

Jan. 17 15 Cents

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RADIO WORLD

Title Reg. U. S. Pat. Off.

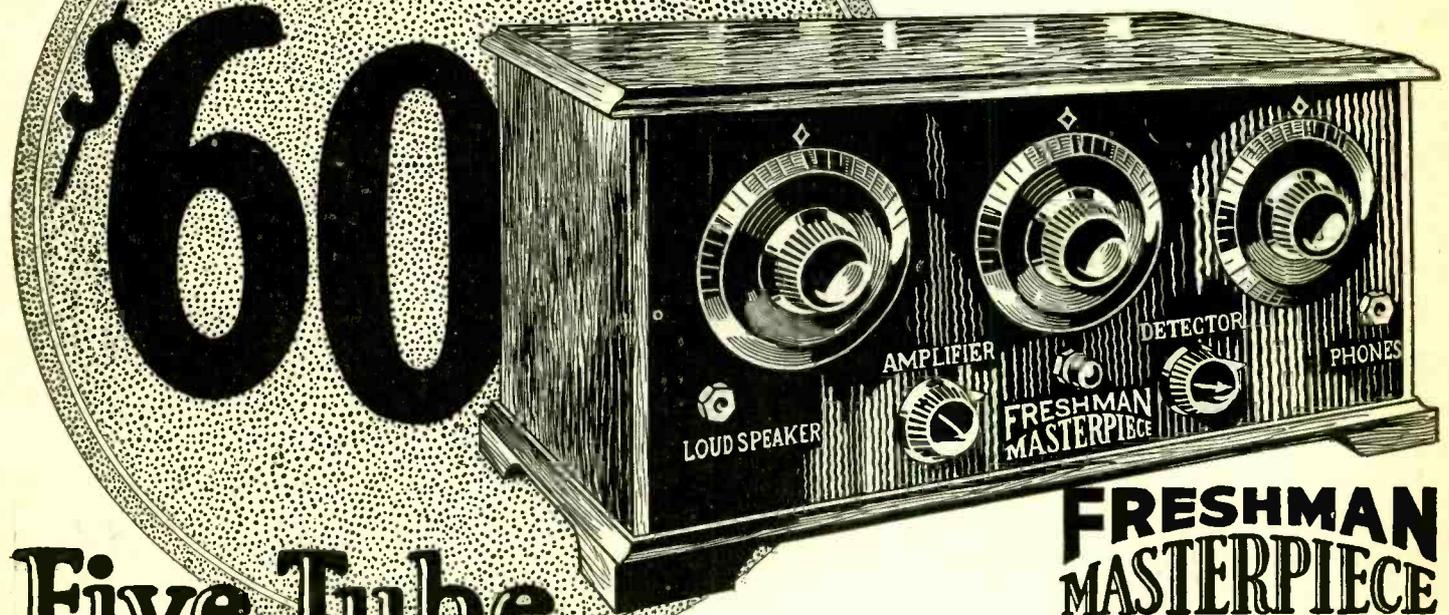
VOL. 6. NO. 17.

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EVERY WEEK



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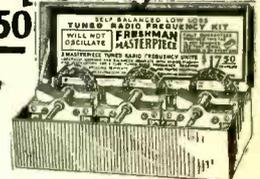


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One Federal No. 85A Audio-Frequency Transformer	Wire, etc.
Four Federal Sockets	
One .00025 Mfd. Dubilier Grid Condenser	
One Variable Bradleyleak	
One Bradleystat	
One Bradley Push-Pull Battery Switch	

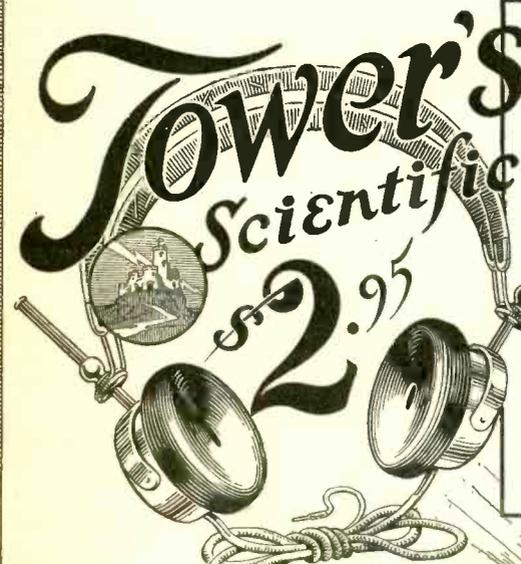
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RADIO WORLD

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A \$25 1-Tube DX Circuit that Works Wonders

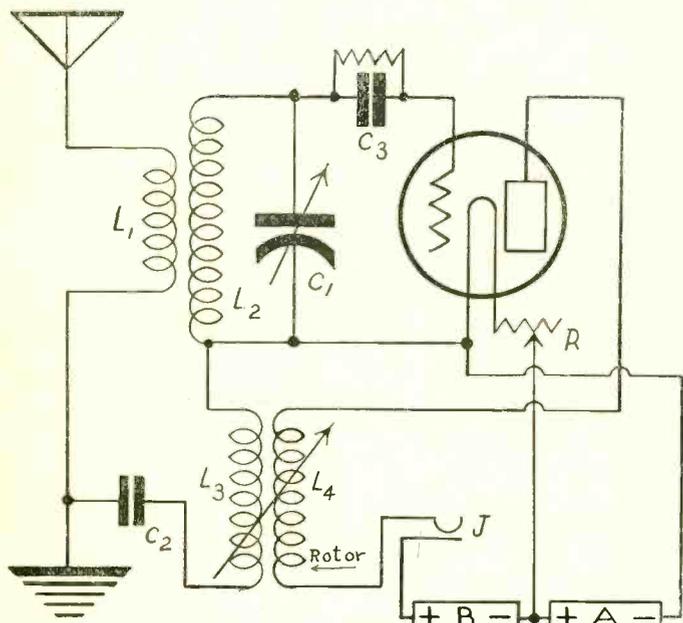


FIG. 1—The circuit of the DX Winder. L1, L2 are the fixed coils, L1 is aperiodic, L2 is a 45-turn secondary. L3 and L4 comprise a split variometer, L3 the stator, L4 the rotor. To avoid body capacity, the rotor plates should be connected to the filament end of the coil L2.

By Abner J. Gelula

NEARLY all radio men are of the opinion that, in the order named, the following features are the most important in a receiving set: Selectivity, sensitivity, volume, tone, ease of control and stability.

Selectivity leads sensitivity because a set that is sensitive but not selective is next to useless. It is far better to hear one station without any interference than a multitude of stations together.

As to volume and tone, it is a question to be decided individually whether an increased volume with some distortion is more desirable than no distortion and decreased volume.

However, this does not insinuate that sensitivity, selectivity, tone and volume cannot be incorporated in one set. There are many sets on the market that contain all of these features, but many of them are expensive. There are not many circuits of the 1-tube type that afford good selectivity, sensitivity, tone, volume, ease of control and stability.

This DX set (distance) will not operate on a loop or satisfactorily on an indoor aerial. A type of 200 tube should be used if a storage battery is available, otherwise the type 12-tube with a 1½ volt dry cell.

The set utilizes two controls, although the rheostat

will be found very useful in eliminating the carrier-wave.

A special coil will have to be wound. It is L1, L2 wound on a 5" diameter spiderweb form. L2 has 45 turns, L1, 8 turns, both No. 22 double cotton covered wire. L1 is wound on the outside of L2, with two turns of cord intervening. If desired, a 75-turn honeycomb coil may be purchased, but you will have to remove 10 turns. The 8-turn aperiodic primary is wound directly over the outside shell of the honeycomb, using the excess wire.

L3, L4 comprises a split variometer. If you haven't already a variometer about the radio room, be sure that the instrument you buy has pig-tailed connections. This type of connection better enables you to "split" the variometer. You will note (Fig. 1) that both of the leads will connect from the rotor coil. However, one of the leads will connect to the stator, the other to the terminal post of the variometer. Clip the lead making connection between the rotor and stator windings. The result will be four leads, the two standard terminals on the variometer, one coming from the stator, the other from the rotor. The other two leads, the result of the recently clipped pig-tail, are one lead from the rotor, the other from the stator.

It is not quite so simple to split a variometer that makes a sliding contact. The rotor leads are connected to the shaft, contact being made by the end-plates. To split, remove the end-plate on either the front or rear of the variometer. You will find a lead coming from the stator. Insulate this wire WELL with empire tubing. Replace the plate, taking added precaution that this wire no longer makes contact with the end plate. Fig. 4 indicates clearly how this should be done. The four connections then come from the two standard terminals (one from stator and one from rotor), one from this insulated connection, and one from the plate that formerly made this connection.

Referring to the circuit (Fig. 1) you will notice that control of the feedback is accomplished inductively, wavelength being undisturbed to any appreciable extent by adjustment of the regenerative action. This improves tone as well as selectivity.

Two stages of audio frequency amplification will increase the practical range of the set in that DX signals that were, before the addition, inaudible now are readily audible on earphones at least.

The condensers, C1, C2, C3 are, respectively, .0005 (23-plates) .001 mfd. fixed, C3 a .00025 mfd. grid condenser shunted by a 2-megohm gridleak. R is a 6-ohm rheostat.

In wiring the set connect the aerial to the beginning of L1, both the ground and one side of C2 to the end of L1. The beginning of L2 goes to the stator plates

Wiring Gelula's DX Set

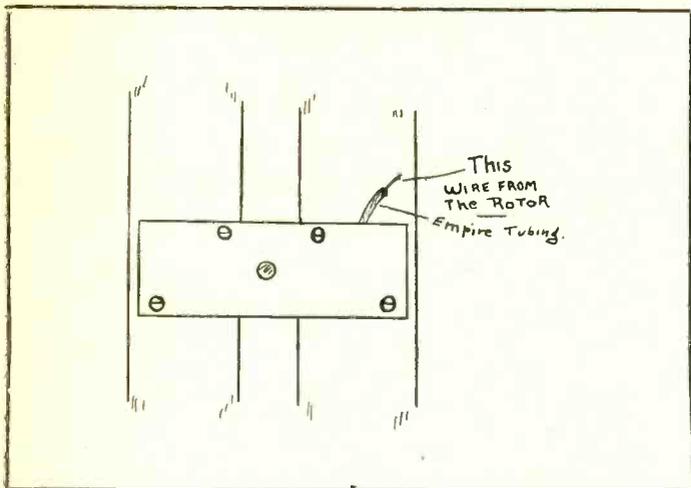


FIG. 4—How to split a variometer that uses friction contact. The end-plate must be removed, the wire underneath well insulated and brought out over the plate. Be sure that this wire is no longer touching the end-plate.

of C1, and to one side of the grid condenser, in which the leak is mounted. The other side of C3 goes to the grid of the vacuum tube. The end of L2 goes to the beginning of L3, to the negative A battery and to the rotor plates of condenser C1. The end of L3 goes to the open end of C2. The beginning of L4 goes to the plate of the tube, the end of L4 to one side of the jack, the other side of the jack to 22½ volts positive B battery. One side of the filament goes to the negative A battery, the other side to one end of the rheostat, the other end of the rheostat to the positive A battery. The negative B battery is also connected to A+.

In tuning the set, turn the rheostat up nearly full. Carefully turn the variometer rotor. When a rushing sound is heard in the phones carefully cut down on the rheostat until this ceases, then turn the rheostat back again to the point just before the hiss. This is the most sensitive point of the receiver, just before the set breaks into oscillation. Now tune the condenser C1 slowly. You will be pleasantly surprised at the number of stations that come in. When you decide to listen to a certain station, adjust the condenser C1 to the best point, then readjust the variometer.

Using a dry-cell tube, the entire set may be built, including phones, batteries and aerial equipment, for \$25.

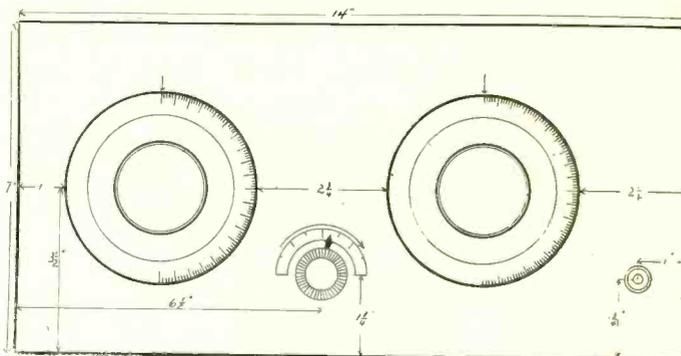


FIG. 2—The panel layout for the Wonder. Four-inch dials are indicated, but if the condenser has a vernier adjustment it will necessitate the use of 3" dials. The rheostat is mounted between the two tuning instruments. The panel is 7x14" high.

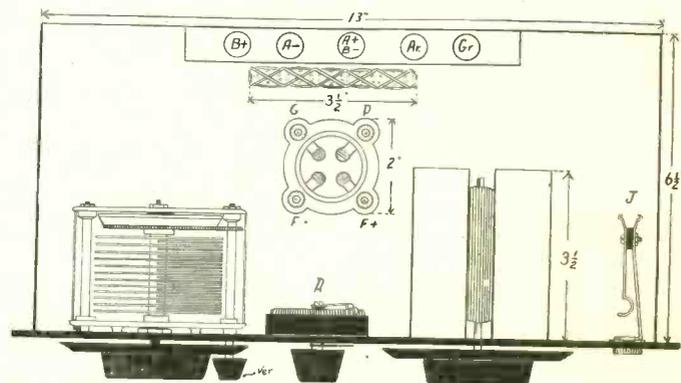


FIG. 3—The baseboard layout. The condenser shows a 4" dial mounted in connection with a vernier knob. The knob is symbolic. If the condenser has a vernier attachment as indicated, a 3" dial must be used. The rheostat is mounted directly to the right of the condenser, followed by the variometer. The jack is mounted to the right of the variometer but in the lower corner.

LIST OF PARTS

- One pig-tailed variometer.
- One DXL 23-plate variable condenser (with vernier).
- One spider-web form, 5" diameter.
- Two fixed condensers; one .001 mfd., the other .00025 mfd.
- One 2-megohm gridleak.
- One 12-type tube.
- One Benjamin socket.
- One 1½-volt dry cell.
- One Patent jack (single-circuit).
- One pair Brandes phones.
- One Federal rheostat.
- One 7x14" Radion panel.
- One 7x13" baseboard.
- Two Univernier dials.
- One A battery (1½-volt dry cell for 12-type tube).
- Six binding posts.
- Aerial equipment.
- 22½-volt B battery.

Making Your Own Fixed Condensers

By Raymond B. Wailes

MANY circuits call for particular sizes or capacities of fixed condensers. Also, many a set has been improved by experiments with condenser values, for instance, removing a .001 mfd. condenser and inserting in its place a .002 or even .005 value. How to make a condenser of any capacity desired is shown in the following approximate table.

Capacity	2 Tinfoils and 3 Mica Sheets	Capacity	2 Tinfoils and 3 Mica Sheets
.0001	1x1/10"	.003	1x3"
.0005	1x1 1/2"	.006	1 1/2 x 4"
.001	1x1"	.008	2x4"
.002	1x2"	.01	2x5"
.02	3x6 1/2"		

For instance, to make a blocking condenser which is often connected across the phones and has a value of .002 mfd., from the table we see 1x2". So cut two sheets of tin or copper foil 1x2" square and place between them, after soldering wires to them, a sheet of

stove mica, so that the plates or the wires do not touch each other. Now place another sheet of mica on top of the top copper or tin foil sheet and another mica sheet on the bottom of the first or bottom one and bind the whole with two little cigar-box boards. The mica sheet placed between the two metal foils should be larger than the foils, say, 1½x2½" so that the metal plates cannot possibly touch each other at their edges or at any other place.

Two Stunts to Make Speaker Behave

SOME loud speakers have a habit of howling when they are worked up to their limit in volume. This occurs especially if the speaker faces the set. One method of getting rid of this annoying condition is to turn the mouth of the horn away from the set or try reversing the terminals of the speaker cords.

The Coils for the Superdyne

Radio World's 1925 DX Model

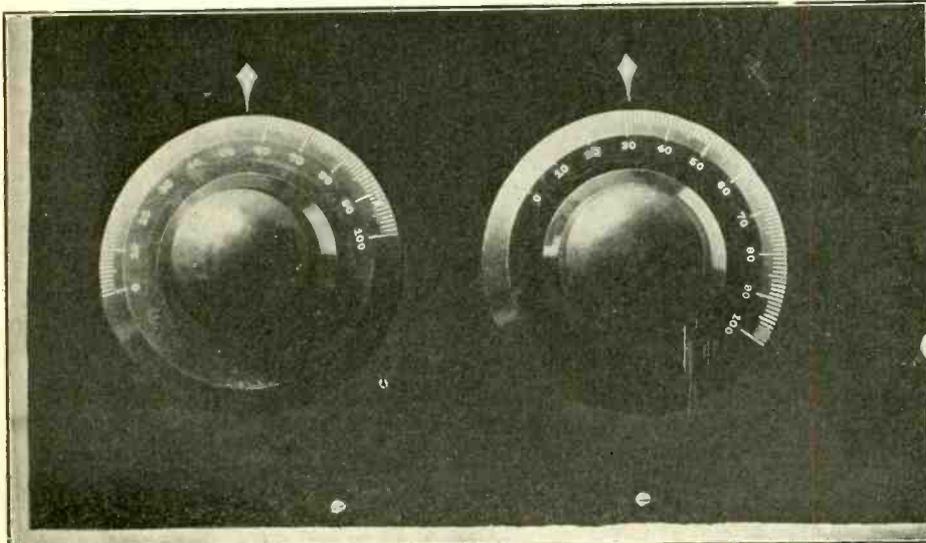


FIG. 9A—RADIO WORLD broadcast lectures are transmitted from Station WGBS, Gimbel Brothers, in New York City, every Friday evening at 6:30 P. M. These courses are given by Abner J. Gelula, Technical Editor of RADIO WORLD. Every week, for three consecutive weeks, circuits are described over the microphone; the four week questions received are answered over the ether. Photo shows dial settings, 55 and 31, for tuning in WGBS, 316 meters, on the 1925 Superdyne.

Inductance May Take a Variety of Forms, But the Coupler and RFT Must Be Matched or Results Are Poor.

[In Part 1 of this article on how to build RADIO WORLD'S 4-Tube DX Superdyne, 1925 model, the author described last week, issue of January 10, the theory of the operation of the set and made a comparison of results between this 4-tube set and the 5-tube Neutrodyne. He explained why two controls suffice, instead of the usual three. The circuit diagram was published in that installment (Fig. 1, page 5), and the connections to the special variable condenser that tunes two coils with one motion were diagrammed (Fig. 2, page 6.) The combined panel layout and assembly plan was presented in a blackprint (Fig. 3, page 7). Three photographs of the completed receiver were shown and a template for mounting the variable condenser was published (Figs. 4, 5, 6, 7 and 8, pages 8 and 9). This week the author discusses the coils, panel and baseboard assembly and some wiring. The constructional article will be completed in next week's issue, dated January 24.—EDITOR.]

PART II.

By Herman Bernard

THE coils for RADIO WORLD'S 4-Tube DX Superdyne, 1925 model, must be matched, otherwise the set will not work properly. If they are not matched the same dial setting of the only variable condenser used in the set will represent different wavelengths, hence a station will come in at two different settings of this dial, and not perfectly in either case. But once the coils are matched the difficulty is solved.

