rheostats have a resistance of 30 ohms and any standard make will carry the half-ampere necessary to heat the tube filaments without overloading. Good sockets with strong spring contacts are of course advised, and there are many reliable makes easily procured. A fixed grid condenser may be successfully used, but a variable condenser will give slightly better results when properly adjusted. The grid leak is entirely optional, many claiming that no great difference is apparent with or without it, using a UV201A.

The neutralizing condensers are easily made at home from parts which always accumulate for the average radio fan, or may be purchased very reasonably. Their construction will be described.

The panel is 21" x 7" x 3/16", bakelite or radium. This is a standard size and may be bought ready cut at any radio supply shop. Panel drilling when gone about

systematically and with good tools is not hard, and a very satisfactory job can be done by any one. Fig. 2 is the panel layout, giving complete and accurate drilling dimensions. No holes are shown for the mounting of the variable condensers, as different makes have mounting holes in different places. However, nearly every good condenser is sold with a paper template drawn to size, making it easy for even the novice to locate the holes properly. The center hole for each condenser shaft is shown in Fig. 2, and these may be drilled first. Perhaps the best method for drilling the panel is to lay out in actual size on paper the lines and holes, marking the drilling spots accurately. Paste this flat on the panel (on whichever side is to be the front) and drill right through. Countersink the holes at the edges for the screws holding the panel to the cabinet. When all the holes are finished, soak the panel in warm water and the paper will come off easily.

[This article will be concluded in RADIO WORLD next week, issue of August 23, on sale August 20. Complete data on wiring and on winding the low-loss coils will be published.]

# Zincite Best Crystal Oscillator

*Using the Autodyne Principle It Is Even Possible to Obtain Regeneration— Potentiometer Tunes In Oscillations.*

*[In RADIO WORLD last week issue of August 9 the first part of an article on "Crystals as Oscillators and Amplifiers" was published. A full page of diagrams was printed, and the following final instalment refers to those diagrams.]*

By Neal Fitzalan

## PART II

**M** LOSSEV, a Russian radio engineer, as stated last week, seems to have overcome many of the difficulties heretofore surrounding the use of the crystal as an amplifier.

Although many mineral crystals prove effective, M. Lossev gets the best results with a low-resistance crystal, such as zincite, in combination with a steel catwhisker, a fine steel needle being suitable for the latter. The steel-zincite contact is fed by a dry battery of 8 to 12 volts to supply the energy for the sustained oscillations. The equipment is much the same as that employed in the case of an ordinary steel-carborundum rectifier, where it is usual to apply a biasing voltage across the rectifying point to work on the bend in the characteristic curve. Its characteristics are like those of the negative resistance curve shown by the Poulsen arc, the dynatron and the ordinary back-coupled tube.

M. Lossev, plotting the milliamperes against the applied volts, has obtained the curve given in Fig. 3. This gives a curve of negative resistance on the right very similar to that of the arc. The theory is that the heat generated by the current lowers the resistance of the crystal contact. The increased current which passes as the result of the diminishing resistance is accompanied by a fall in the applied potential and at a certain stage the arrangement shows negative resistance as in the arc.

The steel-zincite contact is mounted in the ordinary way and to its terminals are attached an oscillating circuit with induction coil, capacity, and, if required, an antenna. Provided the contact point is sensitive, the contact generates RF oscillations in the circuit as soon as the voltage difference at the terminals is sufficient. The wave length is adjusted by means of the battery potentiometer and a resistance of about 1,000 ohms (Fig. 1).

To find the sensitive point, the crystal is made to generate an audible frequency, the operator listening with the microphone. For this an LF circuit with induction of one-tenth henry and capacity of about two-tenths of a microfarad is connected in parallel with the RF circuit. The telephone, whose resistance should be about 100 to 250 ohms, taps part of the induction coil. As soon as the sensitive point is found by regulating the potentiometer and resistance R the RF circuit is switched in.

To prevent the RF currents from passing into the battery part of the circuit, two choke coils are inserted between the steel-zincite contact and the battery. (Fig. 6.) To check the functioning, a galena detector circuit is coupled with the oscillator coil, the rectified current operating a milliammeter.

In the crystal heterodyne it is sufficient to couple its inductance with the inductance of any receiving set

to receive the continuous waves. The coupling may be done more simply by branching across the circuit (Fig. 2, 4 and 5). The diagrams are reproduced by the courtesy of M. J. Quinet, secretary of the Radio Club de France and editor of the "Radio-Revue," who with M. Max Gausner has made some experiments verifying the Russian engineer's results.

They have given the name "Crystadine" to the set mounted as a crystal autodyne amplifier. The arrangement as an Autodyne receiver for long waves is shown in Fig. 2 and for short waves in Fig. 4. A special device for seeking the sensitive point by first tuning in with an audible frequency is given in Fig. 5. As soon as the sensitive point is found by means of the AF circuit, the RF is switched in for receiving. The receiving is done by the ordinary method of beats using the potentiometer to tune in the local oscillations. The potentiometer varies the tuning as sharply as a vernier. It is even possible to obtain regeneration.

It is believed that M. Lossev's discovery opens up a great future for the development of crystal sets and a wide field for further research. The results indicated in the foregoing were obtained in the Radio Electric Laboratory of the Russian Government. M. Lossev freely shows all the arrangements of his mountings to visitors and posts up diagrams for them to copy. No attempt is made to secure patents for any of the devices, but they are made public property. With the crystal transmitter devised by the Russian engineer, a group of some fifteen Russian radio fans in one large Russian city are now able to have two-way communication with one another, each transmitting and receiving over distances of about a mile. There is little doubt they will soon be able to increase the distances considerably and it must be noted that all this is done without tubes.

Two well-known German radio engineers, Count Arco and Dr. Meisner, visited the laboratory last fall and were astonished with what they saw. They were not sparing in their compliments to the young inventor on the results of his discovery, which seems to indicate that in the near future crystal sets, made to amplify and oscillate, will be able to produce all the effects that the thermionic tube is now capable of doing.

## Volume from Aerial

**A** SET used without an antenna does not get as much energy from the ether as one which operates with an outdoor wire. Sets working without an antenna pick up the energy through the coils, wiring and ground wire. Some six and eight tube sets have been designed to work in connection with a small loop, and they give signal strength equal to one or two tubes which operate in connection with an outdoor wire. Even an indoor antenna will not produce as loud volume or cover as great a distance as an outdoor antenna.

## C Battery Results

**A** C BATTERY will cause no improvement in an audio amplifier if the B battery voltage is too low. The C battery permits the use of higher plate voltage, and unless the plate voltage is high distortion often results. Take out the C battery or increase the B battery voltage until the signals are again clear.

# How to Install Charger and Batteries in Cabinet with Set on Top

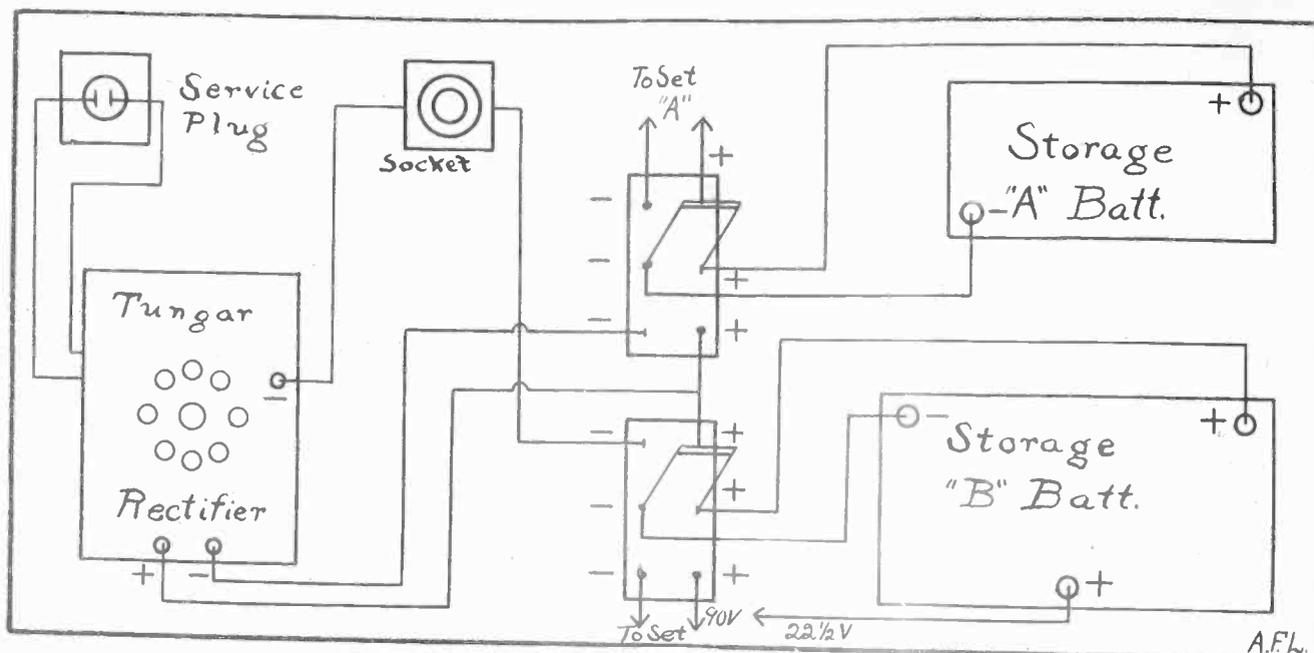


FIG. 2—Wiring diagram showing how to hook up the 2-ampere charger with switching arranging to take care of both A and B batteries. No. 14 or flexible fixture wire is best for this work.

**By Brewster Lee**

Consulting Engineer

**A** VISIT to the average radio fan's home to see his outfit will disclose very often a layout in what would otherwise be a neat and attractive room did it not resemble an electrical laboratory just struck by a cyclone. All kinds of parts strewn about the table, batteries on the shelf and floor regardless of rugs, and enough loose wire to build a new telephone exchange. Exhortations from the rest of the household to "clean that mess up" and "get those wires out of sight" usually have little or no effect, other than a statement from the radio genius that it will be done day after tomorrow or at four p. m. next week. The real reason why it is never done is because he is in doubt about how it should be done and lacks reliable information.

A very neat and efficient layout is herewith described telling in detail how to wire and maintain in operation the A and B storage batteries, together with wiring instructions for charging both from the Tungar rectifier.

The most popular piece of furniture for holding the radio set and batteries is the small console, or server, which may be purchased at a fairly reasonable price at any furniture store. All batteries, switches and the charger are placed inside the cabinet, and arranged as shown in Fig. 1. First, a standard lamp socket is screwed to one side of the cabinet wall, as shown in the illustration. This socket is for the 60-watt bulb used in conjunction with the Tungar rectifier for charging the storage B battery. Next the two double-pole double-throw switches are fastened in as shown. The socket and switches are the only fixtures on the whole arrangement. The batteries and charger are to be movable so that they may be conveniently taken out whenever necessary. Drill five holes  $\frac{1}{4}$ " in diameter  $6''$  from the top on the cabinet on the rear wall, or back, of the console. The wires from the A and B batteries are to be threaded through these holes and up to the

set on top. In this way no wires will be seen, except possibly the antenna and ground leads. If you want these also to be inconspicuous, a twisted pair may be run from the A and G posts of the set and tacked to the baseboard near the floor. Drill another hole, this time at least  $\frac{1}{2}''$  across, for the wire connecting the battery charger to the electric light outlet. Preferably this hole should be  $1\frac{1}{2}''$  in diameter to allow slipping the plug through it when not charging the batteries. Otherwise the plug will have to be unscrewed from the cord, the cord passed through the hole, and the fastener onto the plug again. It is advisable to procure a glass or composition tray in which to place the storage battery to avoid the possibility of damage if the battery should leak. The storage B battery is supplied with a corrugated rubber mat under the cell, so no tray is necessary for it. The Tungar battery charger has rubber feet on it to stop vibration resulting from the flow of current in the transformers.

Fig. 2 is the complete wiring diagram, showing all connections. Each Tungar has a tap on the transformer provided for use when charging storage B batteries. This tap is located at the top of the coil and can be easily identified because it is simply two bare wires twisted together and sticking up. Sometimes a piece of tape covers it, which should be taken off. Procure a small size battery clip, or a large size Fahnestock clip, and fasten a length of flexible wire to it long enough to reach the socket screwed to the inside of the cabinet wall. Clip the wire to the tap and fasten the other end to one side of the socket. From the other post on the socket run a flexible lead to the upper left hand post on the lower DPDT switch. This lead carries the negative potential for the B battery. Ninety-nine out of a hundred fans prefer this flexible fixture wire because it is so easy to work with and it makes a neat wiring job.

The charger has two output leads, one colored red and the other black. The red wire is positive, the black

(Concluded on next page)

# RADIOCAST PROGRAMS

Thursday, August 14

**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.

**WEAF, New York, 492m (610k), E. S. D. S. T.** 11 to 12 A. M., Marie Nicholson, soprano; talks; market and weather reports. 4 to 5 P. M., Elsie Peck, soprano; Sylvia Schachter, pianist; stories for children. 6 to 11 P. M., dinner music from the Rose Room of the Hotel Waldorf-Astoria; mid-week services, auspices of the Greater New York Federation of Churches; "Some Confessions of Veteran Speakers," by Warren C. Du Bois, instructor in public speaking, at New York University; Elmer Grosso and his versatile dance orchestra; "International Polo and the Coming Matches," by Capt. Percy Redfern Creed; Vincent Lopez and his orchestra.

**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 Tea Room orchestra. 12:55 P. M., Naval Observatory time signal. 4:45 P. M., grand organ and trumpets. 7:30 P. M., sports results and police reports.

**WDAR, Philadelphia, 395m (760k), E. S. D. S. T.—** 1:45 A. M., daily almanac. 12 noon, organ recital from the Stanley Theatre; features from

the studio; Arcadia Cafe concert orchestra, Prof. Feri Sarkozi, director. 2 to 3 P. M., Arcadia Cafe concert orchestra; artist recital. 4:30 P. M., artist recital. 5:45 P. M., baseball scores and other sports results.

**WLW, Cincinnati, 423m (709k), C. S. D. S. T.—** 11 A. M., weather forecast and business reports. 1:30 P. M., business reports. 3 P. M., market reports. 4 P. M., piano solos by Adelaide Apfel. 10 P. M., three minutes with the United States Civil Service. 10:30 P. M., "Business Man Turned Gentleman," a radario in one act.

**WAAM, Newark, N. J., 263m (1040k), E. S. D. S. T.—** 12 noon, agriograms from the U. S. Dept. of Agriculture. 6:30 P. M., Ray Southwick's Commodore orchestra, dinner hour concert. 7:30 P. M., James Vincent Moore and his entertainers, latest sensations from Broadway. 8 P. M., Walter Storey, reviewing the late releases by the film industry. 8:45 P. M., Harry Knox and his entertainers, popular Newark vaudeville artists. 10 P. M., Catello's radio entertainers.

**WCAE, Pittsburgh, 462m (650k), E. S. D. S. T.—** 12:30 P. M., news; weather reports. 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. 8 to 9:30 P. M., silent. 9:30 P. M., musical program. 11 P. M., Moore's Cafeteria radio review.

**WJZ, New York, 455m (660k), E. S. D. S. T.—** 1 P. M., Nathan Abas' Hotel Pennsylvania orchestra. 4 P. M., Eleanor Gunn's fashion talk. 4:10 P. M., daily menu. 4:15 P. M., "The Progress of the World," a Review of Reviews talk. 5:30 P. M., state and federal agricultural reports; Farm and Home reports; quotations of New York Stock Exchange; foreign exchange quotations; Evening Post news. 7 P. M., Gotham Hotel concert orchestra. 7:20 P. M., financial

developments of the day. 7:30 P. M., Gotham Hotel concert orchestra. 8 P. M., weekly French lesson. 8:30 P. M., New York Philharmonic orchestra from Lewisohn Stadium. 10:15 P. M., "Slums of London," by Geo. Laval Chesterton. 10:30 P. M., Waldorf Astoria roof orchestra.

**WJY, New York, 405m (740k), E. S. D. S. T.—** 7:30 P. M., Piedmont trio. 8:45 P. M., book review by Grace Isabel Colbron. 9 P. M., Al Reiser's Club Ferreri orchestra.

**KHJ, Los Angeles, 395m (760k), P. T.—** 8 to 9:30 P. M., program presented, courtesy Radio Corporation of Southern California, arranged by B. J. Sacta. 9:30 to 10 P. M., program presenting Hatch Graham singer and banjoist. 10 to 11 P. M., Art Hickman's dance orchestra.

**WOAW, Omaha, Neb., 526m (570k), C. S. T.—** 6 P. M., story hour, conducted by Doris Claire Secord. 6:30 P. M., dinner program by Yost's orchestra. 9 P. M., De Luxe program.

**WOC, Davenport, Ia., 484m (620k), C. S. T.—** 9 A. M., opening market quotations. 10 A. M., household hints. 10:55 A. M., time signals. 11 A. M., weather and river forecast. 11:05 A. M., market quotations. 12 noon, chimes concert. 12:15 P. M., weather forecast. 1 P. M., closing stocks and markets, including weekly report of wool market. 7 P. M., sport news and weather forecast. 9 P. M., orchestra program, the Palmer School radio orchestra.

**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 by the Editor of "The Review of Reviews." 3:35 P. M., piano recital by Ethel Grant. 3:50 P. M., the Magazine of Wall Street. 4 P. M., song recital to be announced. 5:15 P. M., re-transmission of time signals and

(Continued on page 18)

## Console Cabinet Simplifies Operation

(Concluded from preceding page)

negative. The black wire goes to the bottom left-hand post of the upper switch. The red wire goes to the bottom right-hand post of the upper switch, and also to the top right-hand post of the lower switch. This completes the wiring from the charger to the switches.

The storage battery should be equipped with two large spring clips to be connected to the leads going to the two middle posts of the upper switch. The positive lead goes on the right-hand side and the negative on the left. The positive post on the storage A battery is either painted red or marked with a plus sign. To avoid corrosion on the battery terminals, apply a thin layer of vaseline over the spring clips and the battery terminals. The two top posts on the upper switch are connected to the A battery leads on the receiver.

The storage B battery negative terminal is connected to the left-hand center post on the lower switch and the positive lead to the center right-hand post. The 22½-volt tap on the B battery always remains connected to the detector B battery post on the set. The two bottom

posts on the lower switch go to the B positive and negative posts on the receiver.

To charge the storage battery, first place the lower switch in the neutral position and the upper switch in the down position. Insert the plug connection from the charger into the service outlet, and the storage A battery will be on charge. To charge the B battery, place the upper switch in the neutral position and the lower switch in the upward position, and insert the plug. The 60-watt bulb will light at medium brilliancy. Most storage B batteries require a 12-hour charge. The A battery charge is determined by the capacity of the cells, and the charging rate is always indicated on the nameplate of the battery.

Never try to charge both batteries at once, or use the set while either battery is charging. While charging the A battery it is well to remove the caps covering the cells.

When completed, this job will result in an outfit that is clean and convenient to keep in operation, with no wires or batteries lying about underfoot.



SAMPLE of neat-appearing cabinet popular with radio fans in which they install set, batteries, charger and accessories. No more wires dangling around to spoil the appearance of the room.

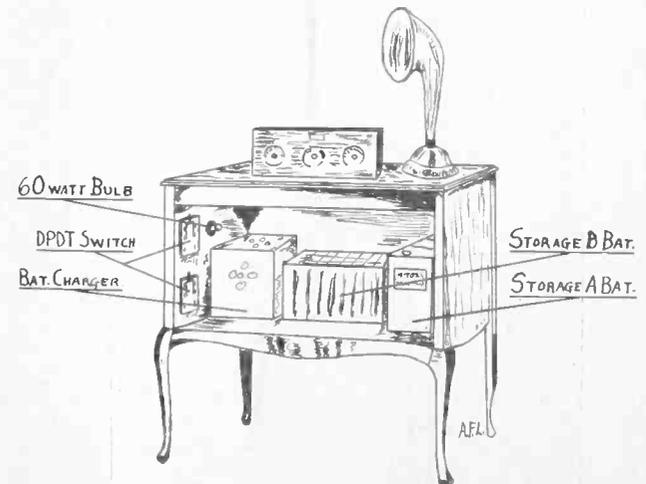


FIG. 1—Cabinet with front removed, showing actual location of the switches, bulb socket and batteries. The lead wires are all passed to the rear, out through the holes in the back and thence up to the set. In mounting the switches, provide enough room to throw them up and down easily.