Varied Choice of Coils

In the choice of coils there is quite a variety. Almost any 3-circuit tuning coil may be used for L1 L2 L3 (Fig. 1 in last week's issue) and the coupling transformer (L4 L5) must be wound just as the stator of the variocoupler is wound. For simplicity and the preservation of inductance values the primaries and secondaries

of both inductances should be identical, except the RFT secondary (L5) is tapped and later connected to one of the condenser stators at that tap which gives the desired perfection of result.

No. 20 double silk covered wire may be used for making both inductances. If a 4" outside diameter tubing is used for making the variocoupler, L1, L2, L3, it should be 2" high. Thirty-one turns are put on for the secondary. The primary should consist of four or five turns of the same wire wound directly over the secondary and for the entire length of the secondary winding, that is, the primary turns are spaced wide apart. All windings of all coils used in this circuit are in the same direction. The Superdyne effect is obtained by reversing the leads, rather than by the more complicated method of reversing the windings and connecting the leads in standard fashion. That will be discussed later. The rotor may be of the former type, that is shaped like the sides of a ship, and on it 36 turns of the same kind of wire are wound. Eighteen turns are placed on one side of the centre of the rotor and eighteen on the other, to leave unobstructed space for inserting the shaft. The forms for making one's own coupler are not easily obtainable and often a home-made coupler is not mechanically strong. If you have an old variocoupler you may convert it into one for use in this circuit, but otherwise it is preferable to purchase a commercial model specially suitable for this circuit.

Taps on RFT Secondary

The specifications given are those of the special coupler manufactured by Wallace for this circuit. However, the Globe low-loss variocoupler also is excellent for use in this circuit, but it is futile to give instructions for constructing one just like it, since that requires factory facilities. One additional turn is required on the secondary of the standard Globe coupler for use in this circuit, and a special coil is now manufactured to meet this need. If Litz wire or its equivalent is preferred by the constructor, he should wind a 16-turn primary on a 3" outside diameter tubing, terminate, leave $\frac{1}{4}$ " space and wind 40 turns for the secondary. The rotor may consist of 36 turns. These are

the specifications for the ARC Tri-Tuner as adapted to this circuit.

These concerns also make correspondings RFT for L4 L5. The primary of the RFT is wound just like the primary of the variocoupler and the secondary likewise matches exactly the secondary of the coupler, except for the taps. It is just barely possible that trivial stray magnetic coupling and capacities built up within the tubes may require an adjustment of the secondary of the RFT. That is why, in winding the RFT secondary, a tap should be taken at every quarter turn on the last turn of this secondary. For double safety the extra-cautious may tap the last two turns at every quarter turn. Once the correct inductance is determined for this secondary, the lead to one of the stators of the special variable condenser is connected permanently. No tapswitch is used.

The windings as specified above are correct, despite the disparity in the number of turns on the primaries as between one type of coupler and another. The commercial products were taken as they existed, and then adapted to this circuit by adjustment of the secondaries. All three models were fully tested.

The Wavelength Settings

With the inductance values used as outlined, in conjunction with a 65-foot outdoor aerial and 30-foot lead-in, WGBS, the Gimbel Brothers' station, New York City, 316 meters, came in at 55 on the tickler dial and 31 on the condenser dial (Fig. 9A). This is the setting, therefore, to tune in on Fridays at 6:30 p. m. to hear diagrams designed by RADIO WORLD'S Broadcast University. The dial settings for the variable condenser are constant and are shown in a chart or graph, Fig. 12. By consulting this chart it was possible to get the correct condenser dial setting for any station. The degrees of the dial are represented horizontally in Fig. 12 and the corresponding wave length shown in the vertical column at left. The chart works both ways. The dial setting may be converted into meters or meters may be converted into the dial setting, the more usual and useful purpose of the chart. Although an aperiodic primary is used the aerial length nevertheless affects the dial settings, hence a slightly different chart will probably result if the aerial conditions are not the same as those in the RADIO WORLD'S laboratories.

The tickler dial need not be charted, especially as slight variation of the setting of this dial for a given station may arise from week to week.

Drilling the Panel

The dimensions given in Fig. 3 last week should be followed for panel drilling. The respective drill holes were given, except for the screws mounting the variocoupler and the rheostat. The template for the condenser (Fig. 6, page 9, last week's issue) gives the data for the screwholes to mount that instrument, while the holes for the coupler will have to be drilled according to the type of coupler used.

From left to right on the panel front are (1) the coupler shaft, (2) the condenser shaft, (3) the push-pull A battery switch, (4) the rheostat and (5) the single-circuit jack. The panel is 7 x 24" black radion, which is excellent for radio purposes and easy to drill. The minimum distance between dial circumferences is 1", the same distance being preserved be-

The Wave Length Graph for Bernard's 4-Tube Quality Set

List of Parts for Superdyne

- One certified Superdyne coupler (L1L2L3).
- One certified matched radio-frequency transformer (L4L5).
- One Bruno Ultra Vario Condenser, No. 19 (C1).
- Two Federal (Nos. 65 and 65A) or two No. 3-A Stromberg-Carlson audio-frequency transformers.
- Three UV201A tubes.
- One UV200 tube.
- Four Federal sockets.
- One .00025 mfd. Dubilier grid condenser (C2).
- One variable Bradleyleak (R2).
- One Bradleystat (R1).
- One Bradley push-pull battery switch (S).
- One Tri-Jack or single-circuit jack (J).
- One 120-ampere-hour Exide storage battery.
- Two 45-volt Eveready B batteries (No. 1 and No. 2 in Fig. 1).
- One 4½-volt Eveready C battery.
- One 7x24" black Radion panel.
- One mahogany cabinet, size to match.
- Two silver Eureka dial pointers.
- Two ½" diameter hard rubber bushings.
- Ten feet of vari-colored Columbia battery cable.
- Two lengths of spaghetti.
- No. 20 double cotton covered wire or round bus bar for internal set wiring.
- One pair of Tower's earphones.
- One Western Electric loudspeaker.
- One Eby terminal block.
- 100 feet 7-strand aerial wire, 50 feet No. 14 insulated lead-in wire, ground clamp, one double Fahnestock clip, screws, U-angle, right angles, two dozen solderless lugs, half-dozen Morsing union joints, ground clamp, lightning arrestor, hardware.

tween the circumference of the first dial and the left-hand end of the panel, and between the jack and the right-hand end of the panel. All this is clearly set forth in the dimensions given in Fig. 3.

The Baseboard

Next tackle the 6½ x 23" baseboard. With a hacksaw cut the terminal block, separating the aerial and ground binding posts, as one unit, from the rest. This is to afford a separate block for the aerial and ground leads, which are thereby shortened. The aerial-ground block is mounted on the left-hand rear of the baseboard, parallel to it, two small blocks of wood or washers, being used to keep the lugs under the terminal block from touching the baseboard. It is well to solder two 6" leads to No. 18 double cotton covered wire, or round bus bar, each to one of the two lugs, so that this connection does not prove an irritating job, which it might, if the soldering were attempted after the block was mounted. The block may be flush with the left-hand rear corner of the baseboard.

The coupler, variable condenser, push-pull switch and rheostat and jack being mounted on the panel, it is well to hold the baseboard in position, as if it were fastened to the panel. This may be done by placing a few newspapers flat under

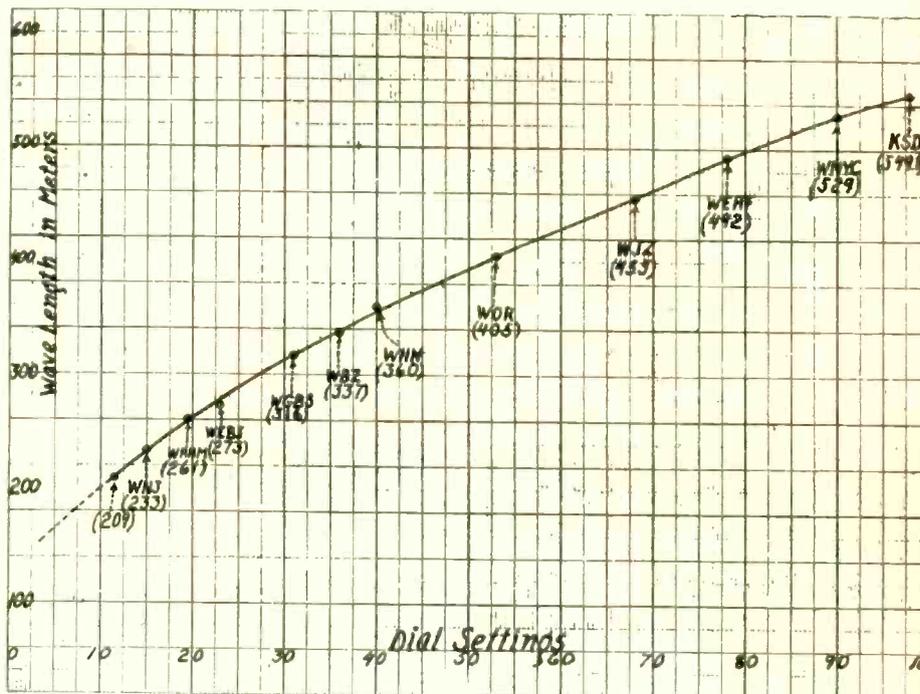


FIG. 12, graph of the variable condenser dial settings and the wavelengths, showing how the set tunes from below 200 meters to about 560 meters. This is a range of about twenty meters in excess of the broadcast band of wavelengths.

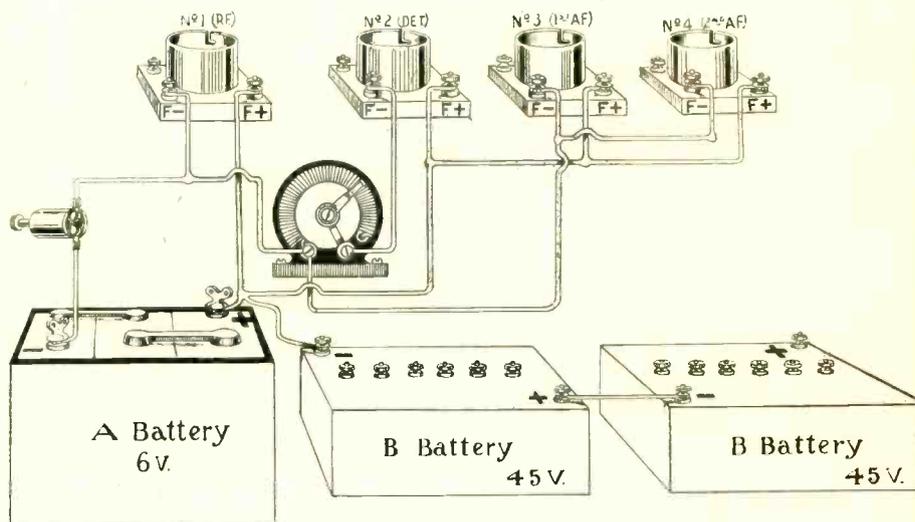


FIG. 9, detail of the filament wiring in the 4-Tube 1925 model DX Superdyne. The A— is connected from the battery to one side of the push-pull filament switch. The other side of the switch goes direct to the F— posts of three of the four sockets. These three are the radio-frequency tube socket at left and the two audio sockets are right. The connection of the A— from the battery to the F— post of the detector tube socket is interrupted by the rheostat. One side of the rheostat is connected to the A battery minus post, or lead therefrom, and the other side of the rheostat to the F— post of the detector tube socket. The A+ post of the battery is connected directly to the F+ post of all four sockets. A+ and B— are joined. How the two 45-volt B batteries are connected is shown also. The B+ leads to the set are not shown.

the baseboard, thus elevating the baseboard about ½" from the bottom of the panel, which is held upright, flat on the table itself, unelevated by the newspapers. Following Fig. 3, the assembly plan published last week, mark where the sockets are to go. The placement of the radio-frequency socket is automatically determined by the positions of the coupler and the variable condenser. Remember that the tube must be unobstructed for insertion in and removal from this socket, hence do not set this socket too far forward. If the rear of the socket is an inch or so from the rear of the baseboard correct placement will result. Draw a square with a pencil, so you will know just where this socket must go, and take

care that the F— post of the socket is at left, front. This automatically places F+ at front, right, grid at left, rear, and plate at right, rear. The next socket to tackle is that for the detector tube. This is placed directly behind the rheostat. This socket is also placed conventionally, as was the other one. The position of the socket posts is confirmed in Fig. 3.

The Audio Stages

The last audio socket, extreme right, Fig. 3, should be allowed for next. It is placed at the rear on the right-hand side of the baseboard and mounted in conventional fashion. To the left of it goes the second audio-frequency transformer, with its G and F posts directly in line

Laying Out the Baseboard

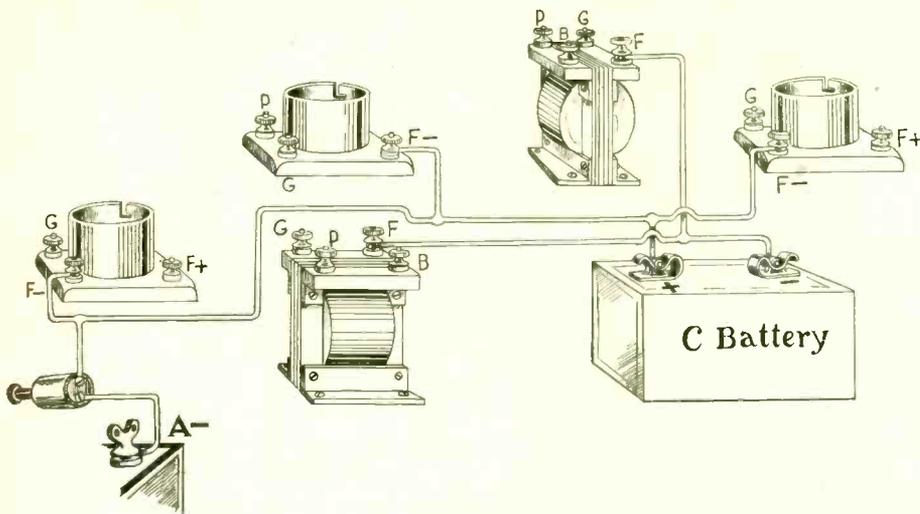


FIG. 10, how to connect the C battery. The F posts of the two audio transformers are connected to C— instead of to A—, while the C+ is joined to A—. Note that this has nothing whatever to do with the filament wiring. The RF tube socket is shown at left, the detector tube socket is omitted for the sake of simplicity, and the two audio sockets are shown.

with the G and F— posts of the fourth or last socket previously discussed. The third socket, or last socket to allow for, is the first audio stage, and that socket alone is mounted sideways, so to speak. The P post of this socket is at left, rear, which brings the G post to left, front, the F— to right, front, and the F+ at right, rear. The location of the first audio transformer is predetermined by the position of the first audio socket, since this transformer is mounted in front of the first audio socket and in alignment in two directions with this socket and the detector socket. The primary of the first audio transformer is in front, the P post at left. This primary is sometimes designated P1 and P2, sometimes P and B. The secondary is marked either G and F or S1 and S2. These corresponding designations are for identical posts.

Behind the detector socket the terminal block for battery connections should be placed at right angles to the baseboard and supported by a brass, copper or iron right angle, about 1 x 1" or 1½ x 1½". This manner of mounting is recommended because it renders the binding posts easy of access after the set is completed and battery connections may be changed without ones' hand getting cramped in between the terminal block and the back of the cabinet, or between parts of the set and the rear cabinet wall.

The location of the radio-frequency

transformer also is predetermined, since it is to be between the detector socket and the variable condenser. Note that this inductance is mounted at right angles to the variocoupler mounting. That is, windings on the coupler are parallel to the baseboard, windings on the RFT at right-angles to the baseboard. This is minimize stray magnetic coupling between the two inductance units, for such action causes losses. The RFT should be mounted at least 1½" from the variable condenser, so as to keep the RFT out of the electrostatic field of the condenser.

Mount the Parts

After the positions for these parts have been allowed for, with the comfortable assurance that there will be no collision of panel-mounted parts with baseboard-mounted instruments, a safeguard which fans readily appreciate, the parts are permanently mounted to the baseboard. A brass, copper or iron U-angle should be used to mount the RFT, to obtain the right-angle position. If such an angle is not handy two right angles may be screwed together to form a U-angle, but this method does not afford any too great security. If the connecting screw loosens the coil form sags.

The parts have been permanently mounted on the baseboard, up to this point, except the battery terminal block. That will require some soldered connec-

tions, a task more comfortably performed when one is free to move the block into the most convenient position.

The panel and baseboard have not been joined yet, because it is handier to wire the filament leads when the baseboard is free.

[Part I of this article on RADIO WORLD'S 4-tube DX Superdyne, 1925 Model, was published last week, issue of January 10. Part III, the conclusion, will be published next week, issue of January 24.]



THE NAME PLATE

FREE NAME PLATE
for RADIO WORLD'S 4-Tube DX
Superdyne

Put it on the panel when you build the 1925 model. Send in your order now. As these nameplates are being manufactured now it will take a little time before we can deliver them. They are of the transfer type (decalcomania) and may be put on just as easily after the set is built. Address Superdyne Editor, RADIO WORLD, 1493 Broadway, New York City.

A Set is Wanted for Clara Morris

CLARA MORRIS, noted actress of a generation ago, is an invalid. Ada Patterson, gifted author, writes to RADIO WORLD:

"Can't some plan be worked out where-by a set would be installed beside Clara Morris's sick bed? She has an active mind and she did look wistful when I said: 'I'm sure you would enjoy a set.'"

Any RADIO WORLD reader desiring to communicate with Miss Morris may address her at Tuckahoe, N. Y.

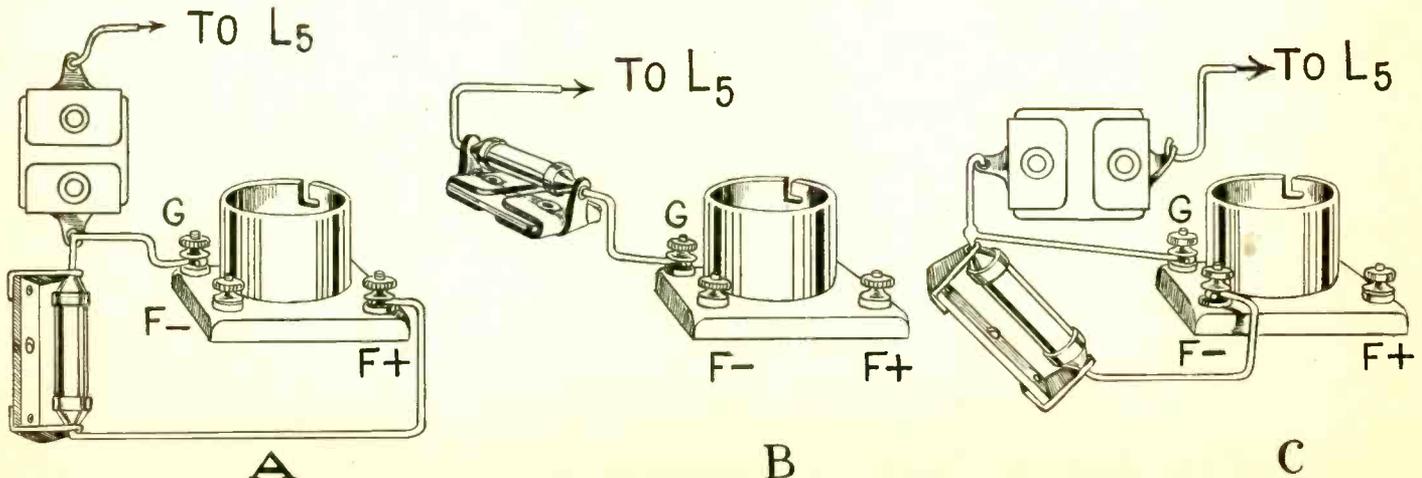


FIG. 11, three ways of connecting the gridleak. The grid condenser connection may not be varied, that is, it must always intercept the end of L5, when used at all. The leak to F+ sometimes works best. This connection is shown in A. The clip affair that looks something like a grid condenser, and which holds the leak in place, is merely a leak mounting, purchasable in any radio store. Note that one side of the leak always goes to the grid post. This is accomplished conventionally as shown in B, where the grid condenser is of the clip type and serves also as the leak mounting. The connection shown in C is the only other option. This will not work as well as either of the other ways of placing the leak in the circuit.

Picture Diagram for Wiring the 1925 Superdyne

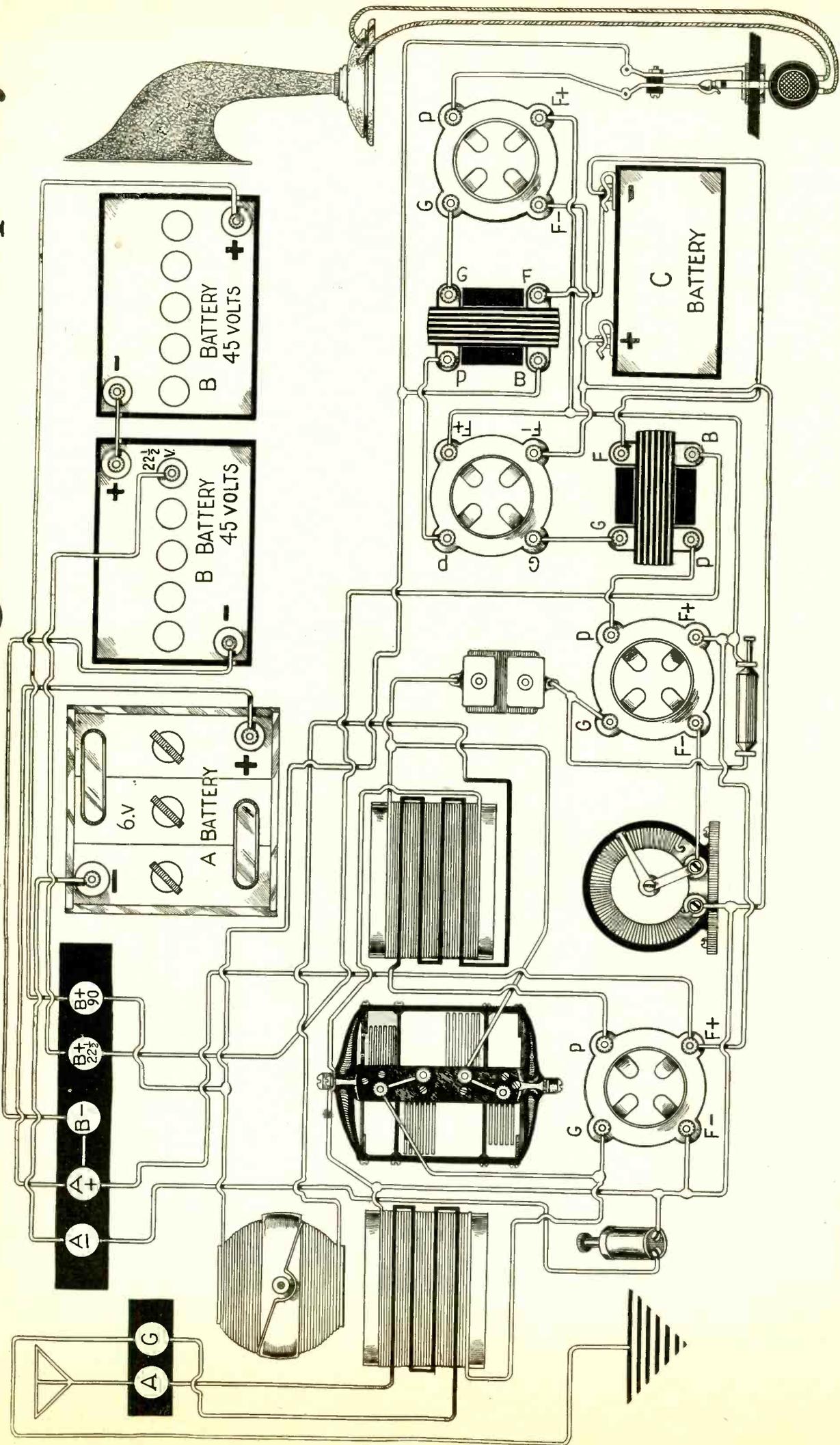


FIG. 13, an asymmetrical or picture diagram of RADIO WORLD'S 1925 model 4-tube DX Superdyne. This shows in another form the circuit network as presented in the schematic diagram (Fig. 1) published last week. The wiring directions will be published next week. The above is in all respects an accurate presentation of the wiring, but the variable condenser is not shown upside down, the object being to expose the wiring.

tions will be published next week. The above is in all respects an accurate presentation of the wiring, but the variable condenser is not shown upside down, the object being to expose the wiring.

Why the Rheostat Should Go in the Negative Lead

How to Bend Busbar, Connect Battery Leads to Sockets, Lay Out a 2-Stage Audio Amplifier, Change Tubes About and Care for Aerial and Ground Discussed for the Novice.

By Lt. Peter V. O'Rourke

Proper Way to Join Rheostat Leads

THE center pole of the dry-cell battery is positive. The positive goes directly to the filament, the negative to one side of the rheostat, the other side of the rheostat goes to the negative filament. Fig. 4 indicates this clearly.

The sockets are usually marked plainly on the filament terminals showing which pole is negative and which positive. However, if the socket is not marked as to polarity, the negative pole is on the same side of the socket as the grid. Figs. 6 and 7 show this clearly.

Fig. 5 shows a Pacent rheostat. Note that it is a departure from the conventional 2-terminal rheostat in that the rheostat may be used as fixed resistance by connecting A and C, or as a variable resistance by A and B or B and C.

The rule to follow is to place the rheostat in the negative lead. In amplifier

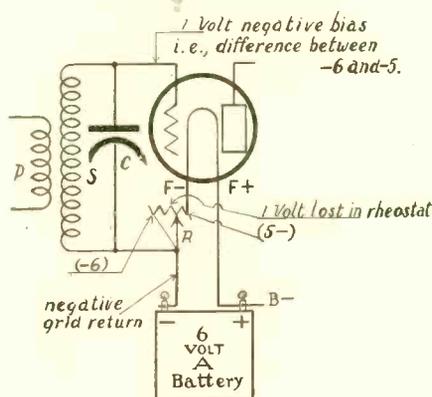


Fig. 11 (above)

FIG. 11, showing amplifier circuit, the grid having a 1-volt negative bias.

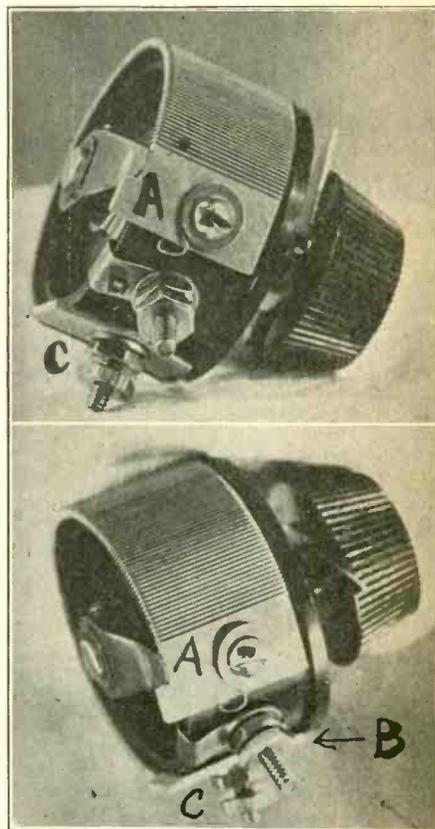


FIG. 5, a departure in rheostats. Full fixed resistance may be obtained by connection with A and C. Connection with A and B or B and C will give the regular rheostat action, one way causing the tube to dim the more the rheostat is turned to right, the other causing it to brighten the more the rheostat is turned to right.

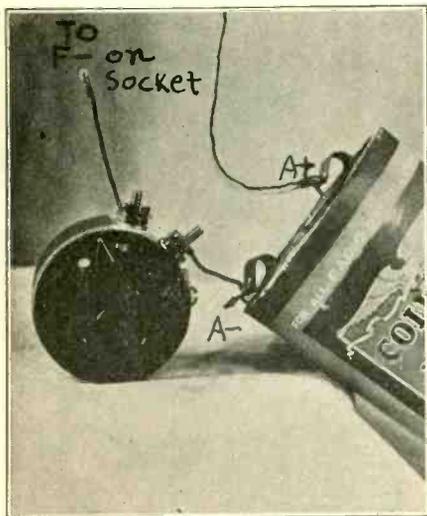


FIG. 4, the positive pole of a dry cell is the center terminal. The positive goes to the positive tube post. The negative goes to one side of the rheostat, the other side of the rheostat to the negative pole on the socket.

circuits, where the grid return is always negative, this will give a negative grid bias of about 1 volt, that is, a negative bias equal to the voltage drop in the rheostat.

Fig. 11 shows a radio-frequency amplifier stage of the tuned type, consisting of the RF transformer PS and a variable condenser, C, with stator plates connected to the grid end of the secondary S. The rheostat R is in the negative lead. The tube is 201A. The negative post of a 6-volt A battery is connected to one side of the rheostat, the other side of the rheostat to the negative filament post of the socket, F—. The voltage at the negative post of the battery is minus 6, but the

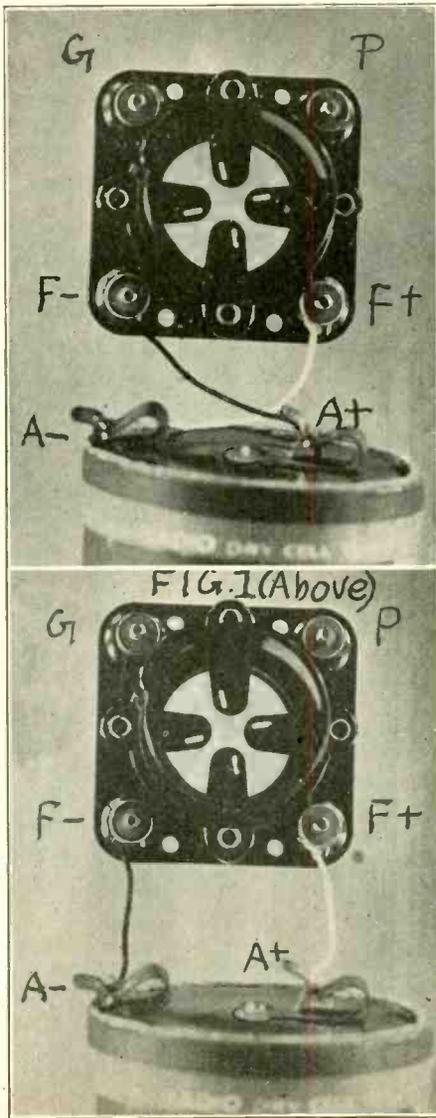


FIG. 6 (top), connect the negative A lead to the negative terminal of the socket, the positive to the positive terminal. Never cross the wires as shown in Fig. 7 (lower).

voltage at the F— post of the socket is only minus 5, or perhaps minus 4.9, due to the voltage drop in the rheostat. Any resistance placed in series with a direct

current circuit reduces the voltage. This loss is due to the obstruction to the current flow offered by the resistance and takes the form of abstraction. Although a 6-volt storage battery is used, only 5 volts are required properly to heat the filament of the tube. That is one reason why the rheostat is inserted at all—to control the heating of the filament so that it can be adjusted to exactly the best operating voltage. Now, the grid end of the coil S has the same direct current voltage as the battery post to which it is connected, i. e., minus 6. With only minus 5 volts on the negative filament and minus 6 volts at the grid, the bias of the grid is the difference (—1) or 1 volt negative bias. Everything in the voltage line is reckoned in respect to the F minus. As the plate is directly connected to the A battery, through the common A+ and B— lead, the grid is one volt negative in respect to the positive plate.

Take Good Care of Aerial and Ground

THE energy transmitted to the radio circuit by the aerial and ground systems is so small that to give it in on microamperes would require a string of ciphers that would almost wear out the cipher cast in the linotype machine. Considering that the incoming energy is so small the utmost precautions should be taken that no power is lost through absorption, leaks or resistance.

Obviously the first step in preventing losses would be in checking up the aerial

How to Place Transformers and Bend Busbar

and ground. The aerial must be clear of all objects, i. e., it must not touch anything throughout its entire length. It should be not more than 100 feet long, if you are within 35 miles of a broadcasting station, otherwise the aerial may have a length of 150 feet. The lead-in should be as short as possible—not longer than 25 feet, at any rate.

Correct Placement of Audio Transformers

A WELL laid out two-stage amplifier is shown in Fig. 8. The two audio transformers are at right angles, the tubes

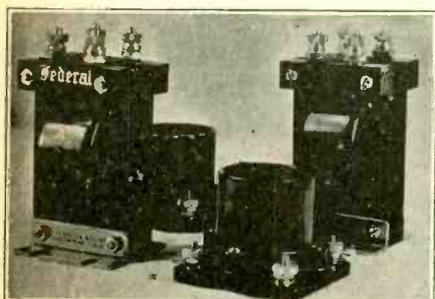


FIG. 9, the transformers NOT at right angles.

between. This allows short leads which mean a minimum loss and greater signal strength. The markings on the AF transformers: P1, P2, S1, S2 show where the respective primary and secondary windings begin and end. P1 goes to the plate of the preceding tube, P2 to the positive B battery. S1 goes to the grid of the following tube, S2 to the negative filament.

Changing Position of Tubes Helps

WHEN you purchase a new set of tubes, or even one tube for a multi-tube set, always switch tubes around so

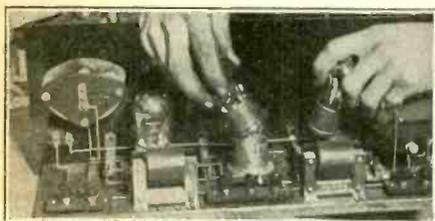


FIG. 10, switch the tubes whenever a new tube is introduced into the circuit. It is well to switch them also at intervals of two months.

that the proper tube will be in the proper place (Fig. 10). Although tubes may be of the same type they always differ as to characteristics. Some tubes may be better detectors than others, while some may respond better in the RF stages or the AF stages. Experiment will determine which is best.

When you think that a tube is "wearing out," try switching. This will usually bring to light the fact that this tube will operate better in another part of the circuit.

Nearly all the circuits on the market today are good. However, for them to operate at the highest efficiency depends upon the way they are wired and as-

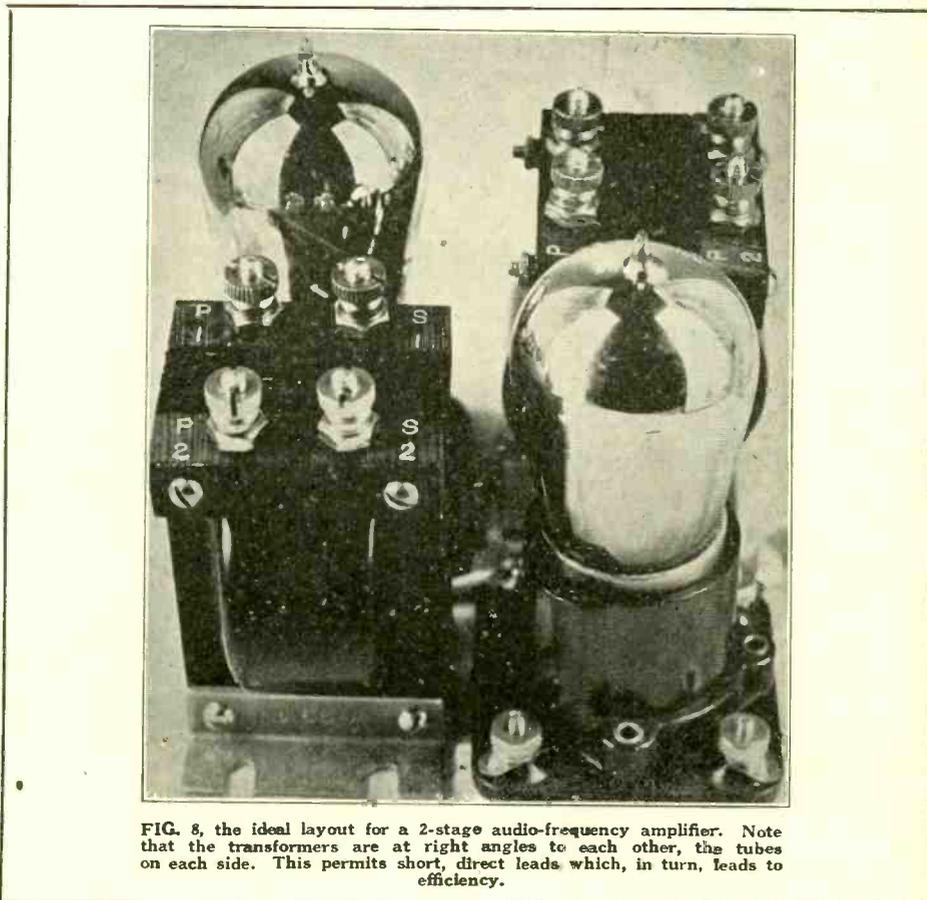


FIG. 8, the ideal layout for a 2-stage audio-frequency amplifier. Note that the transformers are at right angles to each other, the tubes on each side. This permits short, direct leads which, in turn, leads to efficiency.

sembled and the quality of the instruments used.

Use of Busbar Wire in Set Building

EVERY now and then we read of opinions as to the value of busbar for wiring sets. One thing we must all admit: Busbar certainly permits neat wiring. However, it has its drawbacks, also. Wiring a set with busbar and using type 11, 12 or 199 tubes don't always go well together. The busbar transmits the slightest jar to the set.

Fig. 1 shows the proper way to bend busbar. Never attempt to bend it with the fingers, as the proper bend cannot be attained. Quite often a ring is required to fit over a bolt as in Fig. 3. Fig. 2 shows how this is done. Round-nosed pliers are essential in making this turn.

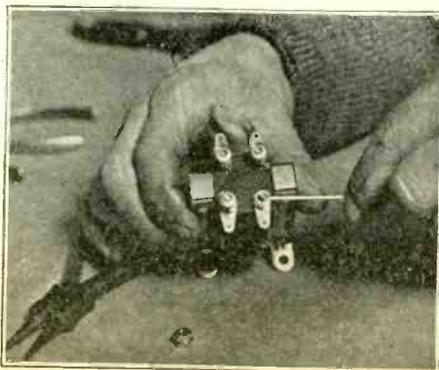


FIG. 3, placing looped end on the terminal.