# How to Install Charger and Batteries in Cabinet with Set on Top

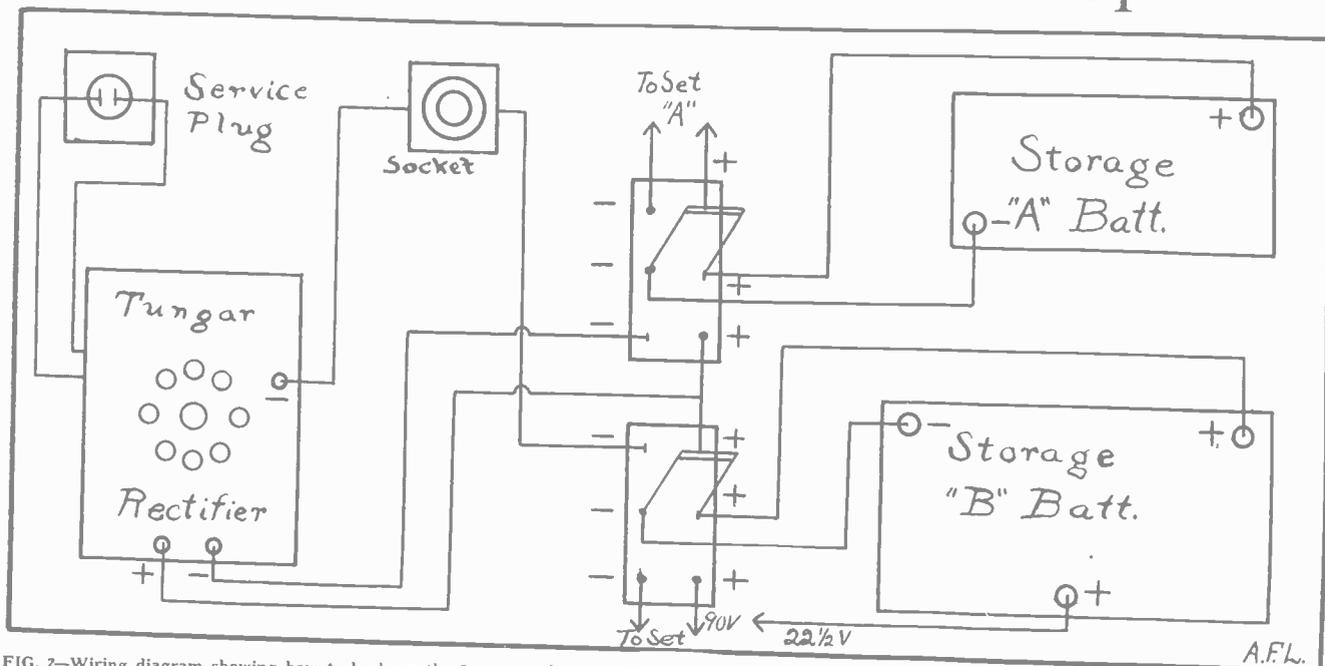


FIG. 2—Wiring diagram showing how to hook up the 2-ampere charger with switching arranging to take care of both A and B batteries. No. 14 or 18 flexible fixture wire is best for this work.

By Brewster Lee

Consulting Engineer

**A** VISIT to the average radio fan's home to see his outfit will disclose very often a layout in what would otherwise be a neat and attractive room did it not resemble an electrical laboratory just struck by a cyclone. All kinds of parts strewn about the table, batteries on the shelf and floor regardless of rugs, and enough loose wire to build a new telephone exchange. Exhortations from the rest of the household to "clean that mess up" and "get those wires out of sight" usually have little or no effect, other than a statement from the radio genius that it will be done day after tomorrow or at four p. m. next week. The real reason why it is never done is because he is in doubt about how it should be done and lacks reliable information.

A very neat and efficient layout is herewith described telling in detail how to wire and maintain in operation the A and B storage batteries, together with wiring instructions for charging both from the Tungar rectifier.

The most popular piece of furniture for holding the radio set and batteries is the small console, or server, which may be purchased at a fairly reasonable price at any furniture store. All batteries, switches and the charger are placed inside the cabinet, and arranged as shown in Fig. 1. First, a standard lamp socket is screwed to one side of the cabinet wall, as shown in the illustration. This socket is for the 60-watt bulb used in conjunction with the Tungar rectifier for charging the storage B battery. Next the two double-pole double-throw switches are fastened in as shown. The socket and switches are the only fixtures on the whole arrangement. The batteries and charger are to be movable so that they may be conveniently taken out whenever necessary. Drill five holes  $\frac{1}{4}$ " in diameter  $6$ " from the top on the cabinet on the rear wall, or back, of the console. The wires from the A and B batteries are to be threaded through these holes and up to the

set on top. In this way no wires will be seen, except possibly the antenna and ground leads. If you want these also to be inconspicuous, a twisted pair may be run from the A and G posts of the set and tacked to the baseboard near the floor. Drill another hole, this time at least  $\frac{1}{2}$ " across, for the wire connecting the battery charger to the electric light outlet. Preferably, this hole should be  $1\frac{1}{2}$ " in diameter to allow slipping the plug through it when not charging the batteries. Otherwise the plug will have to be unscrewed from the cord, the cord passed through the hole, and then fastened onto the plug again. It is advisable to procure a glass or composition tray in which to place the storage battery to avoid the possibility of damage if the battery should leak. The storage B battery is supplied with a corrugated rubber mat under the cells, so no tray is necessary for it. The Tungar battery charger has rubber feet on it to stop vibration resulting from the flow of current in the transformers.

Fig. 2 is the complete wiring diagram, showing all connections. Each Tungar has a tap on the transformer provided for use when charging storage B batteries. This tap is located at the top of the coil and can be easily identified because it is simply two bare wires twisted together and sticking up. Sometimes a piece of tape covers it, which should be taken off. Procure a small size battery clip, or a large size Fahnestock clip, and fasten a length of flexible wire to it long enough to reach the socket screwed to the inside of the cabinet wall. Clip the wire to the tap and fasten the other end to one side of the socket. From the other post on the socket run a flexible lead to the upper left-hand post on the lower DPDT switch. This lead carries the negative potential for the B battery. Ninety-nine out of a hundred fans prefer this flexible fixture wire because it is so easy to work with and it makes a neat wiring job.

The charger has two output leads, one colored red, and the other black. The red wire is positive, the black

(Concluded on next page)

# RADIOCAST PROGRAMS

Thursday, August 14

**WNYS, 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.

**WEAF, New York, 492m (610k), E. S. D. S. T.** 11 to 12 A. M., Marie Nicholson, soprano; talks; market and weather reports. 4 to 5 P. M., Elsie Peck, soprano; Sylvia Schachter, pianist; stories for children. 6 to 11 P. M., dinner music from the Rose Room of the Hotel Waldorf-Astoria; mid-week services, auspices of the Greater New York Federation of Churches; "Some Confessions of Veteran Speakers" by Warren C. Du Bois, instructor in public speaking, at New York University; Elmer Grosso and his versatile dance orchestra; "International Polo and the Coming Matches," by Capt. Percy Redfern Creed; Vincent Lopez and his orchestra.

**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 Tea Room orchestra. 12:55 P. M., Naval Observatory time signal. 4:45 P. M., grand organ and trumpets. 7:30 P. M., sports results and police reports.

**WDAR, Philadelphia, 395m (760k), E. S. D. S. T.—** 1:45 A. M., daily almanac. 12 noon, organ recital from the Stanley Theatre; features from

the studio; Arcadia Cafe concert orchestra, Prof. Feri Sarkozi, director. 2 to 3 P. M., Arcadia Cafe concert orchestra; artist recital. 4:30 P. M., artist recital. 5:45 P. M., baseball scores and other sports results.

**WLW, Cincinnati, 423m (709k), C. S. D. S. T.—** 11 A. M., weather forecast and business reports. 1:30 P. M., business reports. 3 P. M., market reports. 4 P. M., piano solos by Adelaide Apfel. 10 P. M., three minutes with the United States Civil Service. 10:30 P. M., "Business Man Turned Gentleman," a radario in one act.

**WAAM, Newark, N. J., 263m (1040k), E. S. D. S. T.—** 12 noon, agriograms from the U. S. Dept. of Agriculture. 6:30 P. M., Ray Southwick's Commodore orchestra, dinner hour concert. 7:30 P. M., James Vincent Moore and his entertainers, latest sensations from Broadway. 8 P. M., Walter Storey, reviewing the late releases by the film industry. 8:45 P. M., Harry Knox and his entertainers, popular Newark vaudeville artists. 10 P. M., Catello's radio entertainers.

**WCAE, Pittsburgh, 462m (650k), E. S. D. S. T.—** 12:30 P. M., news; weather reports. 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. 8 to 9:30 P. M., silent. 9:30 P. M., musical program. 11 P. M., Moore's Cafeteria radio review.

**WJZ, New York, 455m (660k), E. S. D. S. T.—** 1 P. M., Nathan Abas' Hotel Pennsylvania orchestra. 4 P. M., Eleanor Gunn's fashion talk. 4:10 P. M., daily menu. 4:15 P. M., "The Progress of the World," a Review of Reviews talk. 5:30 P. M., state and federal agricultural reports; Farm and Home reports; quotations of New York Stock Exchange; foreign exchange quotations; Evening Post news. 7 P. M., Gotham Hotel concert orchestra. 7:20 P. M., financial

developments of the day. 7:30 P. M., Gotham Hotel concert orchestra. 8 P. M., weekly French lesson. 8:30 P. M., New York Philharmonic orchestra from Lewisohn Stadium. 10:15 P. M., "Slums of London," by Geo. Laval Chesterton. 10:30 P. M., Waldorf Astoria roof orchestra.

**WJY, New York, 405m (740k), E. S. D. S. T.—** 7:30 P. M., Piedmont trio. 8:45 P. M., book review by Grace Isabel Colbron. 9 P. M., Al Reiser's Club Ferreri orchestra.

**KHJ, Los Angeles, 395m (760k), P. T.—** 8 to 9:30 P. M., program presented, courtesy Radio Corporation of Southern California, arranged by B. J. Saeta. 9:30 to 10 P. M., program presenting Hatch Graham singer and banjoist. 10 to 11 P. M., Art Hickman's dance orchestra.

**WOAW, Omaha, Neb., 526m (570k), C. S. T.—** 6 P. M., story hour, conducted by Doris Claire Secord. 6:30 P. M., dinner program by Yost's orchestra. 9 P. M., De Luxe program.

**WOC, Davenport, Ia., 484m (620k), C. S. T.—** 9 A. M., opening market quotations. 10 A. M., household hints. 10:55 A. M., time signals. 11 A. M., weather and river forecast. 11:05 A. M., market quotations. 12 noon, chimes concert. 12:15 P. M., weather forecast. 1 P. M., closing stocks and markets, including weekly report of wool market. 7 P. M., sport news and weather forecast. 9 P. M., orchestra program, the Palmer School radio orchestra.

**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 by the Editor of "The Review of Reviews." 3:35 P. M., piano recital by Ethel Grant. 3:50 P. M., the Magazine of Wall Street. 4 P. M., song recital to be announced. 5:15 P. M., re-transmission of time signals and (Continued on page 18)

## Console Cabinet Simplifies Operation

(Concluded from preceding page)

negative. The black wire goes to the bottom left-hand post of the upper switch. The red wire goes to the bottom right-hand post of the upper switch, and also to the top right-hand post of the lower switch. This completes the wiring from the charger to the switches.

The storage battery should be equipped with two large spring clips to be connected to the leads going to the two middle posts of the upper switch. The positive lead goes on the right-hand side and the negative on the left. The positive post on the storage A battery is either painted red or marked with a plus sign. To avoid corrosion on the battery terminals, apply a thin layer of vaseline over the spring clips and the battery terminals. The two top posts on the upper switch are connected to the A battery leads on the receiver.

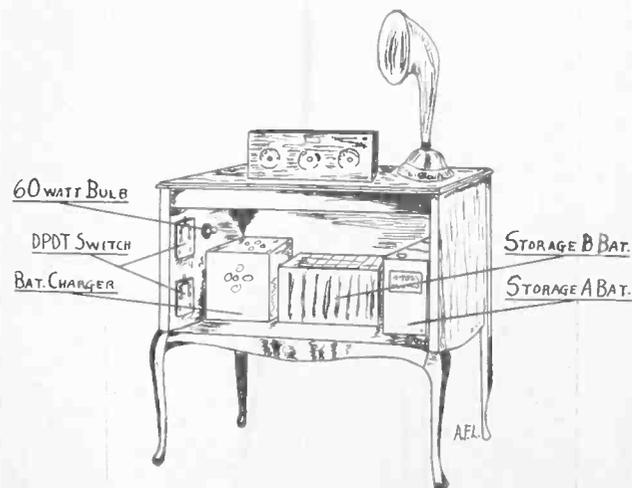
The storage B battery negative terminal is connected to the left-hand center post on the lower switch and the positive lead to the center right-hand post. The 22½-volt tap on the B battery always remains connected to the detector B battery post on the set. The two bottom

posts on the lower switch go to the B positive and negative posts on the receiver.

To charge the storage battery, first place the lower switch in the neutral position and the upper switch in the down position. Insert the plug connection from the charger into the service outlet, and the storage A battery will be on charge. To charge the B battery, place the upper switch in the neutral position and the lower switch in the upward position, and insert the plug. The 60-watt bulb will light at medium brilliancy. Most storage B batteries require a 12-hour charge. The A battery charge is determined by the capacity of the cells, and the charging rate is always indicated on the nameplate of the battery.

Never try to charge both batteries at once, or use the set while either battery is charging. While charging the A battery it is well to remove the caps covering the cells.

When completed, this job will result in an outfit that is clean and convenient to keep in operation, with no wires or batteries lying about underfoot.



SAMPLE of neat-appearing cabinet popular with radio fans in which they install set, batteries, charger and accessories. No more wires dangling around to spoil the appearance of the room.

FIG. 1—Cabinet with front removed, showing actual location of the switches, bulb socket and batteries. The lead wires are all passed to the rear, out through the holes in the back and thence up to the set. In mounting the switches, provide enough room to throw them up and down easily.

# A Radio Splash—Initiated—Loops,



(Foto Topics)  
A FEATURE of WEAf's Summer program is the series of swimming lessons given by E. C. Dalton. The photo shows Mary Gustin about to take a plunge into the cool water, and there listen to the radiocast instruction.



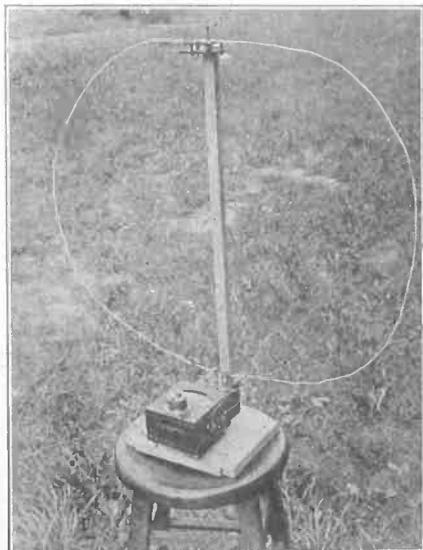
(Fotograms)  
MARGARET RUSSELL had never listened in on a radio before she went to the Salvation Army Camp for Children at North Long Branch, N. J. She was greatly delighted by the voice from the "cigar box" that told her daily all about Brer Rabbit, Mister Woodchuck and the Man in the Moon. Captain Marion Beatty, Salvation Army, is the matron.



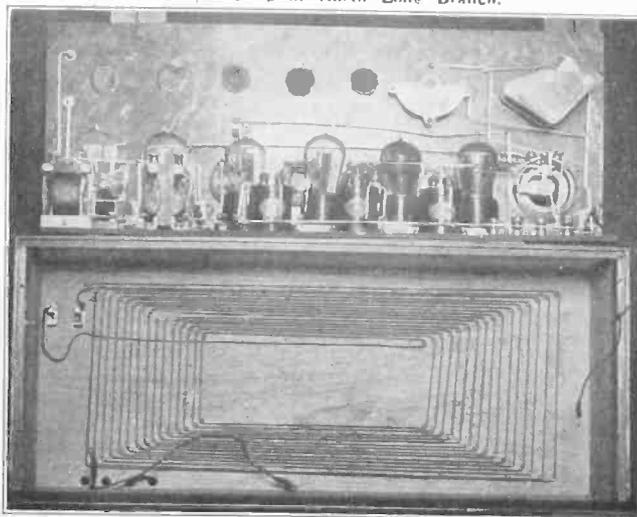
(Kadel & Herbert)  
FRANK E. CAMPBELL, JR., 11-year-old navigator, is the proud possessor of a 52-mile-an-hour motor boat. Frank likes to take his radio along so that he can listen in while speeding through Long Island Sound.



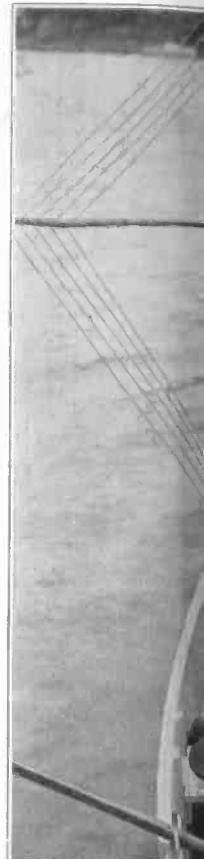
(Kadel & Herbert)  
A GOOD PUBLICITY stunt was engineered by the Salvation Army when it set up a Super-Heterodyne receiver operating on a loop. The music attracted thousands of passers-by, and the mute appeal on the sign brought down a shower of change and bills. This scene is taken in front of the New York Public Library, Fifth Avenue and Forty-Second Street. The money collected here early in the year went towards providing sets for the vacation camp at North Long Branch.



(Miller News)  
THE CROSSED COIL radio beacon guides the ferry boats across San Francisco Bay in foggy weather. The beacon consists of two coil antennae across each other at an angle of 135 degrees.



(Kadel & Herbert)  
REAR VIEW of a remarkably efficient receiver designed and constructed by Rutledge Mayo, of New York City. Using three stages of radio-frequency, detector, and two stages of audio-frequency amplification, Mr. Mayo has picked up stations 1,500 miles distant on the loop. A double circuit jack mounted on the panel enables the use of an outdoor antenna and ground simply by plugging in.



BOY SCOUTS make a r... and outings, not only to localities under all cond... boat in a lake near Tux... the boys have rigged u... from a convenient tree... pocket-knives, they cut



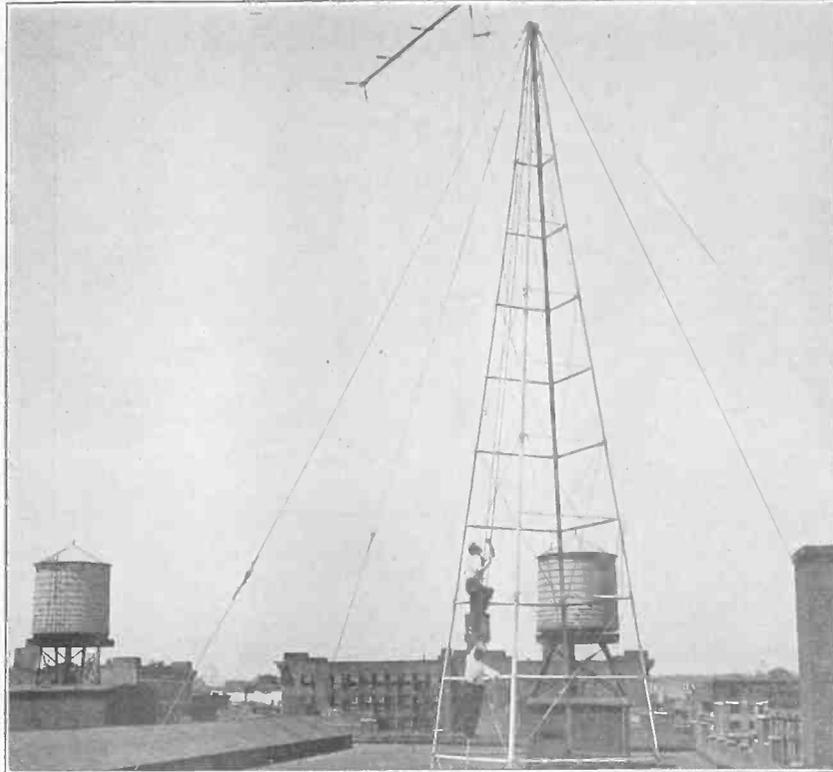
(Foto Topics)

WHEN the American Co... proved to be the best be... dishes were cleared away... many of the latest steps... space. When this photo... were quite happily compos... of the listeners show how... the thing for outdoor life... limb to limb and the g...