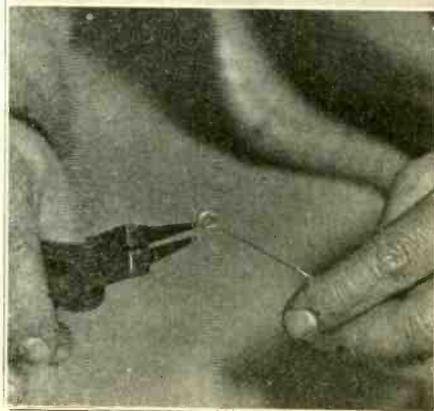
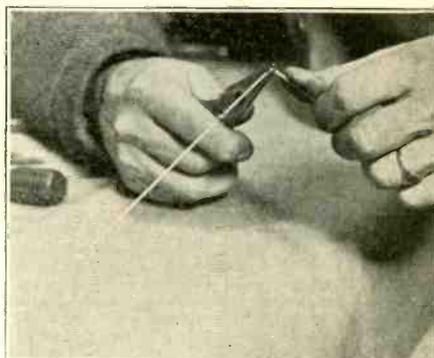


FIG. 1 (top), the proper way to bend busbar. Never attempt to bend the wire to a right angle. The corner should be rounded. Fig. 2 (bottom), round-nosed pliers should be used in looping the wire to fit over the terminal binding post. This is easier than a soldered connection. Fig. 2A shows simple home-made device for bending.

Mechanical Strength in a Coil of Exceptionally Low Losses

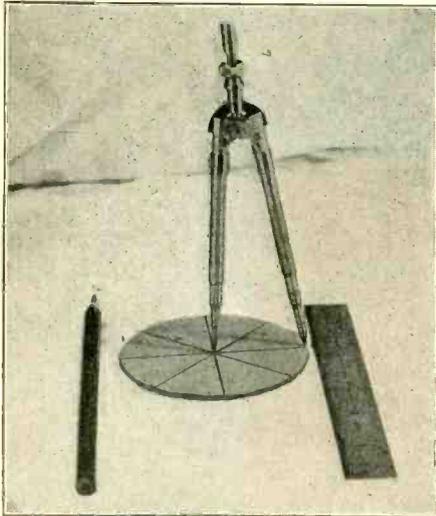


FIG. 1, showing how to describe the $3\frac{1}{2}$ " circle for cutting a round piece of cardboard for use as a marker. The circle is divided into eight equal parts.

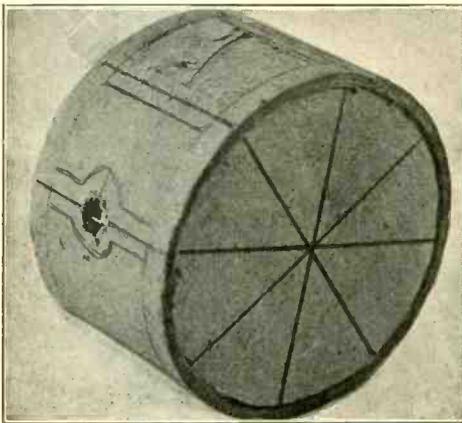


FIG. 2—The circular piece of cardboard fits snugly into the form on which the secondary and primary are to be wound. The points at which the eight lines meet the circumference are carried down the length of the stator. Parallel lines are drawn on either side of these perpendicular markings on the stator. Select any one of the central lines on the stator for a drill hole into which is to go the bushing supporting the shaft actuating the rotor. Semi-circles are drawn around this point, instead of just straight parallel lines. Select the corresponding point on the diametrically opposite side of the stator and do likewise.

By Herbert E. Hayden

Illustrations by the Author

MECCHANICAL strength being an important consideration in the construction of any coil, this is achieved when one makes the low-loss inductance known as the Hayden cutout coil. The insulation form is cut away until only about 20 per cent. of it remains. So that the expense would be kept down to a minimum, cardboard was used. However, the same plan as here outlined may be used if hard rubber, bakelite or other support is used. Cardboard, despite its inexpensiveness, is very good, comparing favorably with bakelite.

Circular Cardboard a Guide

To make a variocoupler of the three winding variety, use a pair of dividers or compass to describe a circle $3\frac{1}{2}$ " in diameter. The radius or setting of the compass is therefore $1\frac{3}{4}$ ". This circle is the same as the interior diameter of

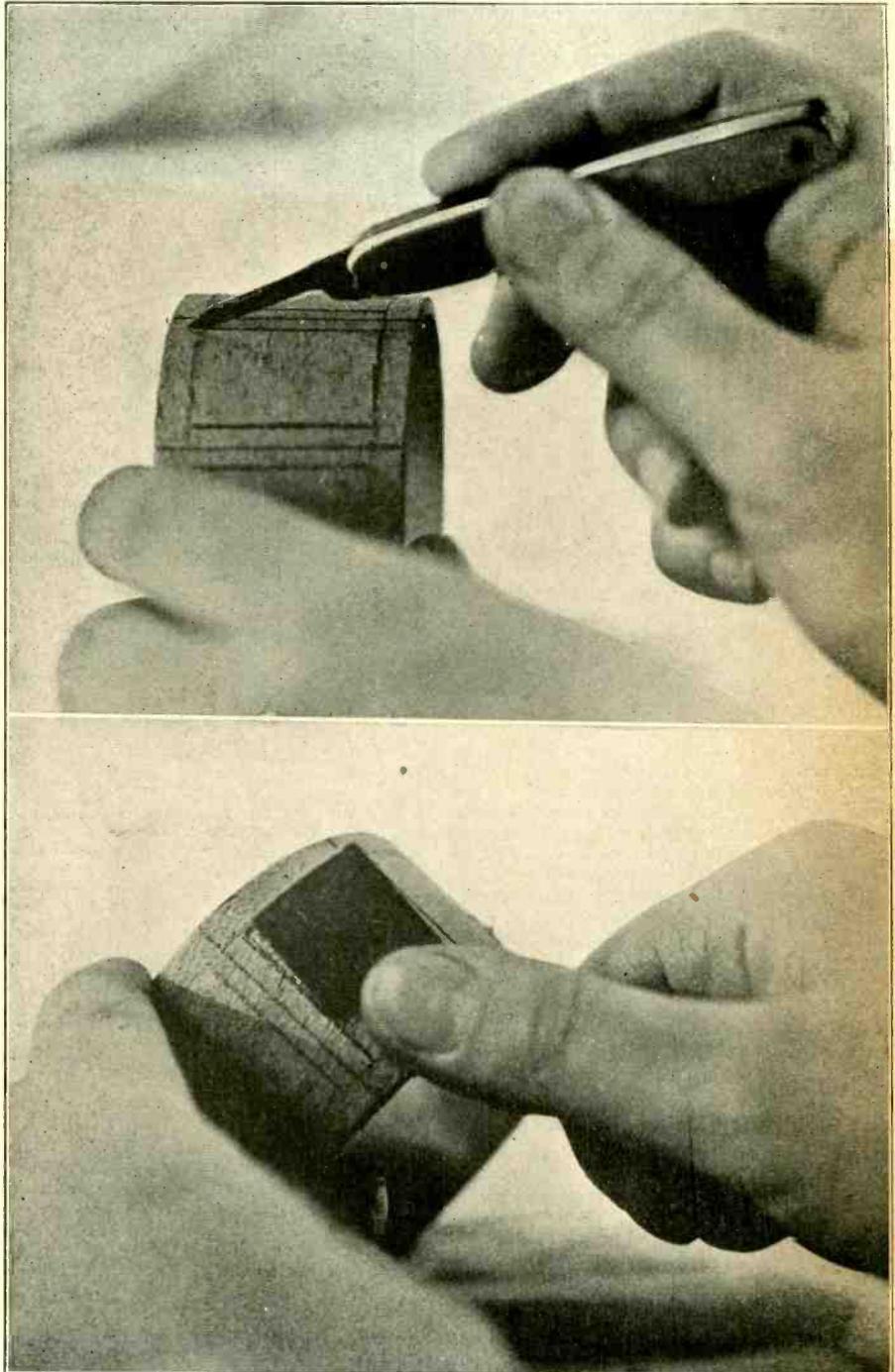


FIG. 3 (top) shows how the cardboard is cut with a sharp penknife and Fig. 4 how the cardboard is peeled off. Note the rectangular surface in which the cutting is done.

the form which will be the stator of the coupler. This form should be at least $3\frac{1}{2}$ " high. The circle just described is divided into eight equal parts by drawing a diameter, then another diameter at right angles and halving the four existing angles, giving eight. (Fig. 1).

The circular piece of cardboard will fit snugly into the core of the stator (Fig. 2) and is used as a guide for marking the stator for cutting. Where each of the eight lines of the circular cardboard touches the circumference of the stator a mark is made and a line drawn the length of the stator. (Fig. 2). A hole is drilled in the center of any given line on the stator and a corresponding hole on the diametrically opposite line, these apertures being for allowing for the insertion of the rods that will support the rotor.

Now draw a line parallel with the circumference of the stator and about $\frac{1}{4}$ " from the circumference. Do the same at the opposite end or bottom of the stator. Also draw parallel lines $\frac{1}{4}$ " each side of the lines that run the length of the stator. Where the two drill holes are make these lines semi-circular. (Fig. 2). The lines are shown in Figs. 3 and 4. Also their objects become apparent from a glance at these photographs.

Use a Sharp Knife

The next thing to get is a very sharp penknife. A dull knife will not do at all. The cardboard is to be cut in such fashion, along the lines of the eight inside rectangles that have resulted from the markings, that eight parallel strips, $\frac{1}{2}$ " wide, and the rims top and bottom will be all

80 Per Cent. of Form Removed In Winding Cutout Coil

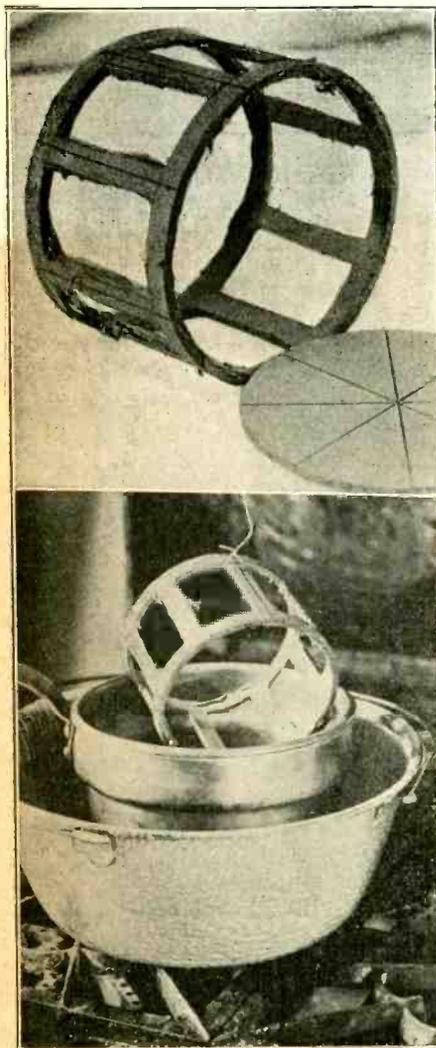


Fig. 5, the form as it looks when the cutting is completed. The circular marker is discarded. Note the jagged appearance of the stator. The form is now dipped in beeswax (Fig. 6).

that remain of the stator. The cutting should be done carefully. The knife blade is not forced all the way through, but the cardboard is sliced just deep enough to enable one to peel off a layer. Then another cut is made at the same place and another layer peeled off. (Fig. 4).

The circular cardboard originally made for marking guide is discarded. The cutting results in a form somewhat jagged in appearance (Fig. 5) but this will be remedied immediately. Use a double boiler and place in the center pot some beeswax, which is far preferable, although if you cannot get beeswax you may compromise on paraffin. The outer boiler contains water. Heat it, melting the wax. Tie a string to the cut form and, when the beeswax is molten, dip the form in it once. Thoroughly immerse the form in the wax (Fig. 6), but if there is not enough wax in the pot for that, then rotate the form in the wax until every inch of the form has been immersed. Then remove the form and hang it up until the wax hardens.

Winding the Coil

Now a neat job has been completed (Fig. 7) and the form is ready for winding with No. 22 double cotton covered wire. The winding is to be put on, half of it on either side of the shaft holes. Two small parallel holes may be drilled at top and bottom rims and the wire

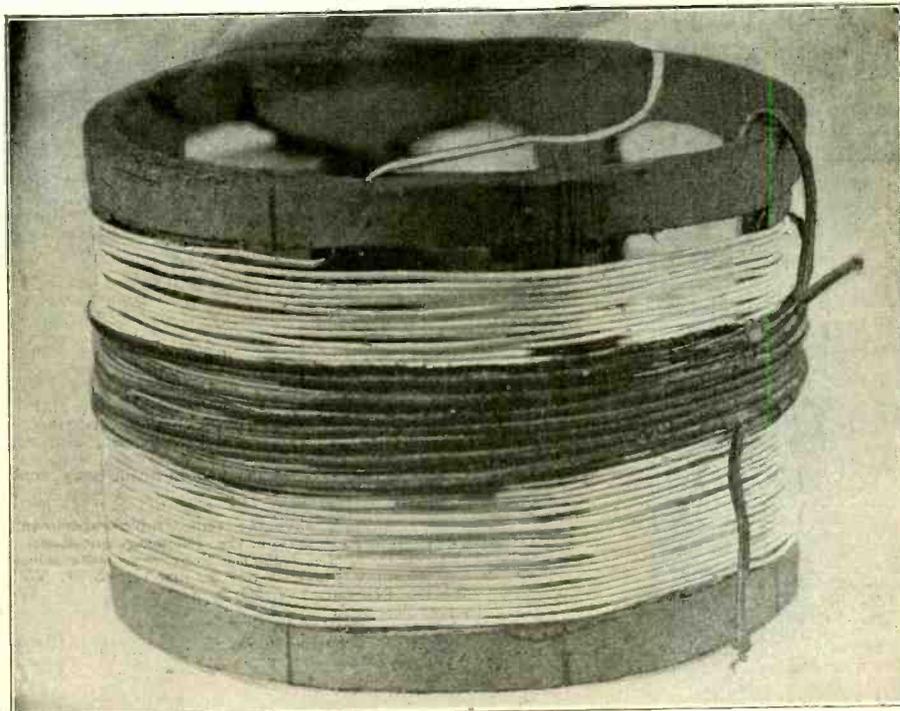


FIG. 10—The stator alone constitutes a radio-frequency transformer (Fig. 10), only the primary should not be wound in the fashion shown, since the close turns on the primary act as the plates of a condenser in respect to one another, and build up distributed capacity. In addition there is the capacity effect between the primary and secondary windings. Hence, to keep down this distributed capacity, which makes for broad tuning, use smaller wire for the primary than that shown (for instance, use No. 22) and widely space the turns on the primary.

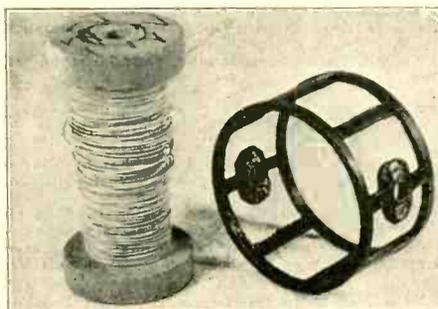


FIG. 7—Quite different in appearance is this neatlooking stator, after the beeswax has hardened. The spool next to it contains No. 22 double cotton covered wire for the primary and secondary windings.

threaded from the outside through one of the holes and from the inside through the adjacent hole, so that the wire emerges on the outside. Leave 5" slack for later connections to the set. Wind in either direction. Put on twenty-one turns on one side of the shaft hole and twenty-one on the other, making a 42-turn secondary. (Fig. 8). Anchor the end of the winding. Now, using the same kind of wire, the primary may be wound right over the secondary in the same direction, six turns being wound over one side of the secondary and six turns over the other side of the secondary, making a 12-turn primary that is widely spaced and which has a winding width, due to the large spacing, the same as that of the primary. This method of winding the primary reduces the capacity of the primary and helps keep the selectivity peak high, instead of causing it to drop, as it does in some instances where the primary is closely wound over the secondary, and each primary turn is right next to the other.

The shafts are inserted as shown in Fig. 9. Do not use a metal shaft running

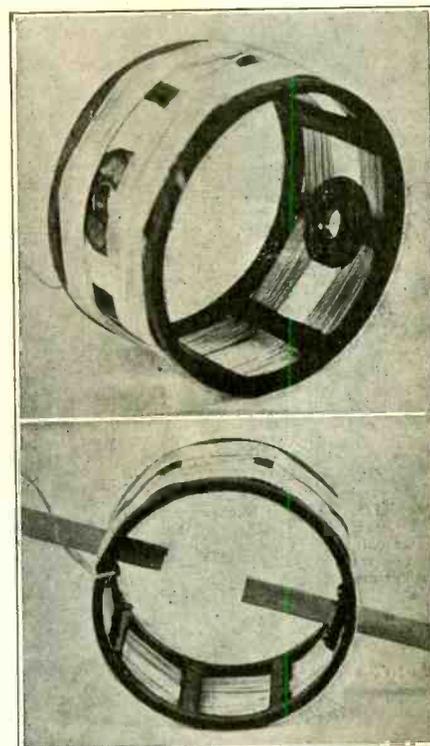


FIG. 8, the product as it looks after the secondary has been wound on it. Fig. 9 (lower) shows why it is better to use separate pieces of shafting, if metal is to be employed. If metal ran right across the field of the coil the eddy current losses would be severe.

all the way through, because that would introduce too much metal in the magnetic field of the coil, causing severe losses, due to eddy currents. However, if a bakelite rod is used it may be a solid, one-piece affair. It is possible even to use
(Concluded on page 26)

The Radio University



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

I BUILT an Ultradyne receiver as per specifications in the issue of Aug. 30. I built the I. F., the tuning and the oscillator coils myself. I procured the best parts possible, but do not seem to get the desired results. I have received PWX, WHAS, WDAF, WYR, WQS and CKY but don't understand why I can't get Colorado stations or stations to the Northwest. Can you tell me?—A. E. Ginther, Box 353, Mulberry, Kansas.

Perhaps your locations is such that stations to the West and Northwest are blocked. If other sets in the immediate vicinity of your station received the Western and Northwestern stations, you should receive them also. Are you tuning your set correctly?

WOULD one stage of RF added to the Reinartz 3-tube set, in the issue of Nov. 22 give increased DX?—J. F. Gardepe, 1419 Main St., Columbia, S. C.

Not necessarily. If you add RF to the Reinartz set it will no longer be Reinartz. We suggest that the circuit be left as it is.

I WISH to change my Ambassador set over from 199 tubes to 201A. What resistance should my rheostats be? (2) Can I use the same panel? (3) Should I still use a C battery? (4) Will the change in tubes bring the stations in much louder?—Rudolph E. Mankein, 268 S. Cortland St., E. Stroudsburg, Pa.

(1) 6-ohms each. (2) Yes. (3) Yes. (4) The chances are that it will.

HOW can I use 120-volt DC current for my set, eliminating batteries?—Henry Winkel, 195 First Avenue, New York City.

You cannot use DC as it comes from the light socket for plate supply as the hum would be annoying. However, for filament lighting it may be used to advantage. Merely insert a 50-ohm resistance in series with the line. This will deliver approximately 6 volts. Keep the B batteries for plate supply. Determine the polarity of the line by immersing both leads, after stepping the voltage down by resistance, in a glass of salt water. The lead producing more bubbles is negative.

IN REFERENCE to Tim Turkey's silk hat circuit, in the issue of Jan. 3, isn't there a mistake in the filament wiring?—Henry Spett, 746 Marcy Ave., New York City.

Yes. There should be no connection between the plate variometer return and the filament. The wiring directions in the article itself were correct.

IN REFERENCE to Caldwell's 5-tube reflex: Will this set cover both high and low wavelengths? (2) Will the set calibrate reliably, as in the Neutrodyne? (3) Do you think it will equal the Neutrodyne in selectivity? (4) How many .005 fixed condensers are used? (5) Two 4½-volt C batteries are shown. Is this correct?—Edw. Groth, 5531 So. Loomis St., Chicago, Ill.

Yes, with the correct inductance values. (2) Yes. (3) Yes. (4) One. (5) Yes.

I BUILT Lt. O'Rourke's World's Simplest 1-Tube Set, as described in the issue of Dec. 13, but I can't get a sound. I have tested everything in the set as well as the aerial and ground and everything tested out fine. Can you possibly give

me any hints to get this set percolating?—F. S. Zickles, 12 S. Ave. W., Cranford, N. J.

If wired correctly and aerial and ground are all right, only the tube, batteries or phones can be the cause of trouble.

IN YOUR estimation, what do you think is the best of all the circuits that you have published in the past year?—Murray Homler, 876 New Lots Ave., Brooklyn, N. Y.

Super-Heterodyne (or Ultradyne), Superdyne, Neutrodyne, Reflex and 3-Circuit Tuner.

AS to the 3-tube Superflex in the issue of Dec. 27, could L3L4L5 be wound on a variocoupler?—H. Q. Ten Eyck, 215 W. Goepf, St., Bethlehem, Pa.

Yes, a variocoupler arrangement may replace the Pfanstiehl coil.

IT WILL save me considerable experimenting if you can answer the following question: Do you think the Anderson Superdyne more selective than the previous one published?—E. J. Wight, 116 Belmont Ave., Ottawa, Can.

Yes.

IS IT possible to build the Superdyne as a 2-tube set, adding the AF a stage at a time, as I am able? (2) Will Meyers' tubes give satisfaction in this set?—J. N. Schwartz, Hilda, Alta.

(1) Yes. (2) Yes.

WILL Litz wire be better for winding the Superdyne coils?—Chas. O. Brubeek, 1001 W. 6th St., Beardstown, Ill.

It is very good for the Superdyne, but no better than 22DCC or 22DSC.

HOW should I build the best loop for a Super-Heterodyne? (2) Is there any issues of RADIO WORLD dealing with loops?—J. P. Campbell, Lenoir City, Tenn.

15 turns on a 24-inch frame, pancake style. (2) Aug. 30.

REGARDING Gelula's 3-tube Superflex, is a 6-ohm rheostat correct for a 201-A tube? (2) What rheostat should I use for 199? (3) I have an Ambassador coil; could I use that in place of the Pfanstiehl?—Wm. Rayfield, 149 E. 84th St., New York City.

Yes. (2) If one rheostat is to be used on the three tubes, 10 ohms. If two rheostats for three tubes, one 3 ohms, the other 20 ohms. If a rheostat is used for each tube, 30 ohms each. (3) Yes.

IN reference to the 1-tube DX Superdyne described by Herman Bernard in the issue of Dec. 20, is it possible to use a 3-circuit coupler such as the Bruno or Ambassador?—Leon Greene, 408 Hopkinson Ave., Brooklyn, N. Y.

Yes.

WHAT types of tubes do you consider best for the Anderson Superdyne?—Ernest Lindman, 128 High St., Bristol, Conn.

201-A for amplifiers; 200 for detector.

I HAVE three 15-plate variable condensers and desire to build a Neutrodyne. Can you kindly tell me how many turns to wind on the primary and secondary of the tuned RF transformers? (2) What size wire shall I use? (3) What turn

should be tapped? (4) Should the primary and secondary coils be wound in the same direction?—P. Calderella, 303 E. 157th St., New York City.

Secondary 65 turns, primary, wound right over the secondary winding, 10 turns. (2) No. 22 double cotton-covered. (3) 16th turn from the grid end. (4) Yes.

IN REFERENCE to Bernard 1-tube DX Superdyne, how many turns of wire should be used if a 23-plate variable condenser is placed in circuit?—R. C. Price, RFD 4, New Philadelphia, Ohio.

Secondary 45 turns on 3½" diameter tubing, primary wound right over the secondary, 8 turns; tickler, 35 turns; plate coil, 30 turns.

CAN you tell me where I can find a set utilizing two or three tubes for use on a loop?—Russell Schmid, Lambert, Minn.

A 3-tube loop circuit was published in the issue of Jan. 3.

RADIO WORLD'S Broadcast University

Questions and Answers on the Air Every Wednesday Evening at WGBS, the Gimbel Bros. Station, New York City.—Department Conducted by Abner J. Gelula, RADIO WORLD'S Technical Editor.

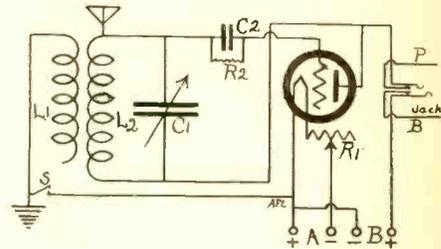


FIG. 79, a 1-dial set.

PLEASE publish a 1-dial set.—Jas. Nyc, Paris, Ky.

Fig. 79 is a 1-tube circuit using one dial.

I BUILT a Superdyne according to data published by the C. D. Tuska Co., but results are far from satisfactory. I checked up the circuit according to RADIO WORLD'S diagrams but to no avail. The best distance so far is Tarrytown, N. Y., with Newark as a close second. WHN and WGBS come in very weak. Can you possibly suggest some remedy?—Joseph D. Boyd, 882 Union St., Brooklyn, N. Y.

Look to your aerial and ground system. See that the aerial is not touching anything throughout its entire length. Lead-in connection should be soldered or well taped. Make this connection over again, cleaning the aerial thoroughly, around the connection. Ground made secure with a clamp. Test the tubes in another set. See that the batteries are up. The Superdyne calls for a soft blue tube for detector—type 200. Why not change it to RADIO WORLD'S Superdyne, described in this issue?

I CAN get all local stations in Philadelphia except WOO. Can you tell me why? I am taking the liberty of asking you through WGBS—Wm. Rolan, 5050 E. 19th St., Philadelphia.

No doubt you can't get high enough in the waveband to get 509. Add approximately 8 turns on the secondary coil, if you have an aperiodic primary. If the primary is tuned, add 8 turns to the primary as well as eight to the secondary.

WE are located in a valley. Can you tell me why I can't get DX on my Neutrodyne. I listen to your WGBS broadcasts every Wednesday at 6:45 p. m. Do you think it is location?—Wm. Pollock, Hendersonville, N. C.

If other receiving sets in your territory have trouble in getting DX no doubt it is location. On the other hand if others get DX it is doubtless in your set, aerial or ground that you must look for trouble. Let us know what the sets near you accomplish and we will advise you more fully.

Join RADIO WORLD'S University Club

and Get your own number. Put the number on your queries and they will be answered personally the same day as received.

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, and a number indicating my membership.

Name
Street
City and State

Telegraph queries will be answered collect the same day as received. Be sure to direct in your query that the answer be sent collect.

The Daddy of Them All!

Great DX, Wonderful Volume, Beautiful Signals!

A very inexpensive circuit, based on the Radiola III.

"A DANDY 1-TUBE DX SET"

By Herbert E. Hayden

In Radio World, issue of October 4. Send 15 cents or start your subscription with that number.

RADIO WORLD, 1493 Broadway New York City

Mme. Alda on Air Thursday

BROADCAST PROGRAMS

Thursday, January 15

WCBD, Zion City, Ill., 345 (C. S. T.)—Mrs. J. D. Thomas, soprano; Mrs. P. M. Larose, contralto; celestial bells; Bessie Wiedman, piano; Lois Wiedman, reader

WDAF, Kansas City, Mo., 411 (C. S. T.)—3:30 P. M., the radio trio. 5:50, marketgram, weather, time, road report. 6 reading, Miss Cecile Burton; address, the Tell-Me-a-Story Lady; Trianon ensemble. 11:45, Nighthawk Frolic.

KFDY, Brookings, S. D., 273 (C. S. T.)—8 P. M., vocal duets by Miriam Hinman and Maude DeGroc. 8:15, the State College Junior short course. 8:25, "Higher Standards for Pharmacy," by E. R. Serles. 8:35, songs by the Shower Bath Quartet. 8:45, "Home Grown Feeds for Dairy Cows," talk by T. M. Olson. 8:55, special musical numbers.

WOS, Jefferson City, Mo., 441 (C. S. T.)—8 P. M., program of operatic numbers; address on "Missouri," George A. Pickens.

WWJ, Detroit, 517 (C. S. T.)—8 A. M., setting-up exercises. 9:30, "Tonight's Dinner." 9:45, Public Health Service. 10:25, weather. 11:55, time. 3 P. M., News Orch. 3:50, weather. 3:55, market reports. 8:30, News Orch., Mme. Homer DuBard, soprano. 10, dance music. 11, News Orch.

WHAS, Louisville, Ky., 400 (C. S. T.)—4 P. M., Alamo Theatre organ, police bulletins, weather, "Just Among Home Folks," readings, news. 4:55, livestock, produce and grain market reports. 5, time. 7:30, concert by the Happy Hoosier Harmonists, International Sunday School, four-minute welfare talk, news, time.

KGO, Oakland, Cal., 312 (P. S. T.)—10:40 A. M., classroom instruction by Oakland Public Schools. 11:30, luncheon concert. 1:30 P. M., N. Y. and S. F. stock, weather. 4, Concert Orch. 6:45, stock reports, weather, S. F. produce and news. 8, "The Green Goddess," William Archer's four-act drama. 10, Henry Halstead's Orch.

KSAC, Kansas State College, 341 (C. S. T.)—12:30 P. M., reading, Osceola Hall Burr; weather; Are Baby Beef Clubs Profitable, M. H. Coe; radio question box; Fur Farming in Kansas, Roy Moore. 7:20, opening exercises. 7:30, Making Your Own Equipment, Harriet W. Allard. 7:40, Radio College Trio. 7:45, What Are Your Cake Making Problems? Mary S. Shaw.

WHN, New York City, 360 (E. S. T.)—12:30, Chas. Strickland and Orch. 2:15, Irving Cherin, songs at the piano. 2:25, "Advice to Screen Lovers." 2:30, Booker's Memphis Six. 3, Bob Miller, popular songs. 3:45, George Betts, pianist and composer. 3:55, Ray D. O'Flynn, tenor. 4:05, Olga Rossi, soprano. 4:20, Vincent D. Daniels, jazz pianist. 4:30, Loretto G. Lynch in "Tea Time Talk." 4:45, Metropolis Trio, popular songs. 5, Kansas City Five. 6:30, Vincent Catanese and Orch. 7:10, WHN Employment Broadcasting. 9:30, O'Meara Gardens Ballroom. 10, Loew's Vaudeville Headliners. 10:30, Evangelist Edmont Haines and John A. Scott, songs. 11, Connie's Inn Revue. 11:30, Interview. 12, Ted Lewis and his Orch.

WRC, Washington, D. C., 469 (E. S. T.)—6:45 P. M., Children's Hour. 7, Dinner Music. 8, "The Y. M. C. A." by Dr. George Otis. 8:30, Concert by Army Band. 9:30, Lee House Trio. 9:55, Time. 10:30, Dance music by Waldorf-Astoria.

KDKA, E. Pittsburgh, Pa., 326 (E. S. T.)—9:45 A. M., Stockman reports. 11:55, Time. 12, Weather; Stockman reports. 12:20 P. M., Institute at Trinity Church. 3:30, Quotations on hay, grain and feed. 6:15, KDKA Little Symphony Orch. 7:15, Stockman reports. 7:30, Children's Period. 8, Program by National Stockman and Farmer. 8:30, KDKA Little Symphony Orch. 9:55, Time; Weather. 11, Concert.

KYW, Chicago, 536 (C. S. T.)—6:30 A. M., Morning exercises. 9:30, News and comment of the financial and commercial markets. 10:30, Farm and home service. 11:35, Table talk by Mrs. Anna J. Peterson. 2:35 P. M., "Afternoon Frolic." 6:02, News, financial and final markets. 6:35, Children's bedtime story. 7, Joska DeBabary's Orch. 7:10, Coon, Sanders Original Nighthawks. 7:20, DeBabary's Orch. 8, "Twenty Minutes of Good Reading" by Rev. C. J. Permin. 8:20, Thomas B. Stephenson, tenor; Tommy Jacosek, harmonica; Sallie Menkes, pianist. 9:15, Talk by Chicago Motor Club. 10, "Evening at Home."

WCCO, Milwaukee, Wis., 417 (C. S. T.)—10:45, A. M., Betty Crocker, "Winter Breakfast Dishes." 2 P. M., "The Popular Concert," Agnes Fryberger. 4, "The Storm" by Konrad Bercovici. 5:30, Children's hour. 6:30, The Original George Osborn's. Russell Murphy, baritone. 7:30, feed talk. 7:45, health talk. 8, Surprise program. 10, George Osborn's Orch.

WOC, Davenport, Ia., 484 (S. T.)—10 A. M., market. 10:05, household hints. 10:55, time. 11, weather and river. 11:05, market. 12, chimes. 12:15 P. M., weather. 6:45, sports news and weather. 7, Sandmand's visit. 9, Schuster Sisters' California Orch. 11, Louis Connor and Orch.; Peter

Alda and Fleta Sing Thursday at 9 P. M.

FRANCES ALDA, wife of Giulio Gatti-Casazza, director of the Metropolitan Opera Company, and one of the leading sopranos there, will sing from WDAF and seven interconnected stations Thursday, January 15. So will Miguel Fleta, Spanish tenor. This is the second of the high-class series of broadcasts by Victor Talking Machine Company artists. The first took place January 1, when John McCormack and Lucrezia Bori sang. Tune in at 9 p. m., Thursday for stations WEAF, WCAP, WJAR, WNAC, WDBH, WGR, WFI or WCAE.

MacArthur, baritone. 12:14, Carlisle Evans and his Coliseum Orch.

WOAI, San Antonio, Tex., 385 (C. S. T.)—9:30, Jimmy's Joys Orch.

KHJ, Los Angeles, 395 (P. S. T.)—12:30 P. M., News items and music. 2:30, matinee musicale. 6, Art Hickman's Concert Orch. 6:30, Children's program. 7:45, talk on "Care of the Body," Dr. Philip M. Lovel. 8, program arranged by G. Allison Phelps. 10, Earl Burtnett's Dance Orch.

WMC, Memphis, Tenn., 500 (E. S. T.)—8 P. M., Bedtime stories. 8:30, organ program by Harry O. Nichols.

WDAR, Philadelphia, 395 (E. S. T.)—11:45 A. M., Daily almanac. 12:02 P. M., Organ recital, features from the studio, Arcadia Concert Orch. 2, Arcadia Concert Orch., Arthur Eichelberger, pianist. 4:30, Clara Zager, violinist; Gladys Zeeman, accompanist. 5, educational talks. 7:30, Dream Daddy.

WIP, Philadelphia, 509 (E. S. T.)—1 P. M., Tea Room Orch. 1:30, weather. 3, recital. 6, weather. 6:05, Art Coogan and his Club Madrid Orch. 6:45, livestock and produce market reports. 7, Uncle Wip's roll call and birthday list. 8, timely topics for motorists; talk by Gene Hugel, secretary of the Philadelphia Automobile Club. 8:15, concert by the Philadelphia Police Band. 9, The Mayflower Orch., direction of Jules Lande. 11, Harvey Marburger and his vaudeville Orch.

KSD, St. Louis, Mo., 549 (C. S. T.)—4 P. M., the home hour.

WEAF, New York City, 492 (E. S. T.)—11 A. M., musical program and talks to housewives, market and weather. 4 P. M., Harry Brown, violinist; Mabel Krugth from Columbia University. 6, dinner music, mid-week services, lecture from Columbia University on Contemporary English Fiction; "Touring," George Cooley; 9, Frances Alda and Miguel Fleta. 10, Vincent Lopez Orch.

KOA, Denver, Colo., 323 (M. S. T.)—1 P. M., N. Y. stock reports, livestock, fruit and vegetable, and weather. 6, final reading, stock reports, livestock, vegetables and late news.

WOR, Newark, N. J., 495 (E. S. T.)—7 A. M., morning gym class. 2:30 P. M., Eugene Moses, blind pianist. 2:45, to be announced. 3, Frank S. Tolman, M. D., on "Psycho-Analysis." 3:15, Eugene Moses. 3:30, recital by Lelia Brown, soprano; Edwin Rainey at the piano. 6:15, Albert E. Sonn, "Radio for the Layman." 6:30, Tom Cooper's Country Club orch.

WOO, Philadelphia, 509.9 (E. S. T.)—11 A. M., grand organ. 11:30, weather. 11:55, time. 12, Tea Room orch. 4:40 P. M., police reports. 4:45, grand organ and trumpets. 9:55, time.

Friday, January 16

WDAF, Kansas City, Mo., 411 (C. S. T.)—3:30 P. M., the Radio Trio. 5:50, marketgram, weather, time and road report. 6, address, speaker from the Kansas City Children's Bureau; the Tell-Me-a-Story Lady; music, the Trianon ensemble. 11:35, Nighthawk Frolic.

WOS, Jefferson City, Mo., 441 (C. S. T.)—8 P. M., musical program.

WWJ, Detroit, 517 (C. S. T.)—8 A. M., setting-up exercises. 9:30, "Tonight's Dinner." 9:45, Public Health Service. 10:25, weather. 11:55, time. 3 P. M., News Orch. 3:50, weather. 3:55, market reports. 8:30, News Orch., Anne Campbell, poet.

WHAS, Louisville, Ky., 400 (C. S. T.)—4 P. M., Alamo Theatre organ, police bulletins, weather forecast, "Just Among Home Folks" readings, news. 4:55, livestock, produce and grain market reports. 5, time. 7:30, concert, talk by George Colvin, news. 4, Selections played on the Alamo Theatre organ, police bulletins, weather, "Just

Among Home Folks," readings, news. 4:55 livestock, produce and grain market reports. 5, time. 7:30, concert by "Dix" Bluegrass Serenaders; reading, Mrs. Frances Carre; news, time.

KGO, Oakland, Cal., 312 (P. S. T.)—11:30 A. M., luncheon concert. 1:30 P. M., N. Y. and S. F. stock reports and weather. 3, studio musical program and speaker. 4, Concert Orch. 5:30, the Girls' all Hour. 6:45, stock reports, weather, S. F. produce and news.

KSAC, Kansas State College, 341 (C. S. T.)—12:30 P. M., tuning in piano selection; reading, Osceola Hall Burr; weather; Why Alfalfa Fails in Eastern Kansas, E. B. Wells; radio question box; Abortion Disease of Cattle, E. J. Frick. 7:20, opening exercises. 7:30, lecture on music, Ira A. Pratt. 7:40, musical numbers, Department of Music. 7:45, lecture on music, Ira A. Pratt.

WDAF, Kansas City, Mo., 411 (C. S. T.)—3:30 P. M., the Star's Orch. 5:50, marketgram, weather, time, and road report. 6, address, Robert W. Babson; the Tell-Me-a-Story Lady the Trianon ensemble.

WWJ, Detroit, 517 (C. S. T.)—8 A. M., setting-up exercises. 9:30, "Tonight's Dinner." 9:45, Public Health Service bulletin. 10:25, weather. 11:55, time. 3 P. M., News Orch. 3:50, weather. 3:55, markets.