# My Dear!—Traction Opens a Station



regular practice of taking along a radio set on hikes entertained, but to study reception in different places. The Scouts shown here are aboard a row-boat, N. Y. In the absence of a regular antenna loop, they simply cut two straight sticks and tied them together with twine. With their hands at each end of the two sticks and in them they receive the broadcast. (Foto Topics)

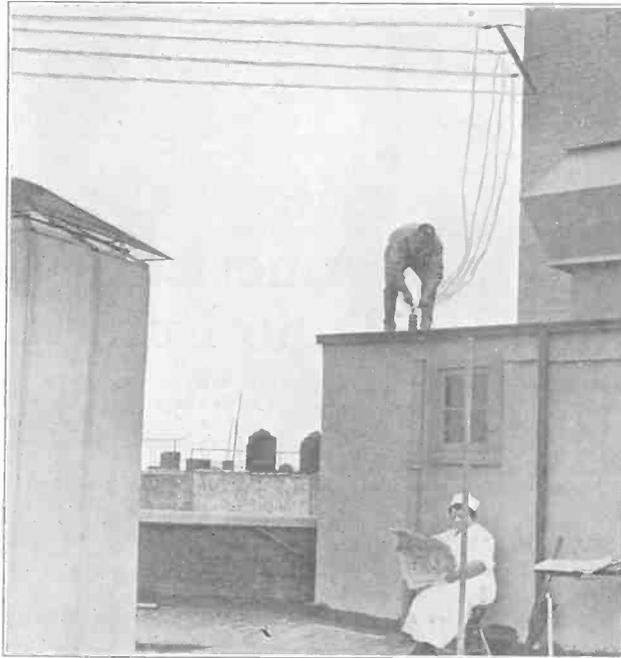


(Kadel & Herbert)

ONE of the steel supporting masts at the Third Avenue Railway Company's new station, WEBJ, located at 130th Street and Third Avenue, New York City. WEBJ is now operating on 273 meters on a power of 500 watts. The station will radiocast twice a week from 7 to 9 p. m. Programs up to September 9 will be preliminary to the official opening on that date. Harry A. Bruno is the director of the station. Many of the programs will be made up of talent among the employees. No advertising of any kind will go over the air from this station, it was announced. This station is the ninth in Greater New York, the others being WEAJ, WJZ, WJY, WNYC, WHN, WFBH, WRW and WBBR. Of these, WEAJ and WNYC use the maximum power of 1,000 watts, WJZ, WJY, WHN and WFBH use 500 watts, and WRW and WBBR 100 watts. New York probably has the greatest variety of radio entertainment of any other locality.



Association gathered at Georges Island for their annual meet, radio was brought along to provide entertainment for the crowd after the supper. Although the rough camping ground is not a very inviting dance floor, the little room that they were easily accomplished with a minimum of equipment was wrapped the audience was enjoying an operatic quartette. All listeners agreed, though you might say one girl was up a tree. The smiles on the faces of the group as they enjoy the radiocast music. They agreed that the radio is just what enhances the enjoyment of one's vacation. The aerial was strung from a tree to a stake. This enabled the reception of DX stations.



(Kadel & Herbert)

THE NEW HUNTS POINT HOSPITAL, Bronx, N. Y., is bringing the benefits of radio to the sick in its care. After experiment the radio has been installed as a permanent feature. The master receiver is located on the roof and cables lead to every ward and bed in the hospital. The operator on duty tunes in on what he considers the most healing program available, and the patients plug their head sets into the wall jacks to listen. The antenna installation is shown being completed, the engineer in charge making the final connection to the lead-in to the radio room.

# A Radio Splash—Initiated—Loops,



(Foto Topics)  
A FEATURE of WEAF's Summer program is the series of swimming lessons given by E. C. Dalton. The photo shows Mary Gustin about to take a plunge into the cool water, and there listen to the radiocast instruction.



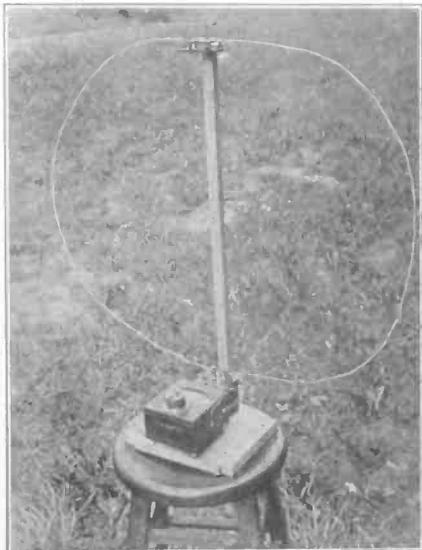
(Fotograms)  
MARGARET RUSSELL had never listened in on a radio before she went to the Salvation Army Camp for Children at North Long Branch, N. J. She was greatly delighted by the voice from the "cigar box" that told her daily all about Brer Rabbit, Mister Woodchuck and the Man in the Moon. Captain Marion Beatty, Salvation Army, is the matron.



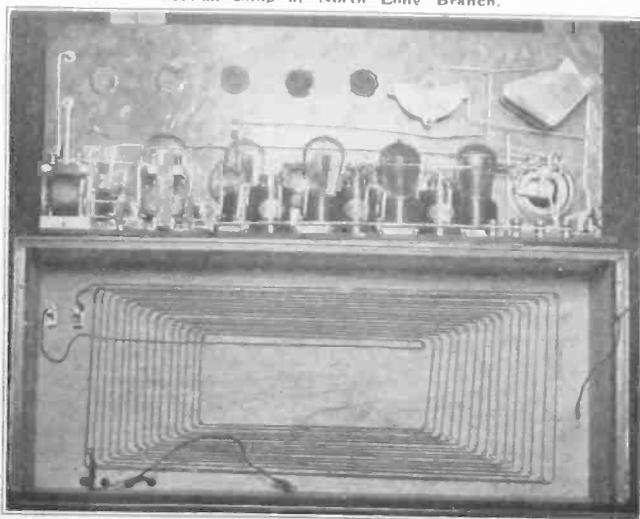
(Kadel & Herbert)  
FRANK E. CAMPBELL, JR., 11-year-old navigator, is the proud possessor of a 52-mile-an-hour motor boat. Frank likes to take his radio along so that he can listen in while speeding through Long Island Sound.



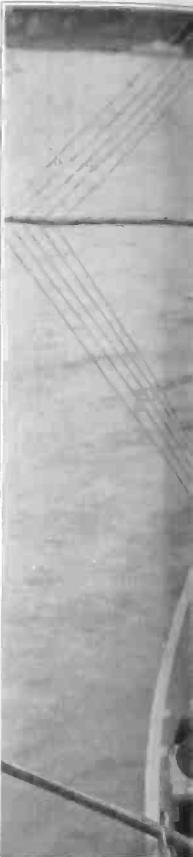
(Kadel & Herbert)  
A GOOD PUBLICITY stunt was engineered by the Salvation Army when it set up a Super-Heterodyne receiver operating on a loop. The music attracted thousands of passers-by, and the mute appeal on the sign brought down a shower of change and bills. This scene is taken in front of the New York Public Library, Fifth Avenue and Forty-Second Street. The money collected here early in the year went towards providing sets for the vacation camp at North Lone Branch.



(Miller News)  
THE CROSSED COIL radio beacon guides the ferry boats across San Francisco Bay in foggy weather. The beacon consists of two coil antennae across each other at an angle of 135 degrees.



(Kadel & Herbert)  
REAR VIEW of a remarkably efficient receiver designed and constructed by Rutledge Mayo, of New York City. Using three stages of radio-frequency, detector, and two stages of audio-frequency amplification, Mr. Mayo has picked up stations 1,500 miles distant on the loop. A double circuit jack mounted on the panel enables the use of an outdoor antenna and ground simply by plugging in.



BUY SCOUTS make a r and outings, not only to localities under all cond boat in a lake near Tux the boys have rigged up from a convenient tree pocket-knives, they cut



(Foto Topics)

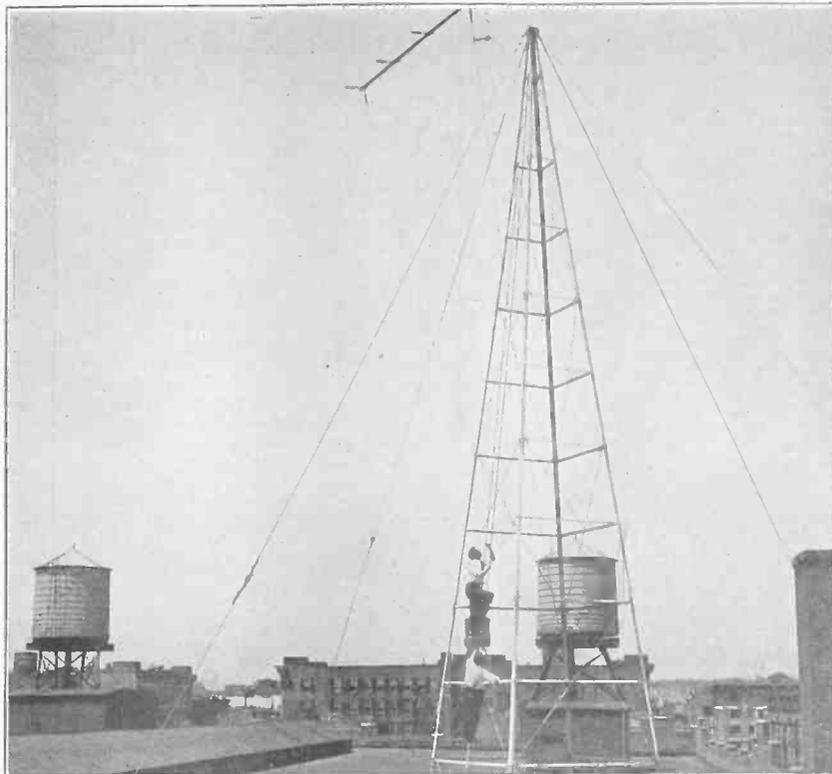
WHEN the American Co proved to be the best bet dishes were cleared away, many of the latest steps space. When this photo were quite happily compos of the listeners show how the thing for outdoor life limb to limb and the p

# My Dear!—Traction Opens a Station



practice of taking along a radio set on hikes entertained, but to study reception in different places. The Scouts shown here are aboard a row-boat, N. Y. In the absence of a regular antenna loop, they simply cut two straight sticks and tied them together with twine. With their hands at each end of the two sticks and in them around the wire.

(Foto Topics)

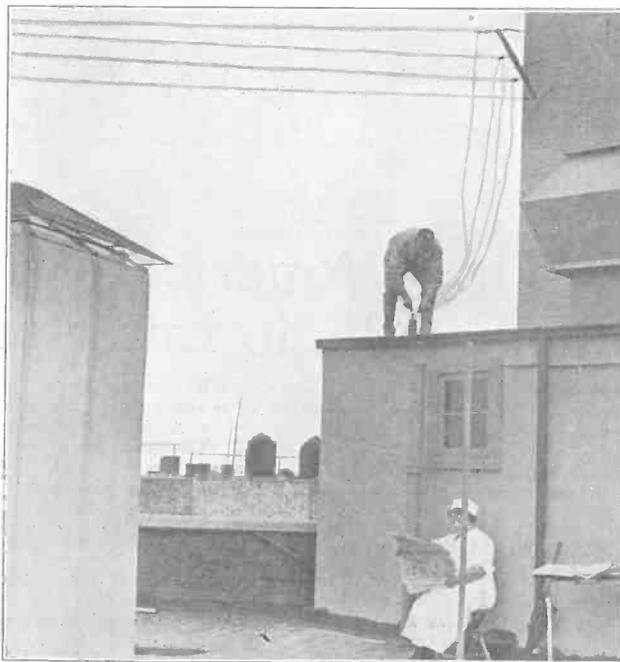


(Kadel & Herbert)

ONE of the steel supporting masts at the Third Avenue Railway Company's new station, WEBJ, located at 130th Street and Third Avenue, New York City. WEBJ is now operating on 273 meters on a power of 500 watts. The station will radiocast twice a week from 7 to 9 p. m. Programs up to September 9 will be preliminary to the official opening on that date. Harry A. Bruno is the director of the station. Many of the programs will be made up of talent among the employees. No advertising of any kind will go over the air from this station, it was announced. This station is the ninth in Greater New York, the others being WEAJ, WJZ, WJY, WNYC, WHN, WFBH, WRW and WBBR. Of these, WEAJ and WNYC use the maximum power of 1,000 watts, WJZ, WJY, WHN and WFBH use 500 watts, and WRW and WBBR 100 watts. New York probably has the greatest variety of radio entertainment of any other locality.



Association gathered at Georges Island for their annual meet, radio was it came to providing entertainment for the crowd after the supper. Although the rough camping ground is not a very inviting dance floor, so little rooms that they were easily accomplished with a minimum of equipment. The audience was enjoying an operatic quartette. All listeners agreed, though you might say one girl was up a tree. The smiles on the faces as they enjoy the radiocast music. They agreed that the radio is just what enhances the enjoyment of one's vacation. The aerial is strung from a tree to a stake. This enabled the reception of DX stations.



(Kadel & Herbert)

THE NEW HUNTS POINT HOSPITAL, Bronx, N. Y., is bringing the benefits of radio to the sick in its care. After experiment the radio has been installed as a permanent feature. The master receiver is located on the roof and cables lead to every ward and bed in the hospital. The operator on duty tunes in on what he considers the most healing program available, and the patients plug their head sets into the wall jacks to listen. The antenna installation is shown being completed, the engineer in charge making the final connection to the lead-in to the radio room.

# Programs

Thursday, August 14 (continued from page 15)

weather forecasts. 6 P. M., stories and songs for children by Peggy Albion.

**WOR, Newark, N. J., 405m (740k), E. S. D. S. T.**—6:15 P. M., Albert E. Sonn, in his weekly talk entitled, "Radio for the Layman." 6:30 P. M., "Music While You Dine," Harry Cox Canary Cottage Inn orchestra. 7:20 P. M., resume of the day's sports with Jolly Bill Steinke.

**WFBH, New York, 273m (1100k), E. S. D. S. T.**—5 P. M., kiddies' hour. 5:15 P. M., Fred Hughes, tenor. 5:30 P. M., Ida Felhelsen and Ann Dedrick, songs. 6 P. M., Fernando Villa, tenor. 6:15 P. M., Hotel Majestic orchestra. 6:30 P. M., Jack Delaney, humor. 6:45 P. M., Hotel Majestic orchestra. 7 P. M., Marcia Stanton, lyric soprano. 7:15 P. M., "Voice of Central Park" orchestra, Harry Voltaire, director. 11:30 P. M., to 2 A. M., midnight rendezvous.

**WHN, New York, 360m (830k), E. S. D. S. T.**—6:30 to 7:30 P. M., dinner music, Olcott Vail's string trio, and au Spick's dance orchestra. 9:30 P. M., Charles Strickland's Palisades Park orchestra. 10 P. M., Vincent Lane, tenor. 10:15 P. M., Sara V. Turits, soprano. 10:30 P. M., Fletcher Henderson's Roseland ballroom orchestra. 11 P. M., Harry Hock and his entertainers. 11:15 P. M., Gene Austin, baritone. 11:30 P. M., Jack Kelly and his Collegian orchestra.

## Friday, August 15

**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.

**WEAF, New York, 492m (610k), E. S. D. S. T.**—11 to 12 A. M., Gene Austin, popular singer and pianist; talks under the auspices of World's Work and the New York Botanical Gardens; market and weather reports. 4 to 5 P. M., Forest Huff, Jr., and his Hotel Ocean Crest orchestra; J. Garfield Dale, tenor, accompanied by Frank Herbert Scherer. 6 to 10 P. M., dinner music from the Rose Room of the Hotel Waldorf-Astoria; "The Story of the Enchanted Cat-tails"; Henry White, baritone; Jimmie Clark, jazz pianist; Marion Metcalf Lindquist, dramatic reader; B. Fischer and company's "Astor Coffee" dance orchestra.

**WOO, Philadelphia, 509m (590k), E. S. D. S. T.**—4:45 P. M., grand organ and trumpets. 7:30 P. M., sports results and police reports; dinner music by A. Candelori and his Hotel Adelphia Roof Garden orchestra. 8:30 P. M., special musical program by the evangelist Rev. Edmund Haine and John A. Scott, pianist. 9:15 P. M., grand organ recital, Harriette G. Ridley; Gertrude Schultz, contralto. 10 P. M., dance program by A. Candelori and his Hotel Adelphia Roof Garden orchestra.

**WDAR, Philadelphia, 395m (760k), E. S. D. S. T.**—11:45 A. M., daily almanac. 12 noon, organ recital from the Stanley Theatre; features from the studio; Arcadia Cafe concert orchestra, Prof. Feri Sarkoz, director. 2 to 3 P. M., Arcadia Cafe concert orchestra. 4:30 P. M., dance program. 5:45 P. M., baseball scores and other sports results. 7:30 P. M., Dream Daddy with the boys and girls. 8 P. M., book review by Arnold Abbott; dance program from the Young's Million Dollar Pier; Charley Fry and his Million Dollar Pier orchestra; the world famous Emmett Welch Minstrels.

**WIP, Philadelphia, 509m (590k), E. S. D. S. T.**—3:30 P. M., concert by Comfort's Philharmonic orchestra, Roy B. Comfort, conductor; soloists, Miss Dorothy Fox, soprano, and Mr. Edwin McKnight, xylophone. 6 P. M., weather forecast. 6:05 P. M., dinner music by Eddie Elkins' orchestra from the El Kadia Gardens. 6:45 P.

# Tennis Championships to Be Radiocast by WEA

**T**HE semi-finals of the national women's tennis championship, Forest Hills, N. Y., will be radiocast by WEA, 492 meters, New York City, on Friday.

The microphone at the courts in Forest Hills will be opened at 4 P. M., and will remain on the air until the matches scheduled for the day have been played off. The finals on the following day, August 16, will be reported in the same manner.

On August 30 and September 1 the semi-finals and finals of the men's national lawn tennis championship matches will be put on the air, probably on the same schedule used in the women's matches.

M., U. S. Dept. of Agriculture livestock and produce market reports. 7 P. M., Uncle Wip's bedtime stories and roll call for the children of Uncle Wip's Kiddie Klub.

**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., piano recital.

**WCAE, Pittsburgh, 462m (650k), E. S. D. S. T.**—4:30 P. M., Sunshine Girl; stock market reports; Pittsburgh livestock quotations. 6:30 P. M., dinner concert from William Penn Hotel. 7:30 P. M., Uncle Kaybee. 8 to 9:30 P. M., baseball scores. 9:30 P. M., musical program.

**WJZ, New York, 455m (660k), E. S. D. S. T.**—1 P. M., Hotel Ambassador trio. 4 P. M., Eleanor Gunn's fashion talk. 4:10 P. M., daily menu. 4:15 P. M., arts and decorations. 4:30 P. M., Hotel Astor organ recital, direct from Hotel Astor. 5:30 P. M., state and federal agricultural reports; Farm and Home reports; closing quotations of the 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. 7:30 P. M., Ernie Golden's McAlpin roof orchestra. 8 P. M., looseleaf current topics, by Dr. William H. Allen. 8:10 P. M., Goldman band concert, direct from Mall, Central Park; Edwin Franko Goldman, director; Wagner program; Genia Fonariova, soprano. 10 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., Eugenie Proion, pianist. 9 P. M., Sailors concert by officers of the White Star liner Majestic.

**KHJ, Los Angeles, 395m (760k), P. T.**—6 P. M., Art Hickman's concert orchestra from the Biltmore Hotel. 6:45 P. M., children's program, presenting Prof. Walter Sylvester Hertzog, telling stories of American history; weekly visit of Richard Headrick, screen juvenile; bedtime story

by Uncle John. 8 P. M., program arranged through the courtesy of Tilda Rohr, contralto. 9 P. M., program presenting Charlie Wellman, jazz tenor; Bill Hatch, pianist; George W. Hood, reader. 10 to 11 P. M., Art Hickman's dance orchestra.