WHN, New York City, 360 (E. S. T.)—2:15 P. M., Richard Hitter's Orch. 2:45, Robert Lee Keith. 2:55, Avon String Trio. 3:45, serial story by Wm. J. Stuart. 4, Archie Harrold's Jubilee Singers. 4:20, Kathryn Behnke, contralto. 4:30, Bert Dixon and Elmo Russ, popular songs. 4:45, Uncle Robert's Chat to Children. 5, Alja and his Orch. 6:30, Vincent Catanese and his Hotel Alamac Orch. 7, Harry Hichman and his Entertainers. 9:30, Dan Gregory and his Crystal Palace Orch. 10, fashion chats by Mme. Belle. 10:10, Bob Miller, popular songs. 10:25, "Storage Batteries" by H. B. Shontz. 10:30, Roseland Dance Orch. 11, Vanity Club Revue. 11:30, Sam Wooding and his Club Alabam Orch. 12, Ted Lewis and his Parody Club Orch.

WRC, Washington, D. C., 469 (E. S. T.)—4 P. M., fashion developments by Eleanor Gunn. 4:10, piano recital by Eleanor Glynn. 4:20, "Beauty and Personality" by Elsie Pierce. 4:30, Meyer Davis' Trio. 6, children's hour by Peggy Albion.

KDKA, E. Pittsburgh, Pa., 326 (E. S. T.)—7 A. M., morning exercises. 8, morning exercises. 9:45, stockman reports. 11:55, time. 12, weather, stockman reports. 12:20, Sunday School lesson. 3:30, quotations on hay, grain and feed. 6:15, dinner concert. 7:15, stockman reports. 7:30, children's period. 8:15, "The Modern Attitude Toward New Truth" by Dr. Mont R. Gabbert. 8:30, concert by the Star Electric Quartet. 9:55, time, weather, hockey scores, basketball scores.

KOB, State College, N. M., 360 (C. S. T.)—7:30 P. M., Doctor Gilmer, address; Mr. Hauter, address.

KYW, Chicago, 536 (C. S. T.)—6:30 A. M., morning exercises. 9:30, late news and comment. 11:35, table talk by Mrs. Anna J. Peterson. 6 P. M., news, financial and final markets, Dun's, Bradstreet's Weekly Review. 6:35, children's bedtime story. 7, Joska DeBabary's Orch. 7:10, Coon, Sanders Original Nighthawks. 7:20, Joska DeBabary's Orch. 8, speeches; "Agriculture a Decade Hence," H. B. White "High Lights at Farmers' Week" by A. C. Page. 9, Midnight Revue. 11, Midnight Revue continued.

WCCO, Milwaukee, 417 (C. S. T.)—10:45 A. M., Betty Crocker, "Nutritious Beverages." 2 P. M., Community Fund talk. 2:30, Nankin Cafe Orch., Hal Keller, leader. 4, "Denleigh Follows Doctor's Advice" by Eleanor Hollowell Abbott. 5:30, children's hour. 6, sport talk. 6:30, dinner concert, Mpls. Athletic Club Orch., C. Eddy Fortier, leader. 7:30, Red River Valley Winter Shows, C. G. Selvig. 8:30, Albert Lea Night.

KHJ, Los Angeles, 395 (P. S. T.)—12:30 P. M., program presenting Perry's Orch. 2:30, matinee musicale; Grace Currey, harpist; George Hood, reader; Mary Newkirk Bower, soprano. 6, Art Hickman's Concert Orch. 6:30, children's hour. 8, program courtesy John Wright. 10, Earl Burtnett's Dance Orch.

WMC, Memphis, Tenn., 500 (E. S. T.)—8 P. M., bedtime stories. 8:30, Britling's Orch. 11, Midnight Frolic.

WDAR, Philadelphia, 395 (E. S. T.)—11:45 A. M., daily almanac. 12:02 P. M., organ recital, Arcadia Concert Orch. 2, Arcadia Concert Orch., playlet. 4:30, Blue Ridge Serenaders. 7:30, Dream Daddy. 8, a book review. 8:10, "Fifteen Minutes With Sam Wingfield." 10, meeting of the Morning Glory Club. 1, features.

WIP, Philadelphia, 509 (E. S. T.)—1 P. M., luncheon music by the Gimbel Tea Room Orch. 1:30, weather. 3, "A Diet for Anaemics" by Mrs. Anna B. Scott. 3:15, Holmes Junior High School Orch. 6, weather. 6:05, popular numbers. 6:15, dinner music by Harvey Marburger and his Vaudeville Orch. 6:45, livestock and produce market reports. 7, Uncle Wip's bedtime story, roll call and birthday list.

KSD, St. Louis, Mo., 549 (C. S. T.)—8 P. M., program by members of the Christian Church Quartet; address on the total eclipse of the sun by Msgr. Martin S. Brennan.

KFAE, Pullman, Wash., 330 (P. S. T.)—7:30 P. M., soprano solos, Vera Bohlke, Grandview; readings, Virginia Crites; piano solos, Ethel Wood, Palouse; hog prospects for 1925, C. M. Hubbard; "Present Tendencies in Auto Design," A. C. Abell; essentials of Successful Farm Man-

(Continued on page 18.)

Radio Ice-Yachters

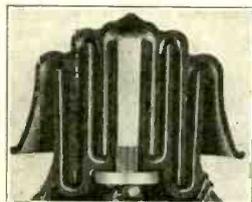


A **HARDSHIP** indeed is this. Ice yachting at Lake Placid, N. Y., exposes one to the chill winds. True, a set and speaker are aboard, a concealed loop feeding the radio currents to the Super-Heterodyne. But sitting in a warm (even stuffy) office is much more comfortable, don't you think? Dissenting votes cast by DeWolf Barton (left), whose ice yacht is one of the most active craft in the Adirondacks; and his passengers, Virginia Markel, Cambridge, Mass.; Dorothy Knoepke, South Orange, N. J.; Patricia Schmidt, New York City, and Eloise Thompson, New Haven. (Underwood & Underwood)



RADIO has an interest in the frying pan. The young lady shown above is using the kitchen utensil as a loudspeaker. The aluminum pan seems to give an unusual amount of volume. The phone is held in front of the pan and the volume reflected. This contrivance need not necessarily be limited to the frying pan. A glass or wooden bowl serves the purpose as well. Of course no loud speaker increases the actual amplification. It merely reproduces the output in volume. A 2-stage amplifier is usually required to produce enough power to actuate a loudspeaker, although, if you are located near a broadcasting station the output of a 1-tube regenerative detector may be enough. No makeshift equals a real speaker.

Filter Speaker Invented, Distortion is Trapped



CROSS-SECTION filter speaker, invented by Harry A. Hall, of Chicago, which passes the audio currents through seven tubings formed by the contour of the interior. The total distance the audio currents cover in their course from the input to the output of the speaker is 42".

(Underwood)

A **SPEAKER** has been patented by Harry A. Hall, of Chicago, which is non directional, thereby eliminating the necessity of facing the speaker in any particular direction, and which embodies acoustic ideas along the lines of internally refracted sound, by filtering. Seven tubings are formed by the internal structure, which is rather intestinal in design. A cross-section shows the adherence to the bell idea for most effectively distributing the sound waves. The rim of the bell is shown at the bottom of

the photo, left and right. Thus it is clear how the sound waves are emitted in all directions equally, after passing through the 42" of tubing length. The speaker is said to produce excellent tonal quality. The connections from the set are made in conventional fashion. The cord tips are shown at extreme right, bottom, in the photo. Distortion effects are said to be absorbed in the tubing; thus their escape (or reception from the speaker) is prevented, says the inventor.

Germany's Challenge



IN the front row, center, left to right, are State Secretary Von Bredow, Professor Braun, of Germany, attending the opening of the new hall erected for the exposition opened the structure. (Gilliams.)

BERLIN. WITH imposing ceremonies a new hall was opened, dedicated exclusively to radio research. So important was the event considered that President Ebert and his Cabinet attended. The opening of the radio hall was everywhere accepted as Germany's bid for "a place in the sun" so far as radio is concerned. The Germans, scientific by mind and nature, are taking to radio research with great avidity. The radio progress achieved by the United

States, the radio league spurred on the German launching what is world supremacy they are, at the moment it is pointed out the search institute of radio is something to boast of, while the such an institution that the nearest the institute is the State

Theatre Managers' Restriction

Complain That Music Is Broadcast While the Shows Are Running and Their Business Is Hurt—Washington Cold to Suggestion of Restriction.

LOPEZ STAYS ON AIR

Replies to Suggestion Contract with a Vaudeville Circuit Fell Through Because He Insisted on Continuing Broadcasts.

STEPS to prevent the broadcasting of music from current productions will be taken by the managers, according to a statement made by Arthur Hammerstein, president of the Managers' Protective Association.

"This practice must be reformed at once," he said, "and our association will take the necessary steps to see that it is done. About ninety-nine out of every one hundred composers have contracts with their publishers by which the latter control the copyrights. These publishers now turn the music over to the big radio stations, and they broadcast the scores of

our shows at the time they are being produced.

Manager

Mr. Hammerstein's position that no composer retained control of his work so that radio companies were prohibited from putting Lawrence Weber, of the Vaudeville Circuit, said at the time contracts with play clauses prohibiting the without permission.

"The present scare said Mr. Hammerstein to the introduction of pictures and will have a commodity neither the moving picture replace the theater, hear and see the art

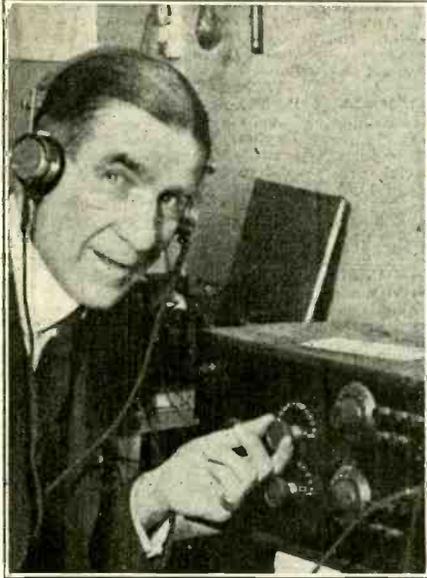
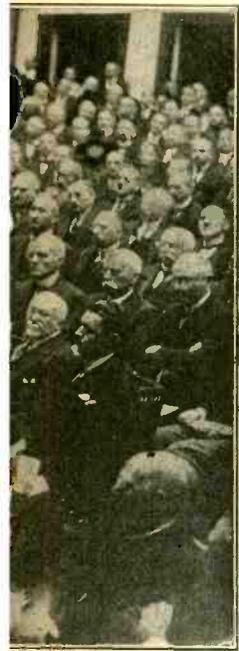
Lopez

There was discussion over a story between a vaudeville Lopez's Orchestra because Lopez had an arrangement for the Pennsylvania Hotel.

ange

Corbett at 58

Heard by 6,000,000!

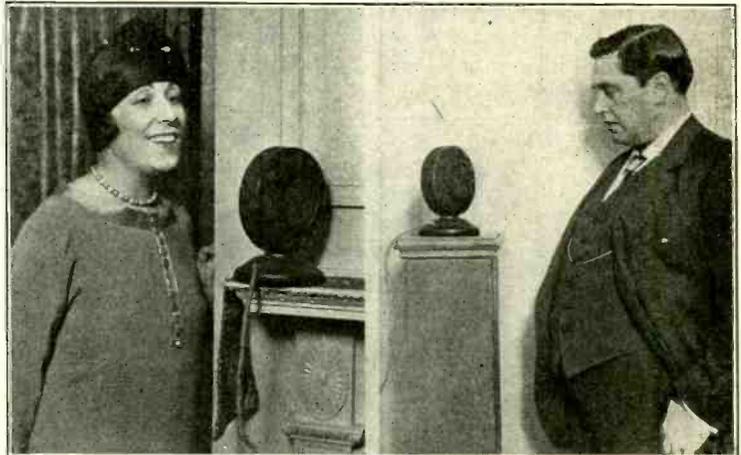


JIM CORBETT tuning in. (Fotograma.)

Ex-Boxer's Philosophy

JIM CORBETT takes mental exercise together with his calisthenics. Although he looks no more than 40 he is 58. He has decided to quit the stage where he has been a success, and take the platform as a health lecturer, telling the people how to keep young, giving personal recipes on the subject. He will broadcast talks.

Mr. Corbett's health prescription consists of a clear conscience, a generous heart, temperance, faith in a hereafter, and a Merciful Deity, plus a reasonable amount of vigorous exercise.



MCCORMACK and Bori broadcast to 6,000,000 people. His wife and daughter listened to McCormack from their N. Y. City home. (Kadel & Herbert)

ident Ebert and Minister radio research. A great

nder of the world, has Germans, and they are regarded as a bid for n radio. Admittedly ment, far behind, but at a great official re- vevoted exclusively to which Germany can e United States lacks . It is believed here ng to an official radio irdards Bureau.

ers Scared, Seek on Radio

ame time the shows throughout the coun-

Angered

added he felt sure the on would take the tracts would be made he future unless they their copyright rights anies could be pro- them on the air. L. official of the asso- ame time that future ers would contain a em from broadcasting

"I would not give up broadcasting for anything," said Lopez when asked about this. "The radio will be the means of developing the musical education of America. I am so much interested in this subject that I have already started a school of music for teaching piano by radio and correspondence, and I broadcast a lesson to the pupils once a month myself."

Restriction Opposed

WASHINGTON.

SENATOR DILL, of the State of Washington, echoes the sentiments of administration authorities in opposing radio restriction. He said:

"Radio is a new art that has the possibilities of educating the masses of the people. It may interfere with theaters but why should the government kill a new and wonderful art because it empties a few theater seats?"

"America has from four to six times as many radio listeners per capita as any other nation. This is because we have kept radio free from licenses. In Germany, the receivers must rent their sets from the government. Such a condition never should and never could come to pass in America."

Effect of Eclipse to Get Test from Four Stations

WASHINGTON.

RADIO fans are invited to listen in during the period of the Solar Eclipse between 8 and 10 a. m., Eastern Standard Time, on January 24, and report to the Bureau of Standards its effect on reception.

The effects of the eclipse on radio transmission and reception will be closely watched by experts at the Bureau of Standards and at a number of Laboratories all over the country. Four stations (WBZ Springfield, Mass.; WEAJ New York; WGY Schenectady, and WGR Buffalo), which will be in the path of total eclipse, will transmit special signals for observation purposes.

These special signals will be transmitted between 7:30 and 11 a. m. on five days, from the 22nd to 26th inclusive, for test purposes. In other words, the signals on the 24th during the eclipse will be checked and compared with

those on the other four days. It is hoped by experts that the tests during the eclipse will lay the foundation for a concentrated and intense study of fading, interference and other atmospheric disturbances which affect radio transmission and reception, with a view to perfecting apparatus to overcome these conditions.

Credit for initiating the movement to observe radio signals during the eclipse is given to Dr. G. W. Pickard, consulting engineer, of the Wireless Specialty Apparatus Co., by Dr. J. H. Dillinger, chief of the Bureau of Standards Radio Laboratory. Dr. Dillinger and his staff are co-operating to the fullest extent in this work and consider it of high value. Dr. Dillinger said:

"The solar eclipse will be the occasion of scientific observations of various types in many laboratories."

Much interest is manifested.

among the theaters," ein, "can be likened of the first moving soon pass. We still he public wants, and pictures nor radio can where you can both ist."

Stands Pat

ission in vaudeville that a contract be- circuit and Vincent ad fallen through be- fused to give up his oadcasting from the

Hookups at WGBS Friday

Programs

Friday, January 16
(Continued from page 15)

agement, Geo. Severance; chat on new books, Alice L. Webb.

WEAF, New York City, 492 (E. S. T.)—11 A. M., musical program and talks, market and weather. 4 P. M., Anna Pizzicara, soprano; French lessons, children's stories. 6, dinner music, Jack Albin's Orch., stories for children by Blanche Wade, Nancy McCord, soprano; The Happiness Candy Boys; Hohner Harmony Hour; concert by the United States Navy Band; Irving Firstenberg, pianist; Meyer Davis' "Lido Venice" Orch.

KOA, Denver, Colo., 323 (M. S. T.)—1 P. M., N. Y. stock reports, livestock, fruit and vegetable report and weather. 6, final reading, stock reports, livestock, vegetables and late news. 6:40, Book of Knowledge program. 8, piano solos; contralto solos, June King; tenor solos, Ralph Freese; readings, Mary Randolph; address, "Are We Unprepared for War?" by Col. K. C. Masteller, "The End of the Way," by Gene Cannon and Clarence Kessler and Italian dialect, sketches by Edna M. Sprague.

WOR, Newark, N. J., 405 (E. S. T.)—7 A. M., Wor morning gym class. 2:30 P. M., Francis Pehl, pianist. 2:45, tenor solos by Francis Pangrac. 3, Allan R. Cullimore, on "How the Boss Should Act." 3:15, Mme. Pangrac, pianist. 3:30, tenor solos by Francis Pangrac. 3:45, Adolph Lewisohn, philanthropist, "National Thrift Week" opening. 6:15, Wallie Osborn's orch. 6:30, "Man in the Moon" stories. 7, Wallie Osborn's orch.

WOO, Philadelphia, 509 (E. S. T.)—11 A. M., grand organ. 11:30, weather. 11:55, time. 12, Tea Room orch. 4:40 P. M., police reports. 4:45, grand organ and trumpets. 7:30, police reports; A. Candelori and orch. 8:15, rally exercises; address by Dr. Russell H. Conwell. 9:55, time. 10:02, weather. 10:30, Vincent Rizzo and orch.

WGBS, New York City, 316 (E. S. T.)—6:30 P. M., RADIO WORLD'S Broadcast University; radio hookups, by Abner J. Gelula, Technical Editor.

Saturday, January 17

WHN, New York City, 360 (E. S. T.)—2:15 P. M., Victor Dietz, jazz pianist. 2:25, Michael Barile, electrician; 2:35, Vladimir Tobachnik, baritone. 2:45, Triangle Syncopators. 3:45, Ellen Montague Cross Concert Co. 4:05, Evangelist Edmont Haines and John A. Scott, cornet, singing and piano. 4:15, William Spence, tenor. 4:25, Burton Levy, child pianist. 4:40, Fain and Cross, harmony singers. 4:50, Mary Felsen, soprano. 5, Harry Moss and his orch. 6:30, Vincent Cantanes and his Hotel Alamac Orch. 7:30, Hotel Carlton Terrace Orch. 8, Arthur Stone, blind pianist. 8:10, A. J. Kohler, harmonica soloist; 8:20, Philip J. Cortese, tenor. 8:30, Strand Roof Entertainers. 9, Ed. F. Kruse, tenor, popular and classical songs. 9:10, Alfred Dulin, concert pianist. 9:20, Juvenile Violin Quartet conducted by Prof. Santo Mineo. 9:45, Jimmy Flynn, dramatic tenor. 10, Metropolis Trio, popular songs. 10:30, Harry Natter's Orch. 11, Jimmy Clarke and his Entertainers. 11:30, Roseland Dance Orch.

WRC, Washington, D. C., 469 (E. S. T.)—6:45 P. M., children's hour conducted by Peggy Albion. 7, Orch. 8, Bible talk. 8:45, "An Ear Test for Radio Fans." 9:15, Canadian Club Dinner. 10:30, Astor Hotel Orch. 11:15, organ recital by Otto Beck.