**WOAW, Omaha, Neb., 526m (570k), C. S. T.**—4:30 P. M., matinee program by Augustana Harmony Four of Rock Island, Ill. 6 P. M., dinner program.

**WOC, Davenport, Ia., 484m (620k), C. S. T.**—9 A. M., opening market quotations. 10 A. M., household hints. 10:55 A. M., time signals. 11 A. M., weather and river forecast. 11:05 A. M., market quotations. 12 noon, chimes concert. 12:15 P. M., weather forecast. 1 P. M., closing stocks and markets. 7 P. M., sport news and weather forecast. 8 P. M., musical program: Ruth Eleanor Hollingsworth, soprano; Emma Bevansee Butler, contralto; Harry Y. Mercer, tenor; Belle Snyder Drury, pianiste. 9 P. M., weekly tourists' road bulletin.

**WRC, Washington, 469m (640k), E. S. T.**—5:15 P. M., instruction in international code. 6 P. M., children's hour by Peggy Albion. 6:20 P. M., baseball scores. 7:45 P. M., talk on motoring, auspices American Automobile Association. 8 P. M., musical program. 9 P. M., band concert. 9:55 P. M., time signals and weather forecasts.

**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., Drucilla Harrington, fourteen-year-old reader and pianist. 7:20 P. M., resume of the day's sports with Jolly Bill Steinke.

**WFBH, New York, 273m (1100k), E. S. D. S. T.**—3 P. M., Bay Park Club orchestra. 3:15 P. M., the Dixie Stars, Bernard and Robinson. 3:30 P. M., world neighborhood news. 4 P. M., Joseph C. Wolff, bass baritone. 4:30 P. M., Ada Kopf, contralto. 5 P. M., kiddies' period. 5:15 P. M., John Barton, baritone. 5:30 P. M., Rita Melvia, dramatic soprano. 5:45 P. M., Frank J. Herel, violin recital. 6 P. M., Cholly Storm's Cinderella orchestra.

**WHN, New York, 360m (830k), E. S. D. S. T.**—7:30 P. M., Bert Reith's Southern Harmonists. 8 P. M., Jimmy Flynn, tenor. 8:15 P. M., Ida Nachmanowitz, concert pianist. 8:30 P. M., Philip J. Cortesi, tenor; John B. Cole, piano. 8:45 P. M., boys' period, Wm. J. Stuart conducting, sponsored by the Kiwanis Club of New York City. 8 P. M., Perfect Harmony Four. 9:15 P. M., vaudeville stars from Loew's State Theatre. 9:30 P. M., National Security League talk, "Radicalism in the Coming Campaign," Jerome F. Collins, speaker. 9:45 P. M., Fitzpatrick Brothers, sixty-year-young entertainers. 10 P. M., Miss Ethyle Redmond, ukulele, with Manny Shubert, uke. 10:15 P. M., Minnie Eichinger, soprano. 10:30 P. M., Vincent D. Daniels. 10:45 P. M., Finch & Britt, songbirds. 11 P. M., Jimmy Clark and his entertainers. 11:30 P. M., Fletcher Henderson's Roseland ballroom orchestra.

## Saturday, August 16

**WEAF, New York, 492m (610k), E. S. D. S. T.**—4 to 5 P. M., courtside description of the final matches of the Women's National Lawn Tennis Championship, direct from the West Side Tennis Stadium, Forest Hills, New York. 6 to 11 P. M., dinner music from the Rose Room of the Hotel Waldorf-Astoria; Ruth Donaldson, soprano; Halsey K. Mohr, pianist and entertainer; Metropolitan male chorus; Edward Avis, whistler; Vincent Lopez and his orchestra.

**WIP, Philadelphia, 509m (590k), E. S. D. S. T.**—3:05 P. M., visiting artists and chats with celebrities, broadcast direct from the WIP control station on the Steel Pier, Atlantic City, N. J. 3:30 P. M., concert by Comfort's Philharmonic orchestra, Roy B. Comfort, conductor. 6 P. M., weather forecast. 6:05 P. M., dinner music by the Kentucky Serenaders. 6:45 P. M., U. S. Dept. of Agriculture livestock and produce market reports. 7 P. M., Uncle Wip's bedtime stories and roll call for the children of Uncle Wip's Kiddie Klub. 8 P. M., concert by Comfort's Philharmonic orchestra. 8:45 P. M., "What the Wild Waves are Saying," picked up by a microphone placed amidst the breaking waves.

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

**WCAE, Pittsburgh, 462m (650k), E. S. D. S. T.**—3 P. M., piano recital by Prof. Otto Kalteis. 3:15 P. M., baseball schedule; results of games played today broadcast every 15 minutes thereafter until 5 P. M. 4:30 P. M., Pittsburgh livestock quotations. 6:30 P. M., dinner concert transmitted from the William Penn Hotel. 7:30 P. M., Uncle Kaybee. 7:45 P. M., baseball scores. 9:30 P. M., musical program.

**WJZ, New York, 455m (660k), E. S. D. S. T.**—1 P. M., Hotel Vanderbilt orchestra, Joseph Strissof, director. 4 P. M., Evan D. Thomas, bass-baritone. 4:30 P. M., Roger Wolfe's Biltmore Tea Room orchestra. 5:30 P. M., state and federal agricultural reports; Farm and Home reports; closing quotations of the New York Stock Exchange; foreign exchange quotations; Evening Post news. 7 P. M., Waldorf Astoria orchestra, direct from Roof Garden. 8:15 P. M., school high spot contest. 8:30 P. M., New York Philharmonic orchestra, direct from Lewisohn Stadium; Willem Von Hoogstraten, director. 10:15 P. M., Fred Fletcher, editor of Hunter and Fishing, "Deep Sea Angling," Evening World. 10:30 P. M., Hotel Astor Roof orchestra.

**WOC, Davenport, Ia., 484m (620k), C. S. T.**—9 A. M., opening market quotations. 10 A. M., household hints. 10:55 A. M., time signals. 11 A. M., weather and river forecast. 11:05 A. M., government bulletins. 11:15 A. M., closing market quotations. 12 noon, chimes concert. 12:15 P. M., weather forecast. 7 P. M., sport news and weather forecast. 9 P. M., orchestra program, the Palmer School radio orchestra.

(Concluded on page 31)

# 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 accompany blank and mail to Radiocasting Manager, RADIO WORLD.

Cut off. Fill out. Mail today.

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

Dear Sir:

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

Name.....  
Street Address.....  
City and State.....

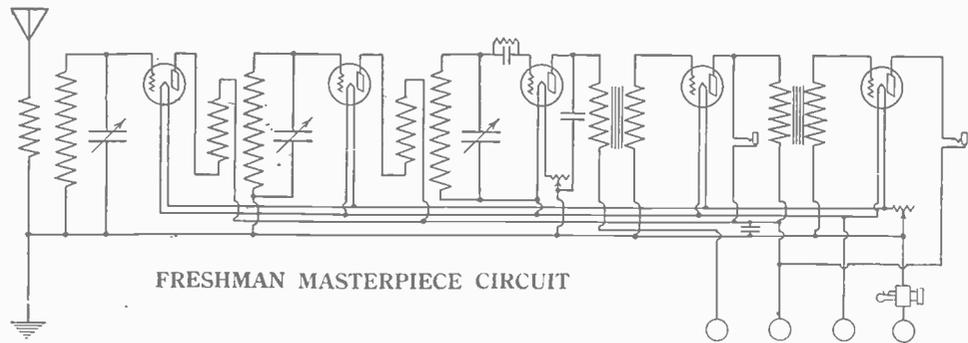
Yearly subscribers for RADIO WORLD may, when sending in their \$6.00 for a yearly subscription, vote the entire fifty-two issues in advance for their favorite entertainer, when they so designate their desire to do so. In this issue there is published a tally showing H. M. Snodgrass, of WOS, Jefferson City, Mo., leading.

Another tally will be made and published in RADIO WORLD soon and an important announcement made.

# The Freshman Masterpiece Set

*A 5-Tube Tuned Radio-Frequency Receiver, Using Low-Loss Parts*

FIG. 1—Circuit network of the two stages of tuned radio-frequency amplification, detector and two stages of audio-frequency amplification. No neutralizing condensers are used, as the coils are so wound as to prevent inter-action between couplings. The dial settings are uniform and a station, once logged, always comes in at the same dial reading. Low-loss coils and low-loss condensers are an outstanding feature of this inexpensive, efficient set. The primaries of the radio-frequency coils are reversed, to prevent oscillation. These coils have a 7-turn primary and a 60-turn secondary, of No. 24 DSC wire, including the coil in the detector circuit, the detector coil not having a reversed primary, however.



By A. W. Franklin

Chief Engineer, Charles Freshman Co.

WITH the splendid co-operation of my associate engineers the development of a 5-tube tuned radio-frequency set using efficient low-loss apparatus was accomplished in compact form and at very low cost, but with very high efficiency.

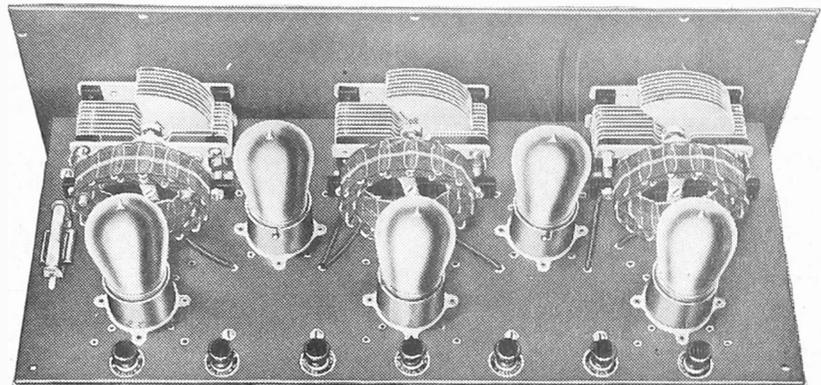
A minimum amount of labor is necessary in assembling the complete set.

The possessor of the Freshman Masterpiece will enjoy a radio set that excels in volume and clarity on both local and distant stations and one that is easy to tune and operate. Its wiring is such that it permits the operator to tune in with the head phones while the loud speaker is in operation.

The circuit (Fig. 1) shows the two stages of tuned radio-frequency, detector and two stages of audio-frequency. There is one tuning unit in the aerial circuit and one on each of the tuned radio-frequency stages, evenly matched, so that all three dials read practically alike. Once the stations are logged the same station always may be brought in on the same dial setting.

The only apparatus visible when the cabinet is opened are the three tuned radio-frequency units, the variable grid leak and the tubes. (Fig. 2.) All other parts are mounted below a hard rubber sub-panel, this panel also serving as the base of all five sockets and the base of the three tuned radio-frequency units. Therefore, the first part to make secure is the sub-panel, the sockets being riveted or eyeleted thereto. All of the wiring, transformers and rheostats are mounted directly under the sub-panel, being thus entirely hidden from view. This permits the use of short straight line connections between the different points and

*(Continued on page 24)*



DUE TO THE BASEBOARD arrangement used, all you see when you look into the cabinet (Fig. 2) are the three tuned audio-frequency units, the variable grid leak and the tubes.

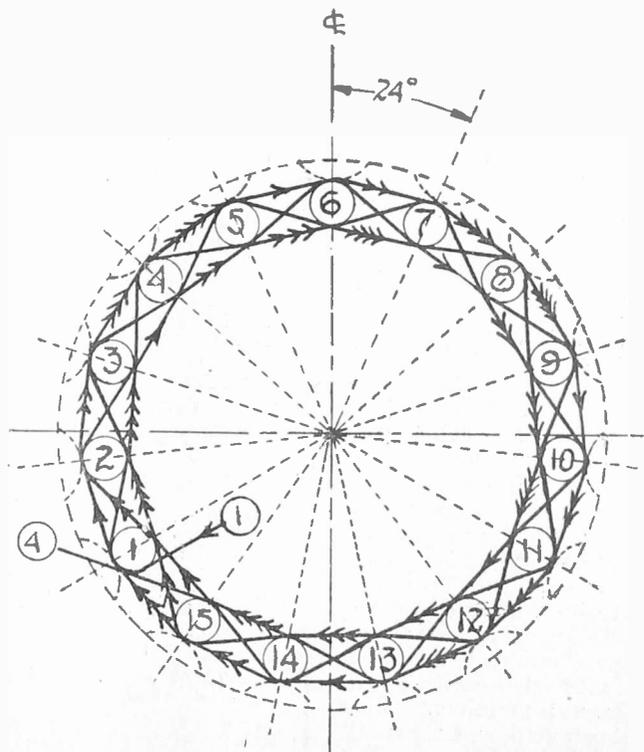


FIG. 3—How to wind the coils.

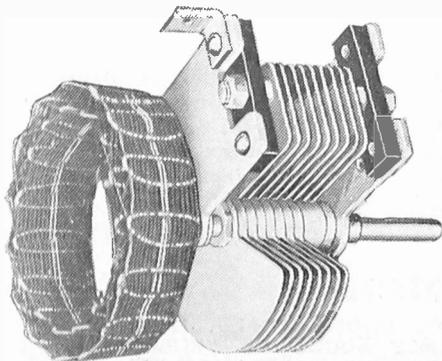


FIG. 4—How coil is mounted on condenser. No tilting is necessary.

**A THOUGHT FOR THE WEEK**—Due mostly to radio, man today can accomplish more before he is 40 than he could have accomplished ten years ago at 60.

# RADIO WORLD

Title Reg. U. S. Pat. Off.

TELEPHONE: LACKAWANNA 2062, 6976  
PUBLISHED EVERY WEDNESDAY  
(Dated Saturday of same week)

FROM PUBLICATION OFFICE,  
HENNESSY RADIO PUBLICATIONS CORPORATION  
ROLAND BURKE HENNESSY, President  
M. B. HENNESSY, Vice-President  
FRED S. CLARK, Secretary and Manager  
1493 BROADWAY, NEW YORK, N. Y.  
New York Representatives: James H. Carroll, W. H. Oke.  
Circulation Manager: David Yokel.  
Boston Representative: Chas. H. M. White, 18 Stuart Street, Boston, Mass.  
Chicago Representative: Mat H. Friedman, 519 East 60th Street, Chicago, Ill.  
Cincinnati Representative: Samuel H. Joffee, 1117 Provident Bank Bldg., Cincinnati, O.  
European Representatives: The International News Co., Breains Bldgs., Chancery Lane, London, Eng. Paris, France. Brentano's 88 Avenue de l'Opera.

EDITOR, Roland Burke Hennessy  
MANAGING EDITOR, Herman Bernard  
TECHNICAL EDITOR, N. N. Bernstein

### SUBSCRIPTION RATES

Fifteen cents a copy. \$6.00 a year. \$3.00 for six months. \$1.50 for three months. Add \$1.00 a year extra for foreign postage. Canada, 50 cents. Receipt by new subscribers of the first copy of RADIO WORLD mailed to them after sending in their order, is automatic acknowledgment of their subscription order. Changes of address should be received at this office two weeks before date of publication. State whether subscription is new or a renewal.

### ADVERTISING RATES

FLAT RATE—Page, 7 1/2 x 11", \$150; half page, 8 1/2 x 7, or 5 1/2 x 3 col., \$75; quarter page, 4 1/2 x 3, \$37.50; one col., 2 1/4 x 11", \$50—\$5 per inch. Back cover page, two colors, \$250. Preferred positions 20% extra.

### CLASSIFIED ADVERTISEMENTS

Five cents per word. Minimum, 10 words. Cash with order.

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

AUGUST 16, 1924

### Radio's Rapid Strides Shown By Price Cuts

THE new list price of tubes of the Radio Corporation of America and of E. T. Cunningham, Inc., a reduction of \$1 having been announced at the same time the National Carbon Company reduced its price on Eveready batteries, radio's progress is doubly emphasized. If demand were small, manufacturing costs for a given article would be high, consequently there would be no price reductions. Quantity production alone is responsible, and it is made possible only by radio's tremendous growth. The rapid strides of today are an indication of the greater progress of tomorrow.

Fans who were scurrying around for R. C. A. tubes last Christmas remember the list price of \$6 and the difficulty of getting tubes even at that price. The previous Christmas found tubes selling at \$8 and \$9 retail, that is, at a premium. There is no tube shortage now, or naturally there would be no price cut. Fans can scarcely complain that radio supplies and sets are overpriced.

## Marching Onward

THE main feature of next week's RADIO WORLD, issue of August 23, on sale August 20 (Wednesday), is an article on how to build a 1-tube single-dial set that gets DX, produces wonderful quality of signals, is selective and fits in a 7 x 7-inch cabinet. It is a set well worth building—not a toy but a highly efficient receiver.

Brewster Lee will contribute an illustrated article, "A Study in Low Loss," including data on converting high loss apparatus to low loss.

An article of interest to the large group devoted to the purity of crystal reception will be "A Selective Crystal Set," one that regularly got 300 miles. It is not a reflex—just a simple crystal set, but an excellent one.

"A Set That Works Without an Aerial," is another interesting "how-to-make" article. The 2-part article on "A Low-Loss Neutrodyne," by N. N. Bernstein, Technical Editor, will be included in that number.

## RADIO WORLD

15 CENTS Illustrated ISSUE OF AUGUST 16, 1924

Vol. 5. No. 21

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.

### TABLE OF CONTENTS

A Low-Loss Neutrodyne (Part I of a two-part article) by N. N. Bernstein, Technical Editor; Constructional Design by A. F. Lapierre, Consulting Engineer. (Illustrated) .....	Page 3
The Super-Audible Wave, by B. J. Bongart .....	Page 5
An All-Around Portable Set for Home and Outdoor Use, by Herbert E. Hayden. (Illustrated) .....	Page 6
The Superdyne Principle in a 3-Tube Set, by Lester Hutter. (Illustrated) .....	Page 9
How to Build a Current Supply Unit So You Can Light Your Amplifier Tubes on A. C., by Brainard Foote. (Illustrated) .....	Page 11
Zincite, the Best Crystal Oscillator .....	Page 13
How to Install Charger and Batteries in a Cabinet with Set on Top, by Brewster Lee. (Illustrated) .....	Page 14
Advance Radiocast Programs .....	Page 15
News and Features Told in Photographs .....	Pages 16 and 17
The Radio Trade .....	Page 22
Latest News .....	Page 23

### Desert Dead Spot Made Live for Reception

THE average fan who thinks he is having trouble will find consolation in a report made by an engineering corps which has been carrying on radio experimental work in the Mojave Desert, always considered a "dead spot" for radio reception. The report has been received by the Electrical Research Laboratories in Chicago. The experimenters are located at

Little Rock, California, and are members of the Los Angeles County Surveyor's Camp. The report is signed by seven engineers and says:

"To obtain successful radio reception we have had to bury the ground 20 feet deep to find even a moist condition, and to raise the aerial 60 feet high. We are using an 'L' antenna, 155 feet long.

## —The Peak

of Performance Obtained on a Single-Dial Set. Quality is so Wonderful that True Resonance is Instantly Recognized—No 1-Tube Set Produces any Better Signals—Selectivity so Good that Right under the Guns of Two 1,000-watt Stations, 30 meters apart, they are separated—Other Stations, 15 meters apart, Do Not Conflict—A Cinch to Build.

## —An Achievement

SEE NEXT WEEK'S RADIO WORLD, ISSUE OF AUGUST 23, ON SALE AUGUST 20. FULL CONSTRUCTIONAL DATA AND DIAGRAMS WILL BE PUBLISHED.

# 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.

I am going to build the Superdyne as described by N. N. Bernstein in RADIO WORLD for May 17, 24 and 31, and would like to know if I can use Myers tubes with good success in this circuit? Also, is it possible for me to use Amperite automatic control resistance for the audio-frequency tubes instead of rheostats?—Everett Birdler, Mt. Pulaski, Ill.

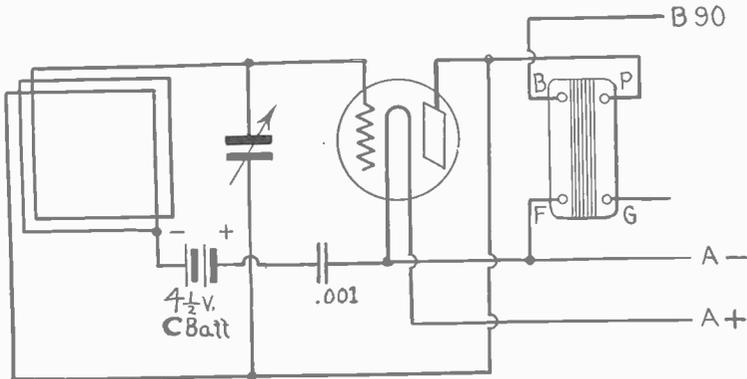
Myers tubes will work excellently in the Superdyne. They have been used in this circuit by Canadian and American fans who report that they are great. The Amperite resistances are serviceable, but be sure and get the proper value unit, which is the same as that used for the 201A type tubes. We would be pleased to hear what you accomplish with the set.

I made up the Super-Power 4-tube reflex by Byrt C. Caldwell, published in RADIO WORLD for July 5, and placed the honeycomb coil in series with the grid of the first tube, as called for. I use a loop antenna with a .0005 mfd. variable condenser for tuning. After hooking it up, I found that I could hear nothing unless I held the

Demonstration Receiver," what are the winding specifications for the two radio-frequency transformers?—W. C. Durham, 75 Herriman Ave., Jamaica, N. Y.

The RF transformers are wound on 3-inch bakelite or radion tubes, 3½ inches long. The primary consists of 12 turns of No. 24 DSC wire wound over one end of the secondary, which consists of 52 turns of the same size wire. Primary and secondary are separated by a layer of paper. A tap is taken from the secondary of the second RF transformer 16 turns from the end. This tap goes to one side of the neutralizing condenser, the other end of which is connected to the grid of the first tube.

Please publish answers to the following questions regarding the Single-Circuit article on page 5, RADIO WORLD for July 12. I would like to know about connecting the honeycomb coil and the .0005 mfd. variable condenser in series with the antenna. 1—Does the antenna connect to the condenser, in Fig. 1, thence to the winding on the stator of the variocoupler? 2—What is the correct size honey-



THE TAPPED LOOP, with C battery inserted (Fig. 28) has a .001 fixed condenser in series with A- and C+. It illustrates the accompanying answer to a question by G. L. Lonsdale, of Hartsdale, La.

wire coming from the honeycomb coil in my hand, and then I heard WEAJ (492 meters) very fine. That is only when I touch the wire, but when I let go I only hear WHN (crj meters). What do you think my trouble can be, and how can I cure it?—Joseph Zonia, 507 Valley Brook Ave., Lyndhurst, N. J.

Your antenna and tuning condenser are all right and will cover the radiocast wavelengths. Your trouble lies either in the wiring, which may be open at some point, or the connections on the honeycomb coil are the reverse of what they should be. It is important that the windings of this coil be identical with all others. Just reverse the two connecting wires on the coil leads, and if the trouble was there it will disappear, providing the rest of the wiring is correct.

I would like to ask a question in regard to the 1-tube set you can log described by Herman Bernard in the July 12 issue of RADIO WORLD. I have everything needed for a 3-tube set, also a 7 x 21 inch panel. Among my parts are three 6-ohm rheostats. My tubes are WD11 and C12. Will I have to use 20-ohm rheostats, or can the ones I have be used?—Irving Cobb, 212 North 11th Street, Camden, N. J.

You will have to use 20-ohm rheostats with the WD11 and C12 tubes. The 6-ohm rheostats, much in vogue a few years ago, were used with the old 201 tubes, and at present are only used with the UV200 detector tubes.

Referring to Byrt C. Caldwell's article appearing in RADIO WORLD for July 26, entitled "A 6-Tube

comb coil to use? 3—Would Litzendrager wire make satisfactory pig-tail connections? 4—Is it necessary to shunt the secondary of the audio-frequency transformer with a fixed condenser, and does this cut down the volume of the signals?—Herbert J. Hause, 507 Second Ave., Tarentum, Pa.

1—Yes, the antenna goes to stator of the variocoupler and to one side of the variable condenser. It does not matter which is first. 2—The honeycomb coil should preferably be connected by means of the regular mounting. In that way you can experiment with different size coils. You may find that the 50-turn coil will be about the best for general all-around use. 3—It is very hard to scrape the insulation from each separate strand of Litz wire, but if you don't mind the trouble the wire makes excellent flexible connections. 4—The fixed condenser is necessary to by-pass the radio-frequency currents so as to keep them out of the secondary winding of the AF transformer. The set is likely to squeal if this is left out. There is no loss of volume with the condenser in.

I have tried the tapped loop idea as set forth in the loop article published in RADIO WORLD recently, but find that in some way the battery short circuits. Will you please publish a diagram showing me how to hookup a tapped loop with a grid bias battery?—G. L. Lonsdale, Hartsdale, La.

Fig. 28 shows how to hookup the tapped loop, which may be any loop at all with a tap midway between the two terminals, with a grid bias or C battery. The fixed condenser (.001mfd.) is placed between the positive post of the C battery and the (Concluded on page 27)

# MAGNAVOX Radio Products



M4  
\$25.00

Exquisite tone quality, harmonious and true to the original broadcast program, distinguishes the new Magnavox Reproducer M4 from other instruments which operate without the use of a battery.

Beautifully finished in dark enamel with gold high lighting, the graceful appearance of M4 suggests its use in the most dignified surroundings.

## Magnavox Reproducers (Electro-dynamic)

- R3—new model with Volume Control; consumes from .1 to .6 ampere .....\$35.00
- R2—same as R3, but larger size; new model with Volume Control, .....\$50.00

## (Semi-dynamic)

- M4—latest Magnavox achievement; requires no battery, .....\$25.00
- M1—same principle as M4; requires no battery.....\$30.00

## Magnavox Combination Sets

- A1-R consisting of electro-dynamic Reproducer with 14-inch curvex horn and 1 stage of amplification .....\$59.00
- A2-R consisting of electro-dynamic Reproducer with 14-inch curvex horn and 2 stages of amplification .....\$85.00

## Magnavox Power Amplifiers

- A1—new 1-stage Power Amplifier, .....\$27.50
- AC-2-C—2-stage Power Amplifier, .....\$50.00
- AC-3-C—3-stage Power Amplifier, .....\$60.00

Magnavox products are sold by reliable dealers everywhere. Write for catalogue.

The Magnavox Company  
Oakland, California

New York and San Francisco  
Canadian Distributors  
Perkins Electric Limited  
Toronto Montreal Winnipeg

# Join RADIO WORLD'S University Club

And Get Full Question and Answer Service for the Coming 52 Weeks.

RADIO WORLD, 1493 Broadway, New York City:

Enclosed find \$6.00 for RADIO WORLD for one year (52 Nos.) and also consider this as an application to join RADIO WORLD'S University Club, which gives me free information in your Radio University Department for the coming year.

Name .....

Street .....

City and State .....

## Particular Brands Demanded by Customers

RADIO has already become an industry of specialists. This is particularly true in relation to the manufacture of parts. For example, one concern dominates the field in making amplifying transformers. This particular firm brought out the first transformer offered to amateurs, and its name and slogan are now known to everyone who is the least bit interested in radio. Another concern dominates the head receiver field, and in the making of various other parts particular firms have established themselves in positions of leadership. Many of them were specialists in allied fields before they began the manufacture of radio apparatus.

Today the public is buying radio by brands. It insists on the brands which have been made famous by good material and by sound advertising and merchandising policies. The writer was told by several radio dealers that the average man who comes into a store to buy radio usually has a list of the parts and the brands of each which he desires, and it is impossible to sell him any other brand. Often he has used the particular brand before; frequently he has been told by a friend of good results obtained with it, or has been impressed by its advertised merits.

There is every reason to believe that within the next few years the manufacture of radio parts in this country will be largely concentrated in twelve or fifteen manufacturers, and all of them will be specialists

## YOU CAN'T GET AWAY FROM IT



in the various fields in which they are now building up their reputations.

### ERROR IN STREET ADDRESS

IN our issue of August 9, the Cortlandt Panel Engraving Company's address was given as 31 Cortlandt St., New York City. The address should have read 81 Cortlandt St. This Company is so well-known, however, that we are sure that all the mail addressed to them will be received.

# The Radio Trade

## First Anti-Trust Hearing Is Set for Sept. 15

THE Federal Trade Commission has granted the United Fruit Company a special hearing on September 15, relative to the Commissions' findings against the so-called radio trust. The Fruit Company asks that the complaint so far as it concerns the activities of the company, be dismissed. This is the first of the hearings in connection with the Commissions' report against the Radio Corporation and its affiliated companies. Either a general hearing or special hearings for each respondent are expected to be held this fall.

## N. C. C. Reduces Prices On "B" Batteries

A MOVE to reduce the cost of operating radio sets came with the announcement by National Carbon Company of a substantial reduction in the prices of its radio B batteries. James R. Crawford, general sales manager, states that the popularity of various multi-tube sets that require additional battery power has made set operation more costly. As one of the leaders in the manufacture of dry-cell B batteries, his company is in position to relieve maintenance costs for the country's millions of radio set owners by reducing the cost of batteries. Development of additional and improved manufacturing facilities, coupled with the growing demand for radio equipment, enable the company to make this reduction.

## SOUTH AMERICA OPENED TO TRADE FROM U. S.

THE adoption of an entirely new and extensive program for the promotion of radiocasting in Latin America by American interests following the abrogation of an agreement under which the American companies had jointly participated in South American radio business for the past three

years with interests of England, France and Germany, was announced by General J. G. Harbord, president of the Radio Corporation of America. He said the new plans gave the United States its first unrestricted opportunity to utilize fully its resources in developing radio in South America. Five of the principal countries of the continent, Argentine, Uruguay, Chile, Venezuela and Brazil, will benefit by the new plan according to General Harbord. He said:

"One of the outstanding advantages of the plan, made effective following our release from Radio Sud America, is a system giving direct contact with the South American radio market from New York, thus eliminating the expenses incidental to carrying on operation through intermediate distributing centers. With newly organized outlets forming a part of the distribution circuits, terminating at Buenos Aires, Montevideo, Sao Paulo, Rio Janeiro, Valparaiso, and other leading cities, every new development in radiocasting apparatus will be made available to South Americans practically simultaneously with their introduction in the United States."

THE GREAT NORTHERN RADIO COMPANY has opened a third store at 4 West Forty-third Street, near Fifth Avenue, New York City, which will make a specialty of catering to the Fifth Avenue and Grand Central zone trade. Philip Feldman is president of the Great Northern Radio Company.

THE BROOKLYN RADIO SERVICE COMPANY, of which Ben Ginsberg is the head, has been appointed Brooklyn, N. Y., distributor for the Ultradyne Super-Heterodyne receiver.

## Coming Events

AUG. 16 TO 21, INCLUSIVE—Pacific Radio Exposition, Civic Auditorium, San Francisco, under auspices of Pacific Radio Trade Association.

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 radiocast from the convention.

NOV. 24 TO 30, INCLUSIVE—International Radio Week.

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

## 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 .....

W. H. Sanders, Hatton, Wash.  
Forrest Flinders, 43 Perley St., Concord, N. H.  
J. J. Brignall, 99 Constance St., Toronto, Ont.  
W. A. Willis, Box 243, Seaser, Ill.  
Jerome Karmial, 1526 39th St., Brooklyn, N. Y.  
William Grogan, 106 South Pacific Ave., San Pedro, Cal.

Phonograph Hospital, Box 525, Long Branch, Cal.

J. L. Lehnherr, dealer, Towanda, Kas.  
James Martin, North Vernon, Indiana.  
Einar Martinsson, 1749 West Minnehaha St., St. Paul, Minn.

Hyman Gordon, 353 E. 77th St., N. Y. C.  
Charles W. Moser, Jr., 310 Penn St., Huntingdon, Pa.

Harold E. Karlsruher, 722 Halsey St., Brooklyn, N. Y.

Electric City Novelty Mfg. Co., Schenectady, N. Y.

Herbert Shaul, 1926 Sheridan St., Anderson, Ind.  
Harry L. Sharpless, Pottstown, Radio View, Pa.

L. M. Germany, dealer, Lenoir City, Tenn.

Sam Phillips, 719 Hopkins St., Buffalo, N. Y.  
William L. Welch, Y. M. C. A. Bldg., Nashville, Tenn.

Scott Thomas, Ferguson, Mo.

H. Tonn, 319 Stagg St., Brooklyn, N. Y.

D. E. Simmons, 65 Main St., Poughkeepsie, N. Y.

M. H. Lewis, 272 West 90th St., New York City.

Clifford R. Dallas, RR No. 6, Muscatine, Ia.

M. L. Bawly, 406 East 2nd Ave., Roselle, N. J.

C. Silbermann, Flood Bldg., San Francisco, Cal.

Charles Brown, Box 31, West Middlesex, Pa.

Paul W. Newman, 1916 Cropsey Ave., Brooklyn, N. Y.

Harris Auto Radio Equipment, Sta. C., Box 74, Los Angeles, Cal.

S. T. Bond, Plaza Hotel, San Francisco, Cal.

THE BUREAU OF THE CENSUS is finishing a census of radio sets and apparatus manufactured during the calendar year of 1923. This survey applies only to apparatus manufactured and not to all sets in use or the distribution of sets. The enumeration being taken is part of a general census on the electrical machinery and apparatus industry. The specific products to be tabulated under radio apparatus include: receiving sets, tube and crystal; loud speakers; head phones; transmitting sets; transformers, rheostats; lighting arrestors, and miscellaneous parts. Motor generators come under the general head of electric generators, and radio tubes are classified under vacuum tubes, with X-ray tubes. Both the number of pieces of apparatus manufactured and the total value are being recorded. It is understood that a final report will not be made for at least a month or two.

## New Corporations

Automatic Radio Corp. of America, buy, sell and deal in automatic slot radio machines, \$1,000; Walter Bacon, Claymont, Del., J. F. Malloy, M. F. McEvilly, Wilmington, Del.

Sampter Radio Corp., Brooklyn, N. Y., 90 shares common stock, no par value. B. and P. Frankel, E. J. Sampter, Attorney, E. Watzner, 51 Chambers St., N. Y. C.

Regal Radio Corp., N. Y. C., \$10,000. L. B. and M. Silverstein, A. D. Zeigler, Attorney, D. S. Silverstein, 114 Park Row.

## 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.

# Britain Abolishes Radio Duty

## U. S. Bolts Wireless Parley

By Carl H. Butman

WASHINGTON.

THE first Inter-American Conference on Electrical Communications, which met in Mexico City recently, passed conventions controlling radio and adjourned to meet next year at Rio de Janeiro, but the United States is not a party to the agreement, according to Allan H. Babcock, American delegate, who has just reported to the State Department.

When Secretary Hughes will officially announce the position of the United States is not known, although he has received a copy of the convention passed by the seventeen Southern Republics, and has also the report from Delegate Babcock, on whom the final details of the work fell. Ambassador Warren and Representative White, the other delegates, were unable to remain in Mexico due to important business in the United States, and returned here.

The personal opinion of Mr. Babcock is that the United States will not submit to any treaty which would place its communication systems, and the industries back of them, under Government ownership or control.

## SNODGRASS STILL MOST POPULAR

Holds Lead in Radio World's Popularity Test—MacDowell Sisters Snatch Second Place from Roxy

HARRY M. SNODGRASS, station WOS, Jefferson City, Mo., is maintaining his lead in RADIO WORLD's popularity contest. In the tally taken June 7 Mr. Snodgrass led the field, with Roxy (S. L. Rothafel, WEAJ, New York) second, just in front of the Old Time Fiddlers, WOS, Jefferson City, Mo.

In the new tally, taken just before this issue went to press, the MacDowell Sisters, station WFAA, Dallas, Texas, came up from fourth place to second position, passing Roxy, who has a comfortable lead over the Little Symphony Orchestra, KDKA, Pittsburgh. The Old Time Fiddlers have dropped to fifth place.

Three new contestants have entered the race: Ford Rush, WLS, Chicago; Bernie and his Bunch, WGI, Medford, Mass., and Leo Reisman and his Orchestra, WBZ, Springfield, Mass.

Popularity votes come in to RADIO WORLD from almost every civilized country. One ballot was sent in by the writer of the following letter:

"I have just received RADIO WORLD and as I see there is balloting for the favorite radio entertainer I think that Mr. Roxy has given me many a good laugh and I think my vote should be doubled, coming from so far away. Give my very best regards to Mr. Roxy by radio.

FRANK LE PAYNE,  
Nakadori, Marunouchi,  
Tokio, Japan."

### THE TALLY

H. M. Snodgrass.....	WOS.....	1118
MacDowell Sisters.....	WFAA.....	986
Roxy (S. L. Rothafel).....	WEAJ.....	836
Little Symphony Orchestra.....	KDKA.....	542
Old Time Fiddlers.....	WOS.....	480
Thornton Fisher.....	WEAF.....	432
Cafe Boulevard Orchestra.....	WJZ.....	406
Wendell Hall (touring).....	WEAF.....	404
Dody Reimer.....	WLAG.....	402
Vincent Lopez Orchestra.....	WEAF.....	370
Edward M. Smith.....	WGY.....	338
Jerry Sullivan.....	WDAP.....	332
Night Hawks Frolic.....	WDAF.....	328
The Harmony Girl.....	WDAP.....	314
Jack Nelson.....	WDAP.....	302
Henry Field.....	WDAP.....	292
Jack Chapman.....	WDAP.....	249
Howard Lannin.....	WDAR.....	236
The Hired Hand.....	WBAP.....	232
Alabam Club Orchestra.....	WHN.....	224
Little Club Orchestra.....	WGY.....	204
Ernie Rogers.....	WSB.....	170
Bob Miller.....	WMC.....	166
Desert Orchestra.....	KZN.....	154
Coon Sander's Orchestra.....	WDAF.....	150
Mary Vogt.....	WOO.....	108
Prison Band.....	WOS.....	106
Ford Rush.....	WLS.....	102
Happiness Boys.....	WEAF.....	92
The Hotel Astor Band.....	WJZ.....	78
Dr. Cadman.....	WEAF.....	56
A. E. Sonn.....	WOR.....	50
Eveready Battery Orchestra.....	WEAF.....	50
Uncle John.....	KHJ.....	50
KGO Players.....	KGO.....	42
Harry Richman.....	WHN.....	40
Bernie and His Bunch.....	WGI.....	40
Leo Reisman Orchestra.....	WBZ.....	34

Watch for Important Announcement Soon! See Coupon, page 18.

33 1-3 per cent. levy rescinded, except on tubes which will be duty free, too, next year. Trade conditions abroad must be appreciated and Radio World offers to solve problems for manufacturers.

By Fred S. Clark

Manager, Radio World

GREAT BRITAIN has abolished the duty on radio goods. An exception exists in the case of tubes, on which the duty, 33 1-3 per cent., must be paid. However, under the revision of the McKenna Bill, whereby the duty was taken off radio sets and parts, even the levy on tubes will be rescinded, effective next August. The abolition on the other items takes effect this month.

This news is of extreme importance to the radio trade in the United States, as it opens up a field hitherto closed because of the prohibitive tariff making competition with British-made goods impossible.

As the United States is easily the world leader in radio, and far ahead of Great Britain, and that ascendancy is reflected in the trade, a profitable enterprise awaits the most enterprising American manufacturers.

Market conditions and methods in England must be sympathetically understood, however. The British have different names for many radio parts and functions, so the advertising has to be translated into their terminology. Also a knowledge of which publications in Great Britain and Ireland are best to use must be possessed.

Also there are public preferences to be considered, such as the insistence that tubes (which they call valves) be exposed to view. The British want to "see valves lighted" while the set is in operation. I made a special study of all these considerations, including marketing conditions, when I was in England. I combined this work with my duties as a delegate to the convention of Associated Advertising Clubs of the World. I returned to America only the other day.

Radio World will be glad to assist any manufacturer desiring to enter the inviting British field. Any question of whatsoever nature affecting this subject may be submitted and will receive prompt and careful attention. Address Trade Editor, Radio World, 1493 Broadway, New York City.

## Tube Prices Reduced by R. C. A. and Cunningham

THE Radio Corporation of America and E. T. Cunningham, Inc., announced a list price of \$4 for their tubes WD11, WD12, UV199, UV201A, UV200, C11, C12, C299, C301A and C300. This is a reduction of \$1 and was effective August 5.

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

### SPECIALISTS

Our Own Coils—guaranteed..... \$6.50  
Kit (Flattening Condensers, Coils and Diagram)..... 19.00  
Complete Parts, Assembled with Diagram..... 65.00  
Superdync Advice Free. Mail Orders Solicited.  
WALLACE RADIO COMPANY, Inc.  
135 LIBERTY STREET NEW YORK CITY

### BRISTOL AUDIOPHONE

MORE THAN A LOUD SPEAKER

Bristol Audiophone, Sr., 15-in. Horn, \$30.00  
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.