KDKA, E. Pittsburgh, Pa., 326 (E. S. T.)—9:45 A. M., stockman reports. 11:55, time. 12, weather. 1:30, concert by Daugherty's Orch. 6, Westinghouse Band, T. J. Vastine, conductor. 7:30, children's period. 8:30, concert by the Westinghouse Band, T. J. Vastine. 9:55, time, weather, hockey scores.

KYW, Chicago, 536 (C. S. T.)—6:30 A. M., morning exercises. 9:30, late news and comment of the markets. 10:30, farm and home service. 11:35, table talk by Mrs. Anna J. Peterson. 6:02-6:18 P. M., news, financial and final markets. 6:35, children's bedtime story. 7, Joska DeBabary's Orch. 7:10, Coon, Sanders Original Nighthawks. 7:20, Joska DeBabary's Orch. 8, musical program. 9:05, Youth's Companion. 9:35, "Congress Classic." 12, "Congress Carnival."

WCCO, Milwaukee, 417 (C. S. T.)—10:45 A. M., Betty Crocker, "Party Plans." 7 P. M., Silent Hour. 8, "Fireside Philosophies," Rev. Roy L. Smith. 8:30, Kiwanis Mixed Quartet. 10, Minneapolis Athletic Club Orch.

WOC, Davenport, Ia., 484 (C. S. T.)—10 A. M., market. 10:05, household hints. 10:55, time. 11, weather and river. 11:05, market. 11:10, agricultural bulletins. 12, chimes. 12:15, weather. 12:17 markets. 6:45, sport news and weather. 7, Sandman's Visit. 7:30, Discussion of the International Sunday School Lesson. 9, Louis Connor and Orch.; Peter MacArthur, baritone.

KHJ, Los Angeles, 395 (C. S. T.)—12:30 P. M., news items and music. 2:30, matinee musicale. 6, Art Hickman's Concert Orch. 6:30, Children's hour. 8, program courtesy Merchants' Tailors' Association. 10, Burnett's Orch.

WMC, Memphis, Tenn., 500 (E. S. T.)—8 P. M., bedtime stories. 8:30, Memphis Plectrum Orch.

WDAR, Philadelphia, 395 (E. S. T.)—11:45 A. M.,

daily almanac. 12:02, organ recital, features from the studio, Arcadia Concert Orch. 2, Arcadia Concert Orch.; Caroline Sherman Johnston, soprano; Marcella North, pianist. 4:30, dance program by the Cotton Pickers. 7:30, Arcadia Concert Orch.

WIP, Philadelphia, 509 (E. S. T.)—1 P. M., organ recital. 1:30, weather. 3, Dal Ruch and his Arcadians. 6 P. M., weather. 6:05, St. James Orch. 6:45, livestock and produce market reports. 7, Uncle Wip's bedtime story. 8, special program from University of Pennsylvania. 10:05, Art Coogan and his Club Madrid Orch. 11:05, organ recital.

KSD, St. Louis, Mo., 549 (C. S. T.)—8 P. M., concert by St. Louis Symphony Orch.

WEAF, New York City, 492 (E. S. T.)—4 P. M., Dart's Brooklake Orch.; dinner music; Gedney and Magee, banjoists; "Thrift"; Ethel Zabriskie, contralto; Cathedral Choral Club; Harry Jentes, pianist; Uniform Firemen's Entertainment.

KOA, Denver, Colo., 323 (M. S. T.)—1 P. M., N. Y. stock reports, livestock, fruit and vegetable report; weather. 9, Joe Mann and his Rainbow Lane Orch.

WOR, Newark, N. J., 405 (E. S. T.)—7 A. M., WOR morning gym class. 2:30 P. M., Cliff Club orch. 3:15, Virginia Parkinson Wells, violinist. 3:30, Grace Kellogg Griffith, novelist. 3:45, Virginia Parkinson Wells. 6:15, Henry Jedel's Hotel Riviera orch. 8, Trinity Cathedral choir. 8:30, Mrs. Wisansky, Leonore Oppenheimer, Mary Boyle. 9, Trinity Cathedral choir. 9:30, Signor A. Buzzipiccia, coach and composer. 10, Robert E. Welsh, editor, "Motion Picture World," on "Films of Today." 10:15, Zo Eliot, composer. 10:35, Jimmie Clark's Whiteway Entertainers.

WOO, Philadelphia, 509 (E. S. T.)—11 A. M., grand organ. 11:30, weather. 11:55, time. 12, Tea Room orch. 4:40 P. M., police reports. 4:45, grand organ and trumpets. 9:55, time. 10:02, weather.

Sunday, January 18

WOAI, San Antonio, Tex., 385 (C. S. T.)—11 A. M., services. 7:30 P. M., services. 9:30, The Montebanks.

WIP, Philadelphia, 509 (E. S. T.)—4 P. M., services. 7:15, evening service. 9:30, Ben Stad and his WIP Symphony Orch.

KGO, Oakland, Cal., 312 (P. S. T.)—11 A. M., service. 3:30 P. M., KGO Little Symphony Orch. 8, service.

WLW, Cincinnati, O., 423 (C. S. T.)—9:30 A. M., school. 11, services, Dr. Frank Stevenson; organist, J. Warren Ritchey; mixed quartet. 7:30 P. M., services, Dr. Frederick McMillan. 8:30, concert by the Western and Southern orch.; George Muhlhauser, tenor.

WHO, Des Moines, Ia., 522.3 (C. S. T.)—11 A. M., church sermon by Dr. C. S. Medbury.

WCAE, Pittsburgh, Pa., 462 (E. S. T.)—10:45 A. M., services. 3 P. M., People's Radio Church. 4, piano, Prof. Otto Kaites. 6:30, dinner concert.

KPO, San Francisco, 423 (P. S. T.)—11 A. M., Church, the speaker, Dr. Frank Boyd; Harry Bullard, baritone, organ by Theodore J. Irwin. 8:30 P. M., Rudy Seiger's Fairmont Hotel Orch.

Monday, January 19

WDAF, Kansas City, Mo., 411 (C. S. T.)—3:30 P. M., program from theatres. 5, weekly Boy Scout program. 5:50, marketgram, weather, time and road. 6, C. H. Cheney, "Banking"; children's story; Trianon Ensemble. 8, "Around the Town with WDAF." 11:45, The "Merry Old Chief."

KGO, Oakland, Cal., 312 (P. S. T.)—9 A. M., music and lectures. 11:30, concert. 1:30 P. M., N. Y. and S. F. stock; weather. 3, musical program; speaker. 4, Henry Halstead's Dance Orch. 5:30, Aunt Betty stories. 6:45, stock reports, weather, S. F. produce news, and news. 8, music by Arion Trio; "The Value of Vocational Education," Professor H. M. Skidmore; "A Lesson in English," Wilda Wilson Church; "The Parent as Teacher," Dr. Aurelia Henry Reinhardt; "Chats About New Books," Joseph Henry Jackson. 10, Henry Halstead's Orch.

WFAA, Dallas, Tex., 476 (C. S. T.)—12:30 P. M., address, Dr. A. D. Laugenour. 8:30, Old Fiddlers.

WMC, Memphis, Tenn., 500 (E. S. T.)—8 P. M., Bedtime. 8:30, Gayoso Hotel Orch.

KFAE, Pullman, Wash., 330 (P. S. T.)—7:30 P. M., Women's Glee Club; talk, Dr. C. W. Stone, education department; Nutrition School Program, Miss Mary Sutherland; important points in poultry raising, J. S. Carver; opportunities in electrical engineering, Prof. R. D. Sloan.

WLW, Cincinnati, O., 423 (C. S. T.)—8 A. M., "Setting Up" exercises. 10:45, weather and business reports. 12:15 P. M., Williamson entertainment and review. 1:30, business reports. 3, market reports. 4, Babson reports. 6, Selensky instrumental quintet. 8, The Times Star orch; Hans Meuser, bassoon; Rene Corne, oboe; Herman Goehlich, piano; Howard Hafford, tenor.

WHO, Des Moines, Ia., 522.3 (C. S. T.)—12 Midnight, organ recital.

WHO, Des Moines, Ia., 522.3 (C. S. T.)—7:30 P. M., Thelma Morrow, xylophone; Mrs. Kate Miller, whistler; Mrs. Maude Hughes, soprano soloist. 8, classical program.

KPO, San Francisco, 423 (P. S. T.)—7 A. M., Setting-up exercises. 11, "Home Making." 11:50, market report. 12, time. 1 P. M., Rudy Seiger's Orch. 5:30, children's hour, Yodeling by "Topy" McCune. 7, Rudy Seiger's Orch. 8, organ recital by Theodore J. Irwin; bass soloist, Alick G.

Sherriffs. 9, Ada Barton, soprano; "Better Lighting" by H. C. Barnard; tenor, William H. Conway; Theodore J. Irwin, accompanist; piano solo, Peter Hansen. 10, E. Max Bradfield's Versatile Band.

WCAE, Pittsburgh, Pa., 462 (E. S. T.)—12:30 P. M., news, weather. 4:30, stock market; The Sunshine Girl. 6:30, dinner concert. 7:30, Uncle Kaybee. 7:45, address. 8, music chat. 8:15, silent. 8:30, musical program. 10, silent. 10:30, concert by artists and orch.

Tuesday, January 20

KGO, Oakland, Cal., 312 (P. S. T.)—11:30 A. M., concert. 1:30 P. M., N. Y. and S. F. stock; weather. 4, orchestra. 6:45, stock reports, weather, S. F. produce news, news. 8, Fusa Donahoo's Orch.; Ida Palmer Walker, soprano; Mildred Berg, pianist; Edwin Heinsohn, baritone; David Rosebrook, cornetist; address, "The American Service Club Movement," Carlos G. White; Lloyd Kramer, pianist; Hawaiian Selections for Steel Guitars.

WDAF, Kansas City, Mo., 411 (C. S. T.)—3:30 P. M., the radio trio. 5, child talent program. 5:50, marketgram, weather, time and road. 6, The Tell-Me-a-Story Lady; radio piano lessons, Maudellen Littlefield; Trisnon Ensemble. 11:45, Nighthawk Frolic.

WFAA, Dallas, Tex., 476 (C. S. T.)—12:30 P. M., address by Charles E. Osborne; music. 8:30, Mrs. D. A. Little and Mrs. Sam Harwell. 11, organ recital, Dwight Brown.

WOAI, San Antonio, Tex., 385 (C. S. T.)—8:30 P. M., Russian composers; instrumental music. 9:30, Jimmy's Joys Orch.

WMC, Memphis, Tenn., 500 (E. S. T.)—8 P. M., Bedtime Stories. 8:30, program by Clemence Warner. 11, Midnight Frolic.

WLW, Cincinnati, O., 423 (C. S. T.)—8 A. M., "Setting Up" exercises. 10:45, weather and business reports. 12:15 P. M., Delta Omicron Sorority; Woody Meyer's orch. 1:30, business reports. 3, market reports. 4, pupils of William Kyle in recital; "Mah Jongg" by Lucy Blackburn; piano solos by Laura Edith Frech. 6, Selensky instrumental quintet. 10, Orio Rubber male quartet and instrumental trio; accordian, by Lawrence Springer; Keefer-Kocker orch.

WCAE, Pittsburgh, Pa., 462 (E. S. T.)—12:30 P. M., news, weather. 4:30, stock market reports; The Sunshine Girl. 6:30, dinner concert. 7:30, Uncle Kaybee. 7:45, address. 8, silent. 8:30, concert by John Wesley. 9, concert by the Everready entertainers. 10, concert by the Goodrich Silvertown Cord orch.

KPO, San Francisco 423 (P. S. T.)—7 A. M., setting-up exercises. 11:50, market report. 12, time. 1 P. M., Rudy Seiger's Orch. 4:30, Rudy Seiger's Orch. 5:30, children's hour. 7, Rudy Seiger's Orch. 8, program under the auspices of the Villa Moret dialogues on "Thrift." 9, Victor Vogel, bass. 10, E. Max Bradfield's Versatile Band.

Wednesday, January 21

WFAA, Dallas, Tex., 476 (C. S. T.)—12:30 P. M., musical and feature program.

WDAF, Kansas City, Mo., 411 (C. S. T.)—3:30 P. M., the radio trio. 5:50, marketgram, weather, time and road. 6, speaker; address-speaker; Tell-Me-a-Story Lady; Trianon Ensemble. 8, classical music.

KGO, Oakland, Cal., 312 (P. S. T.)—11:30 A. M., concert. 1:30 P. M., N. Y. and S. F. stock and weather. 3, musical program. 4, concert orch. 6:45, stock reports, weather, S. F. produce news, and news.

KFAE, Pullman, Wash., 330 (P. S. T.)—7:30 P. M., banjo duets, Erle Hannum, Wenatchee, and Ingwald Henneberg; bass solos, E. W. Thorpe; piano solos, Phyllis Benefiel; How to Read a Newspaper, Joe Ashlock; Pointers on Dairy Farming, Prof. E. V. Ellington; Fruits for the Home Orchard, M. D. Armstrong; Radio Talk, "Condensers," Dean H. V. Carpenter.

WLW, Cincinnati, O., 423 (C. S. T.)—8 A. M., "Setting Up" exercises. 10:45, weather and business reports. 12:15 P. M., Mu Phi Epsilon Sorority; Ahaus Brunswick Shop orch. 1:30, business reports. 3, market reports. 4, program for the "Shut Ins." 6, Selensky instrumental quintet. 8, harp solos by Geraldine Vito, age 9 years; William Stoess, violin; Arthur L. Knecht, cello; Rosemary Ellerbrock, piano; choir of the Latonia Christian Church; Clifford Lang, pianist. 9, concert and entertainment by the Formica orch.; special studio attraction; Emma George Head, danseuse.

WHO, Des Moines, Ia., 522.3 (C. S. T.)—6:30 P. M., Reese-Hughes orch. 7:30, The Bankers' Life radio orch. 9, Mr. J. H. Lyman, pianist.

WCAE, Pittsburgh, Pa., 462 (E. S. T.)—12:30 P. M., news, weather. 4:30, stock market; The Sunshine Girl. 6:30, dinner concert. 7:30, Uncle Kaybee. 7:45, special feature. 8, silent. 8:30, concert by artists and orch.

KPO, San Francisco, 423 (P. S. T.)—7 A. M., setting-up exercises. 11:50, market report. 12, time. 1 P. M., Rudy Seiger's Orch. 2:30, Johnnie Buick's Amphians. 4:30, Rudy Seiger's Orch. 5:30, children's hour. 7, Rudy Seiger's Orch. 8, E. Max Bradfield's Versatile Band. 8:15, fifteen minutes of humorous philosophy.

Thursday, January 22

WDAF, Kansas City, Mo., 411 (C. S. T.)—3:30 P. M., the radio trio. 5:50, marketgram, weather, time and road. 6, reading, Cecile Burton; 4 P. M.

Edmund F. Boettcher, tenor; William H. McRaven, pianist; DeWitt McMurray, philosopher. 6:45, Boy Scout weekly program. 8:30, North Dallas High School Band. 11, hotel orch.

WOAI, San Antonio, Tex., 385 (C. S. T.)—9:30 P. M., Jimmy's Joys Orch.

WMC, Memphis, Tenn., 500 (E. S. T.)—8 P. M., Bedtime Stories. 8:30, WMC celebrating second anniversary

KGO, Oakland, Cal., 312 (P. S. T.)—10:40 A. M., classroom instruction. 11:30, luncheon concert. 1:30 P. M., N. Y. and S. F. stock; weather. 4, concert orch. 6:45, final reading, stock reports, weather, S. F. produce news, and news items. 8, Y. W. C. A., assisted by the Arion Trio; Robert W. Lovegren, baritone; Edith Gilman, soprano; address, "Think It Over," Coleman Cox; Josephine Holub, violinist. 10:00, Henry Halstead's Orch.

WLW, Cincinnati, O., 423 (C. S. T.)—8 A. M., "Setting Up" exercises. 10:45, weather and business reports. 12:15 P. M., Woody Meyer's orch. 1:30, business reports. 3, market reports. 4, piano recital by Adelaide Apfel; French lesson by Madame Teimpidis. 6, Selinsky instrumental quintet. 10, message from the U. S. Civil Service. 10:03, Cooper Corporation program; orchestral program; Sinfonian Frat., College of Music, program; Doherty Melody Boys.

WBZ, Springfield, Mass., 337 (E. S. T.)—11:55 A. M., time, weather, market. 6 P. M., dinner concert. 7, market report. 7:05, bedtime story. 7:15, New England Homestead, "Preparation of Federal Income Tax Returns," Thomas McCarry. 7:30, educational course. 8, Alberta Kelleher, violinist. 8:15, The Original Three Musikeeters; Thomas Moran, monologist; James Brazeil, tenor; Vincent A. Breglio, pianist. 8:30, George Leo Patterson, on "The Coming Eclipse." 9, Three Musikeeters. 9:15, Charles E. Colley, pianist; Sandy MacDonald, Scotch comedian; Lenora Farrari, and Jack Grin, comedian. 9:30, Philharmonic trio. 9:45, continuation of program. 9:55, time, weather. 11, Hotel Brunswick orch. 11:30, popular song, Don Ramsay's Four. 11:45, Hotel Brunswick orch.

WCAE, Pittsburgh, Pa., 462 (E. S. T.)—12:30 P. M., news, weather. 4:40, stock market; The Sunshine Girl. 6:30, dinner concert. 7:30, Uncle Kaybee. 7:45, special feature. 8, silent. 8:30, concert by artists.

JANUARY 22nd
KPO, San Francisco, 423 (P. S. T.)—7 A. M., setting-up exercises. 11:50, market report. 12, time. 1 P. M., Rudy Seigers Orch. 4:30, Rudy Seiger's Orch. 5:30, children's hour. 7, Rudy Seiger's Orch. 8, organ by Theodore J. Irwin. 9, Allen Music Co. program. 10, E. Max Bradford's Versatile Band.

Friday, January 23

WFAA, Dallas, Tex., 476 (C. S. T.)—12:30 P. M., address, Dr. Robert Stewart Hyer. 4:30, woman's hour. 8:30, Wilmer Male Quartet.

WDAF, Kansas City, Mo., 411 (C. S. T.)—3:30 P. M., the radio trio. 5:50, marketgram, weather, time and road. 6, speaker; Tell-Me-a-Story Lady; The Trianon Ensemble. 8, popular program. 11:45, Nighthawk Frolic.

KFAE, Pullman, Wash., 330 (P. S. T.)—7:30 P. M., Hawaiian songs and music, Hula Harmonizers; Washington 4-H Clubs at Chicago, Miss Elmina White; Essentials of Successful Farm Management, Geo. Severance; Book Reviews, Alice L. Webb; Reading in Preparation for Travel in Europe, Prof. Carl M. Brewster.

WMC, Memphis, Tenn., 500 (E. S. T.)—8 P. M., Bedtime Stories. 8:30, Prof. Chin Chin and his Britling's Orch. 11, Midnight Frolic.

KGO, Oakland, Cal., 312 (P. S. T.)—11:30 A. M., luncheon concert. 1:30 P. M., N. Y. and S. F. stock and weather. 3, musical program and speaker. 4, concert orch. 5:30 to 6, The Girl's Half Hour, by Esther W. Schneider. 6:45, stock reports, weather, S. F. produce news, and news. 8, lecture by Richard J. Davis.

WBZ, Springfield, Mass., 337 (E. S. T.)—11:55 A. M., time, weather, market. 7, market report. 7:05, bedtime story.