### NEUTRODYNE KIT \$19.75

Complete kit of licensed Neutrodyne parts including panel, tube sockets, rheostats, jack, fixed condensers and grid leak. Neutroformers complete with variable condensers and neutrodynes. Every part included even to screws and wire. Easy read plans.

Send No Money Order by postcard

Pay the postman

RADIO SURPLUS STORES

HELENA

MONTANA

### 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

### \$15 Set Gets 2,000 Miles

The Essex Radio Special, the receiving set with a condenser, 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.

The Ultimate Radio Receiver

## THE FLEX-O-DYNE CO.

1674 Broadway (At 52nd St.)  
New York, N. Y.

Circle 4569

## CROSLEY

RADIO CATALOG FREE

Describes fully the complete line of radio frequency sets, regenerators, five sets (licensed under Armstrong U. S. Patent No. 1,113,149) and parts.

Write for Catalog Today

THE CROSLEY RADIO CORPORATION

POWEL CROSLEY Jr., President

8401 Alfred Street Cincinnati, Ohio

# Circuit Concentrates Magnetic Field

(Continued from page 19)

keeps the resistance of the circuit the lowest possible, thus increasing the efficiency.

Most persons, especially when the wiring is open to view, try to make a beautiful right angle bend and lose sight of the fact that in making a set pleasing to the eye they sacrifice the most essential features, low loss and efficiency. By using the sub-panel method entirely, we not only had efficiency but believe that the appearance is also improved.

Mount the three Freshman low-loss tuned radio-frequency units. It is impossible to make a mistake in mounting them if you

get an already drilled sub-panel. Follow the wiring diagram and mount the rheostats, jacks, transformers, switch, fixed condensers and variable grid leak.

The audio-frequency transformers being mounted under the sub-panel they do not require an expensive outer casing, which simply adds to the cost but does not change the operation. In other words, all details were taken into consideration so that whenever a saving could be effected without decreasing the efficiency of the set, it was done.

As all parts and wiring are mounted on a sub-panel it made possible the use of a highly finished veneer front panel which matches and fits in well with the furniture in the home.

Note that the coils do not have to be set at an angle, and do not have to be spaced a great distance apart. This is because the magnetic field of this particular winding is concentrated very close to the winding and there is no stray magnetic field which would cause interference between the coils. Due to this concentration of the magnetic field it was possible to eliminate all neutralizing capacities.

A variable grid leak is recommended as it was found that all tubes vary to such an extent that a fixed leak will not permit the tube used to work at its maximum efficiency and distance could always be brought in louder by adjusting the leak to a proper value for the tube. However, it was also found that once the variable grid leak was set at its maximum efficiency for any one station that that point was the best operating point for all stations and that the variable grid leak could then be left set for the particular detector tube being used.

Another set rule was found in testing out different makes of audio transformers for use in this set. The outside end of the secondary coil, the one farthest away from the iron core of the transformer should always be connected to the grid, and the outside end of the primary coil should always be connected to the plate. When connecting up transformers which are not marked, it is always advisable to conform with this rule. By doing so you will obtain maximum volume with the lowest distortion.

To simplify the wiring the phone jack, used when tuning in distant stations, is connected across the plate circuit of the first audio tube. This permits the use of the phones while the loud speaker is in operation.

In tuning a set of this type it is best to set the two dials in the radio-frequency circuit to the highest point usually used, which may be on 90, and then try to tune in a

station by slowly turning the first dial, which is in the aerial circuit, until the station is



## LEGO WONDER FIXED DETECTOR For REFLEX & CRYSTAL SETS

Something Entirely New!  
100% SENSITIVE

10 IMPORTANT FEATURES  
READ THEM CAREFULLY

- 1—No parts to replace or wear out.
- 2—The use of a NEW MATERIAL that effectively eliminates distorted and interrupted reception, and substitutes clarity and increased volume.
- 3—Absolutely 100% sensitive. No searching for sensitive spot.
- 4—Glass encased, it is immune from sun and dust.
- 5—Especially designed to withstand high voltage in reflex circuits.
- 6—Solidly constructed throughout, it is practically everlasting.
- 7—It is ALWAYS READY—no adjustments of ANY kind needed.
- 8—As good looking as it is efficient. High nickel-plated throughout, and attractively designed. It enhances the appearance of any set.
- 9—Constructed so that it is thoroughly VIBRATION-PROOF.
- 10—Carefully tested, approved and unconditionally guaranteed by its makers.

For Sale by All Dealers 90c. or Sent  
Postpaid Insured \$1.00

LEGO CORP., 225 W. 77th St., N. Y. C.

The New Type 54

## SLEEPER MONOTROL

Reg. U. S. Pat. Off.

Grimes Inverse Duplex System

The only set that has 3 stages of tuned radio frequency on one tuning dial.

23 other important improvements.

Write for booklet "W." It's FREE.

SLEEPER RADIO CORPORATION  
48 Park Place New York

## The "Goode" Two - o - One

# A

Le Ton d'argent



Guaranteed

BY  
MAIL  
ONLY

\$2.39

Postpaid

## QUARTER AMPERE AMPLIFIER—DETECTOR RADIO TUBE

GUARANTEED SATISFACTORY

All "GOODE" Tubes Sold Direct to the Consumer—No Dealer Profits.

ONE—"Goode"  
Detector-Amplifier.. \$2.39

THREE—"Goode"  
Detector-Amplifiers. \$6.42

(All Postage Prepaid)

The "Goode" Two-o-One A Tube amplifies or detects. It is a quarter ampere, six volts, standard base silvered tube.

Send express or postal money order or New York draft to—

The Goode Tube Corporation

Incorporated

EVANSVILLE

INDIANA

Improved  
Radio Reception  
Through Scientific  
Tube Tuning

## Are you getting DX?

This book  
will show  
you how  
to get  
more!

It tells all about vacuum tubes and how to control them so as to get greatest DX, most volume and longest life from tubes and batteries. How to get maximum regeneration, clearest signals. Tells how vacuum tubes work.

IT'S FREE! WRITE FOR IT TO  
D X INSTRUMENT CO.  
Dept. RW-816 Harrisburg, Penna.

BLUE SEAL  
**Howard**  
Radio Co. Inc. Chicago, U.S.A.  
GUARANTEED PRODUCTS

Write Today  
For Descriptive  
Folder of the

## NEW HOWARD 5-TUBE NEUTRODYNE

This Remarkable Set has Created a  
Sensation Among Radio Enthusiasts.

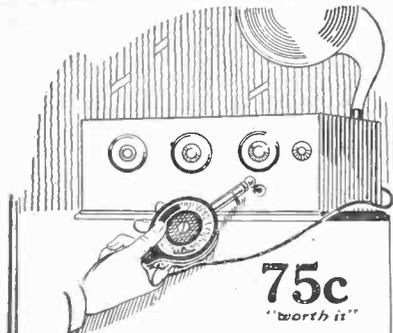
Beautiful Walnut Cabinet with  
Special Howard Neuroformers,  
Tube Sockets and Rheostats.

Independent Radio Manufacturers, Inc.  
Licensed by  
**NEUTRODYNE**  
Pat. March 27, 1923 and April 1, 1924  
Pat. March 27, 1923 and April 1, 1924  
Headline Pat. Nos. 1,450,060 and 1,462,228  
Other Patents Pending

HOWARD MFG. COMPANY  
4248 No. Western Ave. Chicago, Ill.

# Tuning 5-Tube Set

(Continued from preceding page)  
 heard. If there is no station radiocasting on that particular wavelength, the two dials should then be turned down to divisions and the antenna dial turned again approximately within ten divisions of the same setting as the other dials. This should be continued, setting the dials two divisions lower each



## Poly Plug

Eliminates every inconvenience so annoying in the operation of the unsatisfactory screw type plug.

There is no necessity to take PolyPlug apart, no screws to tighten, and what's even more important, positive contact is always maintained.



A wonderful feature of the PolyPlug is the tension slot, allowing the phone cords to be pulled and jarred without disturbing the contact.

At your dealers or sent postpaid on receipt of purchase price.

**Polymet Mfg. Corp.**  
 70-74 LAFAYETTE STREET  
 NEW YORK CITY

time until all the stations on the various wavelengths are logged, after which it is a very simple matter to tune in the same stations by simply referring to the previous log.

As shown in Fig. 1, the primary of the radio-frequency coils are reversed. This is very essential, as it prevents the set from oscillating. This circuit is self-balancing when using these special tuned radio-frequency units and does not require any stabilizer, such as a potentiometer or neutralizing condensers.

The demand for compactness and simplicity, together with far greater efficiency and selectivity of radio receiving apparatus, made it necessary to evolve radical changes in the design of an inductance. Conforming with the policy of using low-loss apparatus, a special inductance coil was made which would fit in back of the variable condenser in such a manner as to make a very compact tuned radio-frequency unit.

These coils can be wound by hand. The Freshman Co. found it more satisfactory to build special machinery for winding, so as to keep the cost low. Practically all coils heretofore made required some kind of supporting feature to keep the winding together, such as lacquer or celluloid cement, or in the case of single-layer coils, bakelite or fibre tubing.

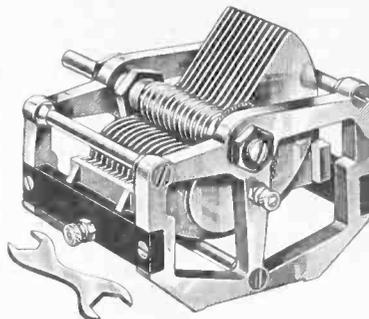
To give the reader a clear conception of this coil which seems to be the most efficient method of winding, Fig. 3 shows how this coil may be wound at home. First procure wooden discs 3 1/8" in diameter and 1/4" thick. Draw a circle 1 5/16" in diameter. On the circumference of this circle drill 15 holes evenly spaced. These holes provide a snug fit for 1/4" wooden dowels. Cut wooden dowels into pieces 1 3/4" long, rounding off the free end with sandpaper. These pegs should be glued into the holes. The recess on the peripheries of the disc are to facilitate the interlacing on the outside of the coil.

After the form is finished proceed with winding the coil as follows: Hold the form in your left hand with the pegs pointing toward you and lay the wire over peg 1 and 2, then inside of 3 and 4 over 5 and 8, then under two pegs and over two pegs until you come back inside of 15 and 1, after which the second turn is started which is over two pegs and then under two and so forth until the third turn is completed over 15 and 1, then the fourth turn is wound in

(Concluded on next page)

## DO YOU WANT IMPROVED TUNING?

**Bremer-Tully Low Loss "Lifetime" Condenser**



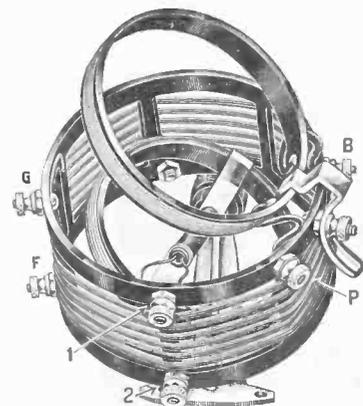
- 150 m.m.f. ( 7 plate) ... \$4.25
- 250 m.m.f. (11 plate) ... 4.50
- 520 m.m.f. (23 plate) ... 5.00
- 800 m.m.f. (35 plate) ... 6.50

We guarantee it has more points of superiority, more advanced features, more vital improvements, more essential advantages than any other.

No matter what circuit you're using this Bremer-Tully "Lifetime" condenser will improve it.

Write for "20-point" folder telling you why.

## BREMER-TULLY Leads again with a new, real LOW LOSS TUNER



Gives results heretofore impossible.

New and improved method of inductance winding. New adjustable untuned primary successfully meets the great problem of the past—that of adapting a tuner to the various types of antennae. Circuit requirements and local receiving conditions—adjustments permit greater selectivity or increased signal strength as desired.

Two types: for broadcasting 200-565 meters; for short wave work 50-150 meters.

Price \$5.00

Better tuning (now in sixth edition) tells you why and shows you how. Complete instructions and diagram for progressive construction from Crystal to Reflex and Radio Frequency circuits. Sent on receipt of ten cents.

**Bremer-Tully Mfg. Co.**  
 531 S. Canal St. Chicago

## They Roll in On Ball Bearings

The Y.M.C.A. Radio Instructor at Detroit says that with Myers Tubes "the stations roll in on ball bearings"—the long distance stations that cannot be tuned in with ordinary tubes. You can put the world on your dial with

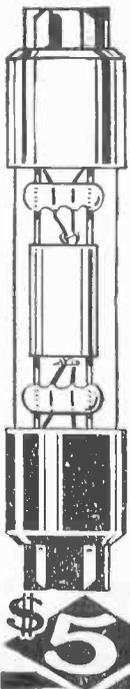
## Myers Tubes Practically Unbreakable

Get England, France, Canada, Cuba, Hawaii, Porto Rico and Japan as others are doing with one, two or three Myers Tubes. They eliminate all noise—function perfectly as Detectors, Amplifiers and Oscillators—increase the radius of your set 50%. Two types: Dry Battery and Universal for storage batteries. (4 volts)

Demand Myers Tubes at your dealers or send price and be supplied postpaid. See "Made in Canada" on each tube. Others not guaranteed.

Complete with clips. No extra equipment required.

**E. B. Myers Co. Ltd.**  
*Radio Vacuum Tubes*  
 240 CRAIG STREET, W.  
 MONTREAL, CANADA



# A 5-Tube Unneutralized Circuit

(Concluded from preceding page) similarly. We now have a complete cycle of four turns. You will now note by studying Fig. 3 and following the arrows, one arrow for the first turn, two for the second, and so on, that no two wires are parallel to each other and that they are a considerable distance apart. This is why distributed capacity is so very low. In winding the second circle of four turns, the fifth turn is laid over and inside of the same pegs as the first turn. The sixth turn is laid the same way as turn No. 2. Seven

follows the same path as turn No. 3, while turn No. 8 goes over the same pins as the fourth turn. This cycle of turns again creates a magnetic field which is staggered from the field made by the first four turns.

The coils of wire are each separated by a space equivalent to the thickness of the wire and its insulation, thereby suffering practically no absorption losses through the adjacent wire. Hence, the maximum amount of inductance is obtained in this form of winding.

Proceed winding the required number of turns as above and after the winding process is completed cut the wire, leaving slack for a suitable lead. To interlace the inductance so as to be able to slide it off the form without collapsing, obtain a medium-sized binding needle and a spool of white thread and guide the needle through the corner next to peg 1 from the top of the coil. Recess A on the bottom of the form will enable you to go past the form with needle and thread. Now pass the needle from the bottom of the coil through the other corner next to pin 1, hold the end of the thread with one hand and pull the thread tight with the other hand. Next guide the needle from top of coil through the further corner next to pin 15. Come back from the bottom of coil through the inside corner next to pin 15, thereby bringing the needle again to top of coil. Next bring the needle through the furthest corner to pin 14 and then from bottom through other ends to pin 14 and so on until you are around the entire coil. When the interlacing is done up to peg 2, lace the thread a second time through the corner next to peg 1. This loops the turn around peg 1 twice and after the ends of threads are tied with double knot there is no chance of the winding ever becoming loose. The coil is now ready to be taken off the form, and to accomplish this without mishap hold the form in left hand and grip the coil with thumb and forefinger of right at the point where a pin is located and pull the coil off the pin about  $\frac{1}{8}$ " and then go to the next pin and again pull the coil off the same distance. Repeat this procedure until you have the coil off the pegs entirely. The coil interlaced on one side

is now rigid enough so as not to lose its shape. However, if you want to make it absolutely rugged, the inside of the coil should be interlaced the same way as the outside. This coil can be used in any circuit that requires an inductance coil and will be far superior to so-called spider-web inductance coils.

Although these coils can be wound for any circuit that requires an inductance, the particular coil used in this set consists of a seven-turn primary and sixty-turn secondary of No. 24 single silk wire.

The set itself is mounted in a mahogany cabinet, 18" x 7" x 7".

**NEW!**  
**SPRING LUG**  
No Solder—No Pliers  
Fits Square or Round Bus Bar  
10 FOR 5 CENTS  
at your dealers  
Mfd. by **PAUL GLAMZO**  
203 Lafayette St. New York City

**RADIO RECORD**  
Keep a permanently bound record of all stations you have received and how you received them. Radio Record  $5\frac{1}{2}$ " x 14"—600 Hacs. All broadcasting stations listed, and indexed with space for new stations—\$1.00 Postpaid.  
**THE BEADLE PRINTING CO.**  
MITCHELL SOUTH DAKOTA  
Applause Cards 60 for \$1.00 Postpaid.

**"RADECO**  
FOR  
**SECURITY"**  
RADECO SAFETY FUSES 50 CENTS EACH  
At Your Dealers or by Mail, Postpaid  
RADIO EQUIPMENT CO., 20 Stuart St., Boston

**COAST TO COAST**  
Every Turn **STAR** No  
A Tap **COIL** Soldering  
SEND FOR LITERATURE  
**STAR RADIO PRODUCTS CO.**  
711 S. DEARBORN ST. CHICAGO, ILL.

**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 100 Amps. 12.50
12-Volt 7 Plate, 17.00	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.195 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, 4219 S. Wabash Ave.  
CHICAGO, ILL.

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

## MANUFACTURERS' ADVICE

### TIPS ON SOLDERING

L. B. Allen Co., Inc., 4519-29 North Lincoln Street, Chicago, manufacturing Allen Special Radio Soldering Paste, "non-corrosive, acidless, protective," gives some valuable tips on soldering. All terminals and wires should be thoroughly cleaned. Scrape with a sharp instrument or use sandpaper. This operation will remove all oxide and dirt.

Place a very small amount of paste (the size of a pin head) on each piece to be soldered; now apply the heated soldering iron to a piece of solder. Enough solder will adhere to the iron to complete the joint. Make sure your iron is well heated. A cool iron is usually the cause of poorly soldered joints. Apply soldering iron containing the solder to the parts to be soldered—the flux will spread, due to the heat and the solder will be drawn from the soldering copper to the parts to be soldered. This is known as a tinning operation. Next, hold the tinned parts in place with a screw driver or other instrument and again apply the heated soldering iron with a little solder and hold the parts together until the solder has set and thoroughly cooled. Now wipe the joint clean. A little alcohol will remove all traces of excess flux.

### SAO PAULO OUT OF LUCK ON FUNDS FOR A STATION

WITH reference to the radio industry in Brazil, Dr. Jose Carlos de Macedo Soares, President of the Associaçao Commercial of Sao Paulo, said that the local Radio Society, known as the "Sociedade Radio-Cultura," has been endeavoring to raise sufficient funds for the construction of a radiocasting station in the capital, but so far their efforts have not been very productive. The municipalities in the interior have been asked for subscriptions, but without result.

## NEW TUBES MANUFACTURERS' SALE

Price, \$2.25 each

All Types—All Guaranteed

Send No Money—Pay Postman

**WALTER SCOTT & CO.**

636 HIGHLAND AVE., NEWARK, N. J.

# EMPIRE

COMBINATION DESK  
RADIO CABINET  
with adjustable panel space



38-in. High  
33½-in. Wide  
15-in. Deep  
Outside

Exquisite Finish

**\$50.**

Write for descriptive circular or phone Calladonia 0323 for other standard styles. Specials built to order.

**EMPIRE RADIO CABINETS**

MANUFACTURED BY THE

**Empire-United Hat Block Co.**

INCORPORATED

312-314 EAST 22nd STREET NEW YORK

## Burnt-Out Tubes Replaced for \$2.50

A Wonderful Tube for  
Your Superdwyne.



ROYALTRON

TUBES

TYPES

199 (.06 Amp.)

WD12 (¼ Amp.)

200 (¼ Amp.)

201A (¼ Amp.)

### GUARANTEE

Burnt-out, Defective or Broken Tubes of any brand or make whatsoever will be replaced by a brand new (not refilled) Royaltron Tube, at a cost of only \$2.50.

It is with the Object of Advertising the MERITS of ROYALTRON Tubes, that we make the above unusual offer.

Every ROYALTRON Tube is accompanied by the above money-back guarantee.

Approved by the Radio News and  
World Laboratories

**ROYAL MANUFACTURING CO.**

Department W. O.

206 BROADWAY NEW YORK

Dealers, distributors and agents, write or wire immediately for unusual proposition.

For Maximum Amplification Without Distortion and Tube Noises use the well known **Como Duplex Transformers** Push-Pull Send for literature. **COMO APPARATUS COMPANY** 446 Tremont St. Boston, Mass.

**COSMOPOLITAN PHUSIFORMER** Send Fifty Cents for Manual 15-17 West 18th St., New York

**ULTRADYNE** the Improved Super-Heterodyne. Send 50c for book giving complete details of drilling, assembling, wiring and tuning 6 and 8 tube ULTRADYNE Receivers. **50c** PHENIX RADIO CORP., 5-9 Beekman St., N. Y. C.

**PETER J. CONSTANT, INC.** 91 Seventh Ave. New York City Direct Factory **DISTRIBUTORS FOR 38 Leading Manufacturers**

**\$25 FOR \$10** THE FAMOUS **BEL-CANTO** Loud Speaker—Price \$10 Direct from Factory to you. Delivered free C.O.D. to your door. Coming, "The Bel-Canto Headset," something entirely new. **BEL-CANTO MFG. CO.** General Office and Factory, Dept. R.W. 417-419-421 E. 34th St., N. Y. City Vanderbilt 8959

Use — Price 75¢ **DURHAM** Variable Grid Leak At dealers, or postpaid Durham & Co., 1936 Market St., Phila.

FOR SALE—One Westinghouse R. C. Set, with Ambassador Coil installed. One five-tube tuned impedance set, both in perfect condition. Returning to Canada cannot take sets. Appointment by letter only. **GRANTZ**, 251 East 13th Street, New York.

# The Radio University

(Continued from page 21)

negative filament lead. This prevents the A, B and C batteries from short circuiting through the primary of the transformer, yet allows the negative potential to reach the grid.

**RADIO WORLD'S Radiocast University** Questions and Answers On the Air Every Wednesday Evening at WLS, the Sears-Roebuck Station, Chicago — Department Conducted by Mat H. Friedman, RADIO WORLD'S Chicago Representative.

I have a single-tube Reinartz set which worked excellently until a short while ago, when a sort of hum appeared that blocks everything out. My antenna, ground and batteries are in good order, and the tube is O. K. What can be my trouble? —Mrs. Bertha Miller, 2847 West 21st St., Chicago, Ill. Obviously the wiring in the set has gone wrong. It is most probable that a wire or wires connected to the coil have become disconnected. This would cause the hum.

I have a one-tube Tusha receiver, aerial, ground and lead-in—125 feet over all. Can I add two stages of radio-frequency amplification to this outfit? If so, will it help in getting DX stations? —George L. Tulley, 1719 West 91st St., Chicago, Ill. Your receiver is a regenerative circuit and should be fairly sensitive as it is. Two stages of radio-frequency with that circuit is likely to be extremely hard to control, so suggest that you add only one stage of radio-frequency. With it you will hear greater DX with increased volume on all stations.

Can I connect another stage of audio-frequency amplification to my one-tube Reinartz set so as to bring the stations in on the loud speaker? My present set uses one WD12 dry cell tube, and I wish to use the same kind in the amplifier. Must I wind any more coils for the amplifier? —Leo Richards, 13000 Baltimore Ave., Chicago, Ill. One stage of audio-frequency amplification will hardly be enough to bring in the stations with

**IS YOUR NEUT RIGHT?** To revitalize unneutralizable Neutrodyne's, we devised this Kladag Coast-to-Coast Circuit. Uses same panel, etc., as Neut, except three less parts. Merely rewire. Success certain. Necessary stabilizer, 22 feet gold shielded wire, circuit and complete, simple instructions—\$5.00 prepaid. Many have already rebuilt their Neut's—and written wonderful testimonials. Thousands will do it. Be FIRST—have the finest five tube set in your neighborhood, revitalize others' Neut's. Description, etc.—10c. Radio Lists—2c. Stamps accepted. **KLADAG LABORATORIES, Kent, Ohio**

sufficient loud speaker volume except on very near locals. Two stages would be fine, and then you could get them all on the speaker. You may use the dry cell tubes with good success. There are no more coils to wind, but you will have to buy an audio frequency transformer for each stage, in addition to the extra socket, tube and rheostat.

**CRYSTAL SETS TESTED 600 MILES** You can now get a genuine Lambert Long Distance Crystal Radio Set for only \$4.98. Particulars Free! **Leon Lambert, 562 Volusia, Wichita, Kan.**

**WHAT IS AN INVENTION?** How to obtain a patent and other valuable information is supplied in our FREE Booklet. Write for a copy today **MANUFACTURERS PATENT CO., Inc.** 70 WALL STREET, NEW YORK

**RADIO MAP FREE** Big Broadcasting Station List. Also Radio Bargain List. Just Out. **The RADIO SHACK** America's Largest Radio Dealers Dept. RW. 8-16 55 Vesey St. New York

**FOR BETTER RADIO CABINETS** Manufactured to order in all sizes—of every description. Can supply dealers or jobbers with any quantity. Factory capacity 4,000 per week. Mail Orders Promptly Filled **MANHATTAN ART RADIO CABINET CO., INC.** 553 W. 53rd St. Tel. Columbus 6375 New York City

**AMPERITE** The "SELF-ADJUSTING" Rheostat PERFECT for every CIRCUIT Simplifies wiring Eliminates hand rheostats **RADIAL COMPANY** 320 W. 42nd St. N.Y. \$1.10 From Your Dealer Write Dept. W-3 For Free Hook-ups Perfect for Magnadyne Circuit

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

Radio World has made arrangements This is the way to get two publications

- 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).

- 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 ..... Put a circle around the other publication you want.

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 .....

Indicate if renewal  Name .....

This Offer Good  Street Address .....

Until  City and State .....

Sept. 1, 1924

TOWER'S

**TOWER'S Scientific**

WEIGHS ONLY 80Z

Perfect Tone Mates

**\$2.95**

Plus a few cents postage

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

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.

**WORLD'S GREATEST HEADSET VALUE**

Scientific

## Seeking Selectivity on One Dial

By Herman Bernard

ANY one experimenting with one-dial sets, especially along the line de-

scribed in RADIO WORLD last week, issue of August 9, will be interested in the two hook-ups published herewith (Figs. 1 and 2). Fig. 1 shows a non-regenerative circuit devised in the interest of gaining selectivity, which is one of the big problems attached to construction of one-dial sets. Note that a solo primary is used, the end of the primary coil being attached to nothing. As the energy from the aerial is passed by this aperiodic or untuned primary to the secondary by induction, the advantage of a double circuit is gained. The fact that no metallic contact is made to the primary except by the aerial eliminates consideration of dead-end-loss possibilities.

In Fig. 1 a 25-turn honeycomb coil may be used for the primary, the aerial connected to the coils beginning, which emerges from under the winding. If you use a 23-plate condenser the secondary may be a 50-turn honeycomb. If 50 turns do not reach a high enough maximum wavelength use 75 turns here. This probably will be a little too much. The experimenter will unwind turns from the coil, one or two at a time, until condenser and coil are properly balanced. As condensers of a given number of plates, say 23, may vary greatly as to capacity range, no definite statement of ratio of turns can be given. But the solution is easy and the experimenter will reach it in 15 minutes or so.

In Fig. 1 a fixed crystal is used at the grid, where the grid leak and condenser usually are. Study the fixed condenser (.001) at the plate and figure out whether this is really a misplaced grid condenser, the crystal functioning instead of a leak, since it passes only positive current. The

ground is connected to the A plus post. In Fig. 2 solo coils are used for a split primary. Aerial is connected to one coil (15 turns) and ground to another (15 turns), both being closely coupled. The rest of the wiring is the same as in Fig. 1, except that a grid condenser and leak are used, and the .001 fixed condenser (Concluded on next page)

**WE REPAIR RADIO TUBES**

WD-11 .. \$2.50	DV-2 .... \$2.50
WD-12 .. 2.50	DV-6A ... 2.50
UV-200 .. 2.50	UV-189 ... 2.50
UV-201 .. 2.50	C-289 ... 2.50
C-300 ... 2.50	UV-201A .. 2.50
C-301 ... 2.50	C-301A ... 2.50
DV-6 .... 2.50	Marconi .. 2.50
DV-1 .... 2.50	Moorhead .. 2.50
6 v. Plain Detector .. 2.50	
6 v. Plain Amplifier .. 2.50	

Mail orders solicited and promptly attended to.

Dealers and agents write for special discounts.

**H. & H. RADIO CO.**

P. O. Box 22-B

Clinton-Hill Station
Newark, N. J.

**"GET HASTINGS, NEB."**

We Will Mail Free the Hook-up of

**"Killoch Kilo Koupler"**

Most Wonderful Coil

A CIRCUIT WELL WORTH WHILE!  
Build a two-tube set, one stage of R. F., using neodyne principle and detector. Full details in Radio World, Issue April 12. Send 15 cents.

**David Killoch Company**

Dodge Building, 45 West Broadway  
Corner Park Place, New York City

M. B. SLEEPER RADIO DESIGN & CONSTRUCTION FOR EXPERIMENTERS, REF. FLEX & RADIO FREQUENCY, \$1.00. The Columbia Print, 1493 Broadway, N. Y. C.

DUTCH RADIO VALVE

D-201-A

.25 Amp. 5-6 Volts

Detector-Amplifier

Guaranteed

Rigidity tested by expert engineers.

List Price \$4.00

Special discount to dealers - a few more distributors wanted.

Sole Distributors for U. S.  
D. R. V. Importing Co.  
515 Orange St., Newark, N. J.

Dealers write to distributors in your territory.

Distributors  
CALIF.—MARSHANK SALES CO.  
1240 South Main St., Los Angeles, Cal.  
MISSOURI—ST. LOUIS RADIO TUBE LABORATORY  
3572 Olive Street, St. Louis, Mo.  
CANADA—CONSOLIDATED ELECTRIC LAMP CO.  
43 Queen St. E., Toronto, Ontario

# One-Dial Experiments

(Concluded from preceding page)  
omitted at the plate. The grid return is to the plate, as formerly.  
Trying these out, how do you fare?

**10c** Brings You  
Our New  
48-Page Radio Catalog  
Includes Thousands of  
Unequalled Radio Bargains

Send a  
dime  
for  
your  
copy,  
today!



CHICAGO SALVAGE STOCK STORE  
Dept. W6, 500 South State Street  
CHICAGO

Do you gain selectivity? How about volume and DX? Have you hit upon the ideal one-dial set?

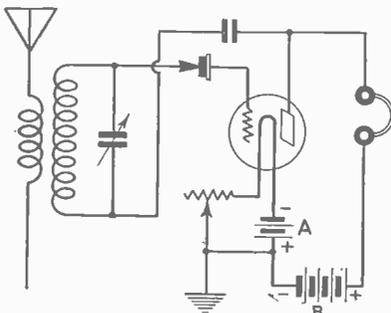


FIG. 1—Circuit for a one-dial set, using a crystal at the grid. The solo primary connects to aerial. The beginning of the secondary goes to the grid. This is an experiment in a hunt for extreme selectivity. The Crystal does not rectify here. Close coupling is used.

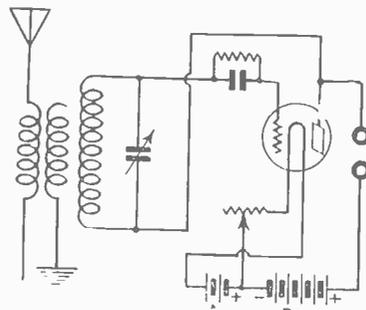


FIG. 2—Two solo coils are used for a split primary. Though three coils are used there are only two circuits. A grid leak and condenser are used and no crystal. Close coupling prevails as to all three coils.

WORKMEN are rapidly completing the new \$150,000 home of The Crosley Radio Corporation and occupancy is expected sometime this summer. When completed, this will be the finest equipped radio building in the Middle West, housing the general offices, the assembling departments and the WLW radiocasting studio.

## MAHOGANITE and BLACK RADION PANELS

DIALS, KNOBS, TUBING, SOCKETS  
MAHOGANITE BINDING POSTS

"THAT SPECIAL SIZE" FOR YOUR  
PHONOGRAPH, PORTABLE OR SUPER

ALL STOCK SIZES  
WHOLESALE RETAIL

Send for Complete Price List

New York Hard Rubber Turning Co.  
212 Centre Street New York City

# ACME

for amplification

## "ROLLS ROYCE" RADIO TUBES



Like their name, significant of quality. Durable and powerful. Bring in distance with a maximum of volume and clearness.

Type 200—5 volts, 1 ampere Detector Tube

Type 201A—5 volts, .25 ampere Amplifier and Detector

Type 193—3-4 volts, .06 ampere Amplifier and Detector

Type 199—3-4 volts, .06 ampere With Standard Base—Amplifier and Detector

Type 12—1 1/2 volts, .35 ampere Platinum Filament—Amplifier and Detector

ALL TYPES of Radio Tubes \$2.50

Type 202 Five (5) Watt Transmitter.....\$3.00

EVERY TUBE GUARANTEED to work in Radio Frequency. Especially adapted for Neutrodyne, Reflex and Super Heterodyne Sets.

Shipped Parcel Post C. O. D. When ordering mention type.

Rolls Royce Tube Co.

21 Norwood Street Dept. W Newark, N. J.

HOOK-UPS FOR EVERYBODY—Henley's 222 Radio Circuit Designs, \$1.00, postpaid. The Columbia Print, 1493 Broadway, N. Y. C.



## Resistance Coupled Amplification

The tone quality from a DAVEN RESISTANCE COUPLED AMPLIFIER is the most perfect known to the radio art.

The Daven Resisto-Coupler, illustrated, greatly simplifies the construction in building up one of these distortionless amplifiers. \$1.50 fiers. Sold everywhere.....

Read our booklet, "RESISTORS—THEIR APPLICATION TO RADIO RECEPTION"

By Zeh Bouck.

Price 15 cents

DAVEN RADIO CORP.

"RESISTOR SPECIALISTS"

9 1/2 Campbell Street

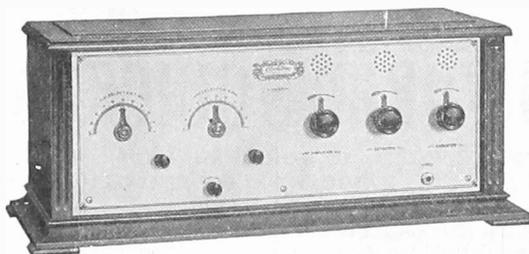
Newark, N. J.

## Cleartone Clear-o-Dyne Model 70

Only a Few Weeks Old—and Fully Approved

Beautiful and Efficient

\$75.00



4 Tubes Selective Long Range Logable

The new Clear-o-Dyne model 70 has been enthusiastically received and heartily approved by hundreds who say that this wonderful receiver performs better than any four tube set ever tested.

The beautifully etched gold finished panels and the distinctive Cleartone solid mahogany cabinets together with the features of selectivity, log-ability and loud speaker volume means a source of education and a real pleasure for all. Send to us for complete circular matter and our special offer.

DEALERS and JOBBERS: You will want our line of loud speaker receiving sets, all of which are guaranteed and are of finest material and workmanship. Our interesting proposition will be sent upon receipt of your request for detailed information.

Model 80 Super Clear-o-Dyne.....	\$120.00	Super Clear-o-Dyne Model 182.....	\$190.00
Model 60 .....	60.00	Clear-o-Dyne Model 70.....	75.00
Model 61 .....	75.00	Clear-o-Dyne Model 71.....	90.00
Model 62 .....	120.00	Clear-o-Dyne Model 72.....	135.00

The Cleartone Radio Company : : Cincinnati, Ohio

**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,  
Professionals, Business Concerns.  
99% Guaranteed 5¢ each  
by refund of

**ROSS-Gould Co.** 313 N. St. Louis  
10th St.

# The Weekly Rebus

HEREWITH are republished Rebuses Nos. 6, 7 and 8. In last week's issue, August 9, Rebuses Nos. 1, 2, 3, 4 and 5 were republished. Next week Nos. 9 and 10 will be reprinted, also a new rebus, No. 11. The following week No. 12 will be printed. The republication is to enable

all readers to try to solve these rebuses. Those who answer all twelve correctly will be placed on the Rebus Honor Roll and their names published. See how clever you are. Address Rebus Editor, Radio World, 1493 Broadway, New York City.



12 Cells  
24 Volts  
Solid Rubber Case

**\$4.00 COB. SPECIAL**  
INTRODUCTORY PRICE

For a limited time only, and to introduce this new and superior Storage "B" Radio Battery to the Public, we are selling it for \$4.00. Regular Retail Price is \$6.00. You save \$2.00 by ordering NOW. A finer battery cannot be built than the

## World Storage "B" Battery

(12 CELLS—24 VOLTS)  
To ten million homes with Radio Sets—and to countless millions of prospective buyers—this WORLD Storage "B" Battery brings a new conception of battery economy and performance. Here is a battery that pays for itself in a few weeks—it will last for years and can be recharged at a negligible cost. And you save \$2.00 by ordering now.

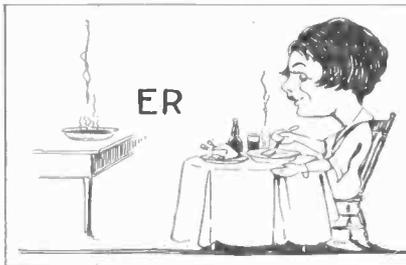
**A Superior Battery Solid Rubber Case**  
Has heavy duty 21-8 in. x 1 in. x 1.4 in. plates and plenty of acid circulation. Extra heavy glass jars allow ready observation of charge and prevent leakage and seepage of current. It holds its charge, while idle, at constant voltage. You will find this battery a boon to long distance reception. It does away with a great many noises so often blamed on "static." Mail your order today.

### SEND NO MONEY

Just state number of batteries wanted and we will ship day order is received. **EXTRA OFFER:** 4 batteries in series (96 volts), \$16.00. Pay Expressman after examining batteries. 5 per cent discount for cash in full with order. Send your order NOW and save \$2.00.

**WORLD BATTERY COMPANY**  
Makers of the famous World Radio "A" Storage Battery  
1219 S. Wabash Ave., Dept. 82, Chicago, Ill.

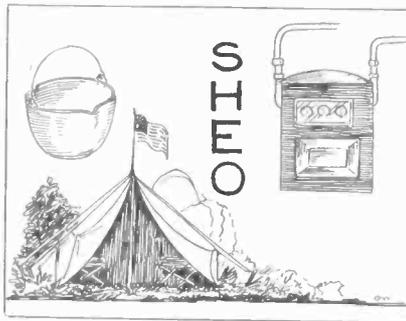
**SAVE \$2.00 BY ORDERING NOW!**



REBUS NO. 6.



REBUS NO. 7



REBUS NO. 8

## NEW RADIOCASTERS

### CLASS A

KFLR—University of New Mexico, Albuquerque, New Mexico	1180	254	100
WEBI—Walter H. Gibbons, Salisbury, Md.	1240	242	15

### BAND RADIOCAST IS DIFFICULT

TO obtain faithful reproduction of large bands has always been a difficult problem for radio-casting experts. The volume produced by individual wind instruments varies greatly. The work of each is important to a harmonious whole; consequently, if the microphone is not well placed, a very unfaithful reproduction is secured.

## FAHNESTOCK CLIPS

"Popular Wherever Radio Is Used"

14 Sizes in Beautiful Display Case

Dealers write for big money-making proposition.

**FAHNESTOCK ELECTRIC CO.**  
Long Island City, L. I.

### SOMETHING NEW

Green Radio Applause Cards

Bound in Book Form

with stubs on which records of Radio Artists are kept after card is detached and sent. A Log Book and Card combined, all for 1c. 25 CARDS 25c.

Sent by mail postpaid. No stamps. Address

**PLATTSBURGH RADIO SUPPLY CO.**

PLATTSBURGH, N. Y.

DEALERS: Write for sample and terms.

## 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.

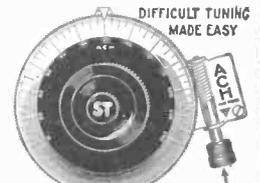
Send for Circular

**S. A. TWITCHELL**

1930 Western Avenue

Minneapolis, Minn.

## ACH SHARP TUNER



Mail Orders Prepaid

Why the ACH is different

3 in. DIAL \$2.50 (38-10-1)

4 in. DIAL \$3.00 (38-10-2)

5/8 REC. 1/4-SHS. CUSHINGS 35 EACH

Send for Circular B

**A. C. Hayden Radio & Research Co.**  
Brookton, Mass., U. S. A.

**HENLEY'S 222 RADIO CIRCUIT DESIGNS**—A fine book for the novice and the expert. Mailed on receipt of \$1.00. The Columbia Print, 1493 Broadway, New York City.

**CRAM'S RADIO MAP IN TWO COLORS**—Best map on the market, 35c. The Columbia Print, 1493 Broadway, N. Y. C.

# Genuine French Power Tubes

DETECTOR AND AMPLIFIER

Fil. Volts ..... 5  
Fil. Amps. .... 6/10ths  
Plate Voltage ..... 22½-30

Specially Priced **\$2.95**

Made in France—Standard Base—Every One Guaranteed

Write for List of other Radio Specials at Reduced Prices.

MAIL ORDERS FILLED. ADD POSTAGE.

**J. L. Lewis, Inc.**

132 W. 32nd STREET  
NEW YORK

# RADIO WORLD'S QUICK-ACTION CLASSIFIED ADS.

5 CENTS A WORD. 10 WORDS MINIMUM. TELEPHONE YOUR CLASSIFIED IF IN A HURRY.

RADIO WORLD'S PHONE NOS. ARE LACKAWANNA 2062-6976.

**THE WORLD'S LARGEST DOG KENNELS** offer for sale Oorang Airedale watch dogs, auto mobile dogs, children's companions, farm dogs, stock drivers, hunters and retrievers. Also Big Game Hounds, Coon Hounds, Fox Hounds, Rabbit Hounds and thoroughbred Hounds, and Airedale puppies. Satisfaction and safe delivery guaranteed to any point in the United States. Large illustrated, descriptive catalog mailed free. OORANG KENNELS, Box 139, La Rue, Ohio.

**PATENTS**—Write for free Guide Books and Record of Invention Blank before disclosing inventions. Send model or sketch of your invention for our prompt Examination and Instructions. No charge for the above information. Radio, Electrical, Chemical, Mechanical and Trademark experts. Victor J. Evans & Co., 294 Ninth, Washington, D. C.

**COMMERCIAL TYPE RADIO APPARATUS**, by M. B. Sleeper. Mailed on receipt of 75c. The Columbia Print, 1493 Broadway, N. Y. C.

**SPECIAL SUPERDYNE CONDENSERS**, transparent, enclosed, \$3.50 each. Complete (Original Specification) Coil set, \$4.00. Pauer, 152 Dewitt St., Buffalo, N. Y.

**A ONE-TUBE SET YOU CAN LOG**, cost of construction \$25. Two honeycomb coils and two condensers used. Full data in RADIO WORLD, issue of July 12. Send 15c for a copy.

**RADIO WORLD'S CLASSIFIED DEPARTMENT.** If you want to buy, sell or exchange anything, use RADIO WORLD'S Quick-Action Classified Department, 5 cents per word, 10 words minimum. RADIO WORLD, 1493 Broadway, New York City.

**M. B. SLEEPER'S DESIGN DATA FOR RADIO TRANSMITTERS AND RECEIVERS**—Sent postpaid on receipt of 75c. The Columbia Print, 1493 Broadway, N. Y. C.

**FOR SALE**—Paragon Detector Amplifier \$30 and Magnavox Power Amplifier \$35, in good condition, tubes. Oscar G. Herrick, P. O. Box 71, Honesdale, Pa.

**NO TUBES OR BATTERIES**—DX and Loud Speaker records. A new crystal set. Send \$5 for special coil and Crystal Hookup. Complete set \$10. Ra. D. O. Co., Pomona, Calif.

**RADIO TELEG. & TELEPHONE RECEIVERS FOR BEGINNERS**—Mailed on receipt of 75c. The Columbia Print, 1493 Broadway, N. Y. C.

**ALL ABOUT VACUUM TUBES.** A. B. C. of Vacuum Tubes. Price \$1.00. The Columbia Print, 1493 Broadway, N. Y. C.

**WIRELESS IN THE HOME.** By DeForest. Sent postpaid on receipt of 15c. The Columbia Print, 1493 Broadway, N. Y. C.

# Programs

Saturday, August 16 (concluded from page 18)

WRC, Washington, 469m (640k), E. S. T.—5:15 P. M., instruction in international code. 6 P. M., children's hour by Peggy Albion. 6:20 P. M., baseball scores. 7:45 P. M., Bible talk. 8 P. M., dance program. 8:45 P. M., musical program. 9:55 P. M., time signals and weather forecasts.  
 WOR, Newark, N. J., 405m (740k), E. S. D. S. T.—3 P. M., Clement Wood in a group of Negro spirituals. 3:15 P. M., the Ori-Peerless trio. 6:15 P. M., "Music While You Dine," Charley Storm and his Collegians. 7:15 P. M., resume of the day's sport with Jolly Bill Steinke. 8 P. M., recital by Lilyan Mae Challenger, contralto. 8:15 P. M., Yascha Fishberg, concert violinist. 8:30 P. M., concert by the orchestra of the S. S. President Harding, U. S. Lines. 9:45 P. M., Robert Wilderforce, C. B. E., of the British Library of Information. 10 P. M., program by the Ben Friedman entertainers.  
 WFBH, New York, 273m (1100k), E. S. D. S. T.—2:45 P. M., Jimmie Clark's entertainers. 3 P. M., Fanchard on orchestra. 3:30 P. M., Betty Murphy, contralto. 3:45 P. M., Alvin Hauser, melody of old songs. 4:15 P. M., Nelson Van Horn, piano. 4:45 P. M., Jack Niles and Elise-

worth Morse, 5 P. M., kiddies' Period. 5:15 P. M., Katherine Connolly, songs. 5:30 P. M., Fred Hughes, tenor. 6 P. M., "Voice of Central Park" orchestra. 7 P. M., Dr. Eugene Christian, health helps. 7:30 P. M., Leonardo's Garden orchestra.  
 WHN, New York, 360m (830k), E. S. D. S. T.—6:30 to 7:30 P. M., dinner music, Olcott Vail's string trio, and Paul Specht's dance orchestra. 9:30 to 10 P. M., Charles Strickland's Palisades Park dance orchestra. 10 P. M., Wright & Bessinger, "The Radio Franks." 10:15 P. M., baseball statistics. 10:15 P. M., Tom Bracken and Bob King, songsters. 10:30 P. M., Fletcher Henderson's Roseland ballroom orchestra. 11 P. M., vaudeville artists from Loew's State Theatre. 11:30 P. M., Club Alabama Revue, Sam Wooding's orchestra.

## Sunday, August 17

WOS, Jefferson City, Mo., 441m (680k), C. S. T.—7:30 P. M., union open air religious services broadcast from the Capitol lawn; music by the Missouri State Prison concert band.  
 WJF, Philadelphia, 509m (590k), E. S. D. S. T.—3:35 P. M., special Sunday afternoon concert by Comfort's Philharmonic orchestra. Roy B. Comfort, conductor. 7:45 P. M., evening service broadcast direct from Holy Trinity Church, Philadelphia, Rev. Floyd W. Tomkins, D. D., rector. 9:30 P. M., Sunday evening concert, with prominent soloists, broadcast direct from the WIP control station on the Steel Pier.  
 KGO, Oakland, Cal., 312m (960k), P. T.—3:30 P. M., concert by KGO Little Symphony orchestra and soloists, Carl Rhodehamel conducting.  
 KFI, Los Angeles, 469m (640k), P. T.—10 A. M., L. A. Church Federation service. 6:45 P. M., Metropolitan Theatre program. 8 P. M., Ambassador Hotel concert orchestra. 9 P. M., program from Examiner studio. 10 P. M., Packard Six orchestra.  
 WGY, Schenectady, 380m (790k), E. S. T.—9:30 A. M., service of First Methodist Episcopal Church, Schenectady, N. Y. 2 P. M., concert program by Schenectady's Little Symphony orchestra. 7:30 P. M., concert with the New York Philharmonic orchestra, Willem Van Hoogstraten, conductor, broadcast from Lewisohn Stadium, New York City.  
 WFBH, New York, 273m (1100k), E. S. D. S. T.—9 to 11 A. M., religious services. 5 to 8 P. M., society radio entertainers; regular Sunday sacred concert.

## Monday, August 18

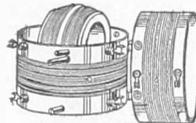
WFAA, Dallas, Tex., 476m (630k), C. S. T.—12:30 P. M., address, Ellis W. Shuler, geologist, Southern Methodist University, on "Some Selenid Geological Finds in Texas." 8:30 P. M., Lone Star Five orchestra in popular music recital.  
 WOS, Jefferson City, Mo., 441m (680k), C. S. T.—8 P. M., address, "Missouri," by Geo. A. Pickens, general secretary of the Greater Missouri

Association. 8:20 P. M., program by the Missouri State Prison orchestra and piano soloists by Harry M. Snodgrass.  
 CKAC, Montreal, 425m (710k), E. S. T.—1:45 P. M., luncheon concert from the Mount Royal Hotel. 4 P. M., weather; stock; news.  
 WMAQ, Chicago, 448m (670k), C. S. D. S. T.—4 P. M., sport reports. 6 P. M., Chicago Theater organ recital. 6:30 P. M., Hotel LaSalle orchestra.

### LEGO FIXED CRYSTAL ON MARKET

A NEW fixed crystal detector that renders efficient service is the Lego Wonder, marketed by the Lego Corp., 225 West 77th St., New York City. The crystal is sensitive and, being enclosed in glass, is well protected. The crystal is designed to withstand high voltages, hence is serviceable in reflex sets. Its appearance is attractive.

## SUPERDYNE



ORIGINAL GLOBE COILS  
(Single Mounting)

Wound with silk wire on bakelite to correct specifications. **\$6.25**  
C. O. D. Parcel Post.....

Complete 4-Tube Set, K. D. Panels **\$35.00**  
Drilled, best parts (fitted).....

GLOBE RADIO EQUIPMENT  
217 W. 125TH ST. NEW YORK CITY

## Federal Standard RADIO Products

Over 130 standard radio parts, each bearing the Federal iron-clad performance guarantee.

Write for Catalog.  
FEDERAL TELEPHONE & TELEGRAPH CO.  
Buffalo, N. Y.

### Perpetual Radio Fuse \$2.50

\$100.00 reward if you can blow your tubes with this protector in your circuit according to our instructions. SUPER ULTRADYNE Transformers, complete set including blue print.....\$18.00  
 ULTRA SYNCHRODYNE Coils, set of three.....\$7.00  
 Including blue print. With condensers.....\$17.00  
 DEALERS and JOBBERS, we have an attractive territory proposition.

THE STANLEY RADIO COMPANY, Manufacturers  
2947 Lorain Avenue Cleveland, Ohio

## ARE YOU GOING TO BUILD A SET?

We have just what you want—complete outfits of the very best parts for the construction of the most popular and best circuits of today.

We use the very best standard parts which we can obtain—Acme audio transformers, Radion panels and dials, Frost and Federal jacks, Acme and Erla Radio frequency transformers, Pada rheostats, Cardwell, National, American Brand low loss variable condensers, Dubilier Micadons, etc.

By selling the complete outfit, we can offer the receivers at a price considerably lower than what it would cost if the parts were purchased separately. In addition, the panel is drilled, and the receiver is completely assembled, ready for wiring. Bus wire and lugs are included, and complete blue prints and instructions are furnished so that even the beginner who has never had any previous experience, can make in a short time, a perfect receiver, equal in every respect to the factory made product.

For those to whom price is the first consideration, we have prepared a Grade B set of a number of the receivers, using exactly the same parts as the Grade A set, except for the variable condensers, which are of stencil manufacture, and the A. F. transformers, which are made by the Coto Coil Co. These are very good parts, but are not quite as expensive as those which we use in our Grade A sets.

The receivers which we list are the very best in every particular for the number of tubes which are employed, and will give maximum satisfaction.

1 tube, Reflex. Will operate a loud speaker on local stations. This set has done 2,000 miles with phones. No howling, whistling, nor radiation. Perfect tone. Very selective.  
 Grade A, \$18.50 Grade B, \$15.00

2 tubes, Reflex. Loud speaker range 500 to 1,000 miles.  
 Grade A, \$26.00 Grade B, \$22.00

2 tubes, Reflex. On new receiver. See Radio World, July 5 to August 2, for details. Equals five tube receivers. Up to 2,500 mile range, very selective.  
 Grade A, \$33.50 Grade B, \$28.50

3 tubes, Reflex. 1,000 or more miles loud speaker range.  
 Grade A, \$33.50 Grade B, \$30.00

4 tubes, Reflex. Has done 3,000 miles with an indoor antenna or loop on the loud speaker.  
 Grade A, \$43.50 Grade B, \$38.50

1 tubes, Superdyne. Featured by Radio World. Better than the 6 tube Navy amplifier.  
 Grade A, \$38.00 Grade B, \$35.00

5 tubes, Neutrodyne. The most popular circuit at the present time.  
 Grade B, \$38.50 Grade A, \$45.00

8 tubes, Super Heterodyne and Ultradyne. "The soundest receivers for this winter."  
 Grade A, \$85.00

If the receiver which you desire is not listed, write us.

Satisfaction Guaranteed

The Biltmore Radio Company  
Dept. W Boston 30, Mass.

**DIRECT**

# The Nation's Largest RADIO Mail order House.

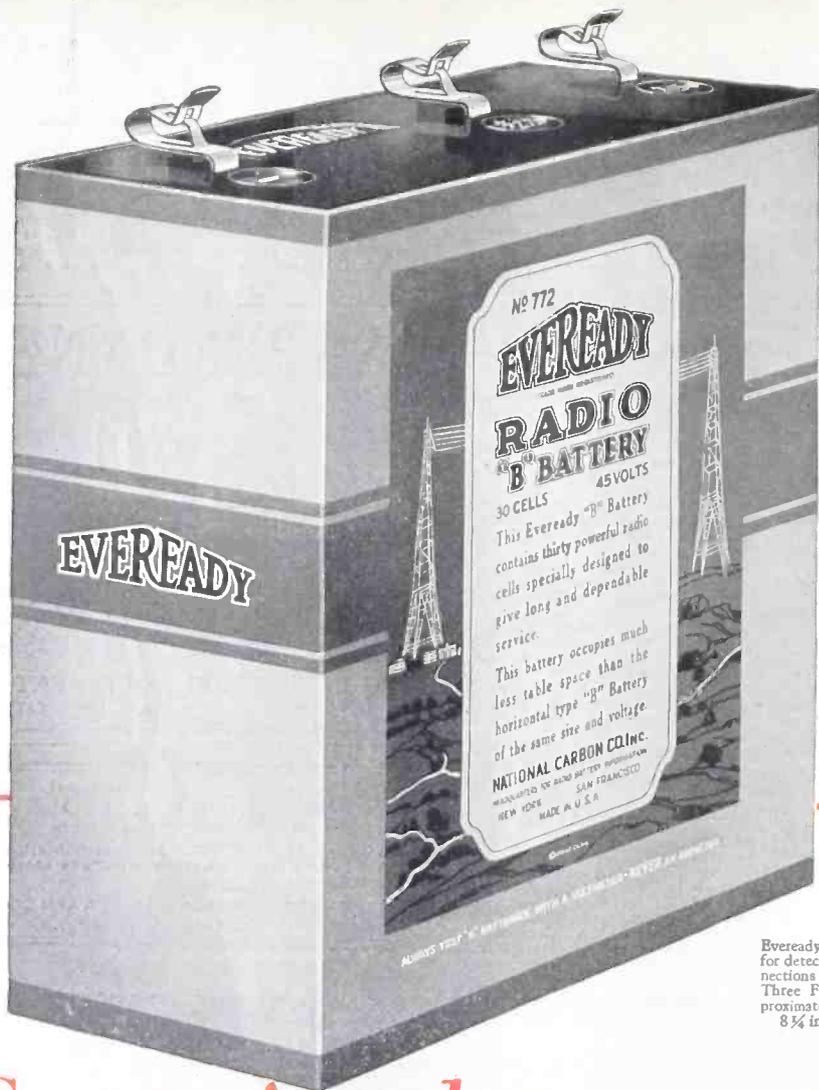
WE DEFY COMPETITION ON MAIL ORDERS  
 Our Prices are Lower Than Any Other House in the Country—Every Item in Stock Has the Stamp of Highest Quality

PHONES		Sockets	
Western Electric.....	\$9.45	Stasco 6 ohm.....	.69
Federal.....	4.50	Stasco 30 ohm.....	.79
Distograph.....	4.60	<b>SOCKETS</b>	
Baldwin Type O.....	4.95	Fada.....	\$0.79
Ambassador.....	7.85	Tillman.....	.35
N & K.....	6.50	DeForest.....	.50
Scientific.....	2.98	Hoosier Falls.....	.75
<b>LOUD SPEAKERS</b>		Pacont 199.....	40
Patho.....	\$11.98	Federal.....	.79
Music Master.....	24.50	General Radio.....	.89
Spartan.....	\$9.25	Workrite, 199.....	.60
Firth Adjustable.....	5.98	<b>TRANSFORMERS—PUSH PULL</b>	
Sonora.....	30.00	Como Duplex.....	\$9.90
New Diatogrand.....	28.50	All American.....	9.50
Magnaphone.....	28.00	Modern.....	10.00
<b>Plugs Included</b>		<b>TRANSFORMERS</b>	
<b>CHARGERS</b>		Star.....	\$2.95
Rectigon, 2 Amp.....	\$15.40	Modern.....	4.25
Rectigon, 4 Amp.....	23.40	Acme.....	3.50
Tungar, 2 Amp.....	15.40	All American.....	3.35
Tungar, 5 Amp.....	23.40	Federal No. 65.....	4.90
Ward Leonard, D. C.....	9.75	Thordarson.....	3.98
<b>RHEOSTATS</b>		Jefferson No. 41.....	3.20
Fada.....	\$0.60	Amertran.....	4.55
Ameco (all styles).....	.95	Erla.....	3.95
C. Hammer, 6 Ohm.....	.79	Federal No. 225.....	3.90
Pacont.....	.89	Acme R-2, 3, 4.....	3.50
Ultra No. 18.....	.79	Acme 30-K Super-Het.....	4.20
		Tri-Coil.....	1.90

Ultradyne, Complete, 8-Tube, Parts, \$85.00, With Blue Prints and Connecting Wires  
 Ultradyne Kit.....\$20.00 Ultradyne Book.....\$0c

# THE BROOKLYN RADIO SERVICE CO.

577 Myrtle Avenue  
Brooklyn, N. Y.



# Sustained power!

WHERE table or cabinet space is limited, use this new vertical 45-volt Eveready "B" Battery No. 772. It has the same long life, the same steady high power as the horizontal Eveready 45-volt "B" Battery, but because it stands upright it takes less than half the table space.

Tables and most battery cabinets have more headroom than floor space. This battery is built in recognition of that fact. It fits the Radiola Super-Heterodyne cabinet perfectly.

Many multi-tube receiving sets use a "hard" detector tube which does not require fine adjustment of "B" voltage, so the new Eveready Vertical 45-volt "B" has but three plainly marked terminals, negative, plus 22 1/2 and plus 45 volts.

Standing upright to save space, made of large, powerful cells to last longer, here is the battery you've been looking for.

Manufactured and guaranteed by  
**NATIONAL CARBON COMPANY, INC.,** New York—San Francisco  
 Headquarters for Radio Battery Information

Canadian National Carbon Co., Limited, Toronto, Ontario  
 If you have any battery problem, write G. C. Furness, Manager, Radio Division,  
 National Carbon Co., Inc., 200 Orton Street, Long Island City, N. Y.

# EVEREADY

## Radio Batteries

*-they last longer*

Eveready "B" Battery No. 772 for detector and amplifier. Connections at 22 1/2 and 45 volts. Three Fahnestock Clips. Approximate over-all dimensions, 8 3/4 in. x 3 3/4 in. x 7 3/4 in.

Eveready 6-volt Storage "A" Battery



No. 767 "B" Battery, 45 volts Variable taps Fahnestock Clips



No. 766 Eveready "B" 45 volts Six Fahnestock Spring Clip Connectors



No. 771 Eveready "C" Battery. Clarifies tone and prolongs "B" Battery life.

No. 764 Vertical 22 1/2-volt "B" Battery



No. 711 Eveready Radio "A" Dry Cell Specially manufactured for use with dry cell tubes