WLW, Cincinnati, 423 (C. S. T.)—8 A. M., "Setting Up" exercises. 10:45, weather and business reports. 12:15 P. M., Woody Meyer's orch. 1:30, business reports. 3, market reports. 4, Mr. Leo Stofregen's pupils program; French lesson by Madame Teimpidis.

WHO, Des Moines, Ia., 522.3 (C. S. T.)—7:30 P. M., The Williamson Bros; Arthur Cohen, violinist; Rudy Baie, popular soloist; Roy Beggs, pianist; Margaret Young, accompanist.

WCAE, Pittsburgh, Pa., 462 (E. S. T.)—12:30 P. M., weather. 4:30, Sunshine Girl; stock market. 6:30, dinner concert. 7:30, Uncle Kaybee. 8, silent. 8:30, short vocal program; concert by the Astor Coffee orch.

KPO, San Francisco, 423 (P. S. T.)—7 A. M., setting-up exercises. 11, "Home Making." 11:50, market report. 12, time. 12:45 P. M., talk. 1, Rudy Seiger's Orch. 4:30, Rudy Seiger's Orch.

Saturday, January 24

WMC, Memphis, Tenn., 500 (E. S. T.)—8 P. M., Bedtime Stories. 8:30, program by Hugh Sandidge.

WDAF, Kansas City, Mo., 411 (C. S. T.)—3:30 P. M., The Radio Orch. 5:50, marketgram, weather, time and road. 6, message from Roger W. Babson; Tell-Me-a-Story Lady; The Trianon Ensemble.

WFAA, Dallas, Tex., 476 (C. S. T.)—12:30 P. M., More Cotton per Acre Contest. 8:30, Walter J. Fried in violin recital. 11, Adolphus Hotel Orch.

KGO, Oakland, Cal., 312 (P. S. T.)—11:30 A. M., luncheon concert. 12:30 P. M., final reading, stock reports and weather. 4, concert orch. 8, pro-

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gram given by the Oakland Realtors' Glee Club, Zura E. Bells, director; assisted by Elizabeth Johnstone Westall, accompanist; Edna Fischer Hall, contralto; Willy Meier Pauselius, guitarist. 10, dance music.

WBZ, Springfield, Mass., 337 (E. S. T.)—8 A. M., special test during eclipse of the sun. 11:55, time, weather. 6 P. M., Leo Reisman's ensemble. 6:45, George Rogers, popular songs. 7, market report. 7:05, bedtime story. 7:15, sketches from U. S. history. 7:30, concert by the Hotel Kimball trio. 8, broadcast from Boston Arena, Harvard-Princeton hockey. 9:55, time, weather.

WLW, Cincinnati, O., 423 (C. S. T.)—8 A. M., "Setting Up" exercises. 10:45, weather and business reports. 1:30 P. M., market reports. 3, Hubert Buschle's orch. 6, Selinsky instrumental quintet; Lafafone by E. D. Leonard.

WCAE, Pittsburgh, Pa., 462 (E. S. T.)—12:30 P. M., news, weather. 2:30, tea-dansant music. 4:30, Ed Lally's Rendezvous Cabaret orch. 6:30, dinner concert. 7:30, Uncle Kaybee. 7:45, movie chats. 8, news and road conditions. 8:15, silent. 8:30, musical program.

KPO, San Francisco, 423 (P. S. T.)—7 A. M., setting-up exercises. 11:50, market report. 12, time. 1 P. M., Rudy Seiger's Orch. 2:30, California Grays. 4:30, E. Max Bradford's Versatile Band. 8, Art Weidner's Dance Orch.

PISIK JOINS LEWIS AD FIRM

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A. B. C. Editor, RADIO WORLD, 1493 Broadway, New York City.

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The Superdyne Cycle

"RADIO WORLD'S 1925 MODEL DX SUPERDYNE," by Herman Bernard. Only two controls; 4 tubes. Issues of January 10, 17 and 24.

"A 1-TUBE REFLEXED SUPERDYNE," by Herman Bernard. One stage of tuned regenerative RF, crystal detector and one AF stage, great quality of signals. Good for about 150 miles on earphones. Issue of December 6.

"A SELECTIVE 2-TUBE SUPERDYNE," by Herman Bernard. Fine quality. Good for about 500 miles on earphones. Two RF stages ahead of crystal detector. Very selective. Issue of November 29.

"THE 1-TUBE DX SUPERDYNE," by Herman Bernard. One of the best 1-tube DX sets ever published. Fine signal quality. Issue of December 20.

"THE 3-TUBE DX SUPERDYNE," by Herman Bernard, explaining how to add two audio stages, transformer-coupled, to the 1-tube DX Superdyne. Issue of December 27. Get December 20 issue, too, for full particulars on the detector circuit.

"THE ANDERSON 4-TUBE DX SUPERDYNE," by J. E. Anderson, consulting engineer. One of the most popular and best DX and quality sets ever designed. Issues of November 22 and 29. TROUBLE-SHOOTING in December 6 issue.

Any of the above copies at 15 cents each, or start your subscription with any number. RADIO WORLD, 1493 Broadway, New York City.

Index Vol. 5 of Radio World

From January 1, 1924, to September 1, 1924. Full contents, cross indexed, appeared in Radio World dated Oct. 18. 15c. per copy or start your subscription with that number. Radio World, 1493 Broadway, N. Y. C.

A THOUGHT FOR THE WEEK!

Here is an instance of arithmetical progression: John McCormack has been appearing before audiences for several years. In 49 minutes on New Year's night last more folk heard him sing than had listened to him during the twenty years of his previous professional experience. Radio deals in figures that startle the old-timers—and the end is not yet!

RADIO WORLD



TELEPHONE LACKAWANNA 6976, 2063
PUBLISHED EVERY WEDNESDAY
(Dated Saturday of same week)
FROM PUBLICATION OFFICE
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MANAGING EDITOR, Herman Bernard
TECHNICAL EDITOR, Abner J. Gelula

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ADVERTISING RATES
General Advertising

1 Page, 7 1/2 "x11", 462 lines.....	\$300.00
1/2 Page, 7 1/2 "x5 1/2", 231 lines.....	150.00
1/4 Page, 4 1/2 "x D. C., 115 lines.....	75.00
1 Column, 7 1/2 "x11", 154 lines.....	100.00
1 inch.....	10.00
Per space line.....	.75

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4 consecutive issues.....	10%

CLASSIFIED ADVERTISEMENTS
Ten cents per word. Minimum, 10 words. Cash with order.

Entered as second-class matter, March 28, 1923, at the Post Office at New York, New York, under the act of March 3, 1879.

JANUARY 17, 1925

Are the Great Voices on the Air to Stay?

A GOOD example of the effect of the broadcasting by Lucrezia Bori, soprano of the Metropolitan Opera Company, and John McCormack, the Irish tenor, is that ten days later people were still talking delightedly about it. The appearance of these noted singers before the microphone—their radio debut—was an artistic success beyond question or means of measuring. It was simply an overwhelming triumph. The Victor Talking Machine Company, who made this possible, is disseminating optimistic reports, yet modified with circumspection. The reason is palpable. The Victor Company's sole desire is to accelerate the sale of phonographs and records and unless the broadcasting achieves this commercial result the experiment will be discontinued. The artists themselves, who are not being paid by any for their ap-

Dealers and Squealers Blamed for Radio Retardation

L ETTERS from readers are pouring into the office of the RADIO WORLD'S Survey Editor, discussing "What's the Matter With Radio?" and offering solutions. These letters are paid for at usual rates. Anybody is at liberty to send in a letter.

The object of the Survey is to determine (a) the state of the radio industry, a task being undertaken by RADIO WORLD'S Industrial Statistics Bureau; (b) to obtain the views of the general public on why there is such a small percentage of radio sets in use, compared with the number of homes; (c) to lay these facts and opinions before a committee of experts, to be announced later, for the purpose of having them submit a report, with recommendations to the public and the trade.

Radio ranks thirty-second as an industry, indeed a high position for any young industry. But considering that radio is the greatest invention ever devised and has a greater entertainment, informative and educational influence than anything else in the world, it should be more generally used.

"A radio in every home" is not too ambitious a slogan. How to achieve that is one of the objects of the Survey. Following are published some of the letters received:

Too Many Stations, but Programs Not Good Enough for Fan

SURVEY EDITOR:

WHAT is the matter with radio? I have a radio. I am not exactly an experimenter but built my own set. It is a 5-tube tuned radio-frequency set. I have at different times received from either coast and I think right there is one of the things that is the matter with radio. Every one is after more power in the receiver and with the number of broadcasting stations it is almost impossible to have a set that will get distant stations without getting interference.

The majority of programs from the average small town stations are absolutely terrible. There is only one remedy to the ills of radio. Get rid of about 90% of the broadcasting stations and give what is left about ten times as much power. The stations should be permitted to continue only as long as their programs are good.

WM. L. AILLAUD,
Newton, Ia.

Gyp Dealers Bane of the Industry, Another Finds

SURVEY EDITOR:

THE big trouble with radio is that too many gyp dealers are in the game. They appear like a lot of circus men who are in town today and gone tomorrow. They tell you anything to sell you and then turn around and say 50% of their profits are eaten up in service. If they told the truth they could cut their service overhead 75%. Again, they have nothing to sell you when you want to buy. They have all the sets made and can't stand on their two feet and say one is or is not better than another. No two dealers have the same price on any one set. Advertising run by many department stores is not direct price-cutting but sucking the public into a store where you find salesmen who never saw the ad and who start off to sell you according to how much they think you can stand.

T. A. DILLON,
573 Rosedale St., Pittsburgh, Pa.

pearances before the microphone, are interested because they get a royalty on the sales of their own records.

The question, therefore, is: Will the broadcasts increase the sale of phonographs and records? Maybe

Sets that Radiate Called a Menace to Radio

SURVEY EDITOR:

THERE are too many sets of the re-radiating type. They set up a lot of squeals and whistles so that a person with a regular set cannot get a program to save his life. I have a 5-tube Neutrodyne but there are times that I cannot get anything but squeals and have to shut the thing off and go to bed and at times feeling not very good-natured either. Until there is something done about these squealers there will not be much done in the radio line.

W. J. GILLO,
791 St. Anthony, St. Paul, Minn.

RESULTS

RESULTS EDITOR:

I BUILT the set described by Lieut. Peter V. O'Rourke on page 16 of the Dec. 6 issue of Radio World. It was entitled "Great DX on 1 Tube and 1 Dial." Stations I have heard include: KFKX, Hastings, Neb.; WCAL, Northfield, Minn.; WOAW, Omaha, Neb.; WCB, Zion, Ill.; WSAI, Cincinnati, O.; KDKA, E. Pittsburgh, Pa.; WOC, Davenport, Ia.; WGR, Buffalo, N. Y.; KOA, Denver, Colo.; WEBH, Chicago, Ill.; WAJ, Chicago, Ill.; WGY, Schenectady, N. Y.; WWJ, Detroit, Mich., and WDAF, Kansas City, Mo.

All of the stations with the exception of WDAF Kansas City, were heard while the local station WCCO was broadcasting. Reception was very clear and in most cases of good volume. I use an outdoor aerial, 75 feet long and about 35 feet above the ground. WCCO comes in with sufficient volume so that it can be heard plainly all over the room through a loud speaker using a Baldwin unit.

R. D. SAUNDERS,
4314 Garfield Ave., Minneapolis, Minn.

it would be advisable for radio fans to buy a few operatic records now and then as a sort of not unpleasant tax to insure this fine quality of broadcasting. Anyway, it's a problem, and a big one. The future holds the answer.

British Manufacturers Combine to Boycott U. S. Goods

Defy Law That Lifts Restrictions, U. S. Consul Reports

WASHINGTON.

POPULAR interest in radio in Great Britain continues apace with that in the United States, according to a report to the Department of Commerce from

Radio So Good General Lord Fears It

WASHINGTON.

GENERAL Herbert M. Lord, Director of the Budget Bureau, is one of the busiest men in Washington. His task is to keep Government expenses to the absolute minimum in order that taxes may be correspondingly decreased. Speaking of radio, he said:

"I'm afraid of it. A friend of mine is worse about radio than some people are about golf. He has been trying to persuade me to get a set. If I got a radio set I'd sit up nearly all night working on it. I'm afraid I'd be just as bad, if not worse, than my friend. It would take up too much of my time and I cannot afford to take a chance on it. Radio is a wonderful thing. Why, only the other day my friend was telling me he got England on his set."

"Oh, that isn't anything," the writer told the General. "I was fooling with my set the other night and I got chilly."

"You'd better read the papers," the General retorted. "You ought to know that a man got killed for pulling that."

are trying to prevent the importation of foreign makes.

"Although import restrictions were scheduled to be dropped at the beginning of 1925," Consul MacCates reports, "British manufacturers have formed a national association and have entered into arrangements with the retailers with a view of restricting the trade to wireless goods of British make. It is understood (Concluded on next page)"

"Better Than an Aerial"

Say Many Fans and Dealers of

THE

PARAMOUNT LOOP

LIST PRICE \$12

A Marvelous New Antenna, the Popularity of Which is Fairly Sweeping the Country.

Spider-web wound with silk over phosphor-bronze wire on genuine Bakelite frame, the PARAMOUNT LOOP gathers and sends direct to the receiver every electron of current, producing

GREATER VOLUME!

GREATER CLARITY!

GREATER DIRECTIONAL EFFECT!

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For results that will add still greater delight to your "Radio Afternoon or Evening."

Order a PARAMOUNT LOOP from Your Dealer—or Direct from the Manufacturer—To-day!

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Big Opportunity for Dealers.

How to Build ULTRADYNE

Model L2

12 page illustrated book with detailed instructions on drilling, wiring, assembling and operating Model L-2 Ultradyne Receiver. Latest Authentic edition by E. E. Lacault—A. M. I. E. E., inventor of the Ultradyne—the most selective receiver known. Write for descriptive circular.



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New York

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New York's newest and most beautifully furnished hotel—accommodating 1034 guests

ROOM WITH PRIVATE TOILET \$2.50
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ALL OUTSIDE ROOMS.

Equal distance from Pennsylvania and Grand Central — Walking distance to Times Square and the shops. All transportation lines at our door — Broadway at 63rd St. Within the zone of Columbus Circle (Central Park and 59th St.) the most important motor objective in the world.

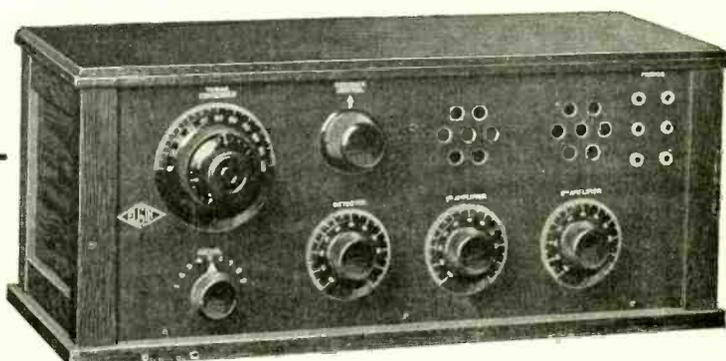
P.V. Land, Manager



COMPLETE 1924 INDEX OF RADIO WORLD

Appeared in RADIO WORLD dated Oct. 18, 1924, and Jan. 10, 1925. 15c per copy. RADIO WORLD, 1493 Broadway, New York.

Consul R. B. MacCates. Also like the Americans, the British are intent upon promoting their own brand of sets and



You Can Build This Set

Without Soldering

Save Fifty-Dollars

Don't pay the other fellow for doing what you can do yourself. Build your own Radio set—and have the fun of building it! The Elgin Super-Reinartz is supplied "knocked down." But it is different from the average so-called knocked down set.

Everything is drilled, the panel is engraved—and there is absolutely nothing to solder. The parts assemble just like building blocks, all wires "clip" into place and the panel slides in the grooved cabinet and fits! Nothing to do but drive a few screws!

If you can use a screw driver you can build this highly efficient receiving set in an hour or so. Then call in your friends and show them the set you built yourself! Show them how easy it is to tune in the stations they have been unable to get with ordinary sets.

The Elgin Super-Reinartz is the set that has repeatedly tuned in 2LO, the hard-to-set London station. This same set has logged every worth-while station in the United States, Canada, Mexico and Cuba.

FREE!

We want you to learn more about this amazing set—mail the coupon with your name and address and we will send you the complete working drawings of the Elgin Super-Reinartz — absolutely FREE!

The parts supplied you are exact duplicates of the parts we used in the original model, the hook-up is the same and an exact simplified working drawing is supplied. You can't go wrong!

We guarantee every part in the Elgin Super-Reinartz to be the utmost in efficiency. We guarantee the drawings furnished you to be duplicates of the same set that heard London. We guarantee reception that is only equaled by sets twice the size and price, providing our drawings are followed and the set is properly constructed as we direct! Read our FREE offer to you.

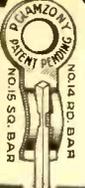
Elgin Radio Supply Company, Suite B, 207 E. Chicago St., ELGIN, ILL.

I want to know all about the set that heard London. Send the working drawings of the Elgin Super-Reinartz set by return mail—Free! I am enclosing a stamp to cover postage.

Name
Address

ELGIN Super-Reinartz "The Ford of Radio"

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SOLDERLESS LUG
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 199 With Standard Base
 Life, Tone and Volume
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 NOW **\$3.00**

 Approved by Radio News
 Laboratories
TYPES
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 and Amp.
 412-1 1/2 V. 1/4 Amp.—Det.
 and Amp.
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 402 Transmitter.
 At all good dealers.
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RESISTANCE COUPLED
AMPLIFIER KIT

 The wave of public opinion in
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COUPLED AMPLIFIER KIT
 is the most ideal for the Home
 Set Builder to use.
 Supplied in 3 or 4 stage Kits with-
 out Sockets and Condensers.
 Buy of your dealer, the "RESISTOR
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 tion on Resistance Coupling.
 Price 25c.
DAVEN RADIO CORP.
 "Resistor Specialists"
 Newark, New Jersey

Letters from Our Readers

RESULTS EDITOR:
I WISH to compliment you on the clear
 and explicit instructions in your ques-
 tion and answer department.

I consider your magazine the best in the
 field and getting better and better each
 issue. Heretofore I bought four or five
 radio magazines each week, and finally
 boiled down my purchases to your one.
 Plenty of good hookups with clear dia-
 grams and no exaggerated claims are what
 I like, and every circuit I hooked up from
 the RADIO WORLD always came up to
 claims. This is my plaything.

ANDREW DEVORE,
 Care of Rechart Sign Letter Co.,
 637 Cass St., Chicago, Ill.

I HAVE obtained the last few copies of
 your magazine and have almost eaten
 them up. I have read them from cover to
 cover and have enjoyed the discussions of
 hookups. The articles written by Herman
 Bernard are certainly fine.

LESLIE POTTER,
 Wheatland, Wyo.

MAHOGANITE
 and **BLACK**
RADION PANELS
 DIALS, KNOBS, TUBING, SOCKETS
 RADION LOUD SPEAKER HDNRS. ETC.
 "THAT SPECIAL SIZE" FOR YOUR
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5 TUBE RADIO FREQUENCY
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 Write for Details

RADIO MONEY SAVING
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 your ideas. Send us a sketch or sample model of
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 Write for FREE BOOKLET
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Ward's Radio Department is
 headed by experts who know and
 test everything new. Who know
 by experience what is best—
 what gives the best service.

Our catalogue is prepared
 under their supervision. It
 shows all the best hook-ups,
 everything in parts and com-
 plete sets—so simple that you
 yourself can install them in a
 short time.

Headquarters for Radio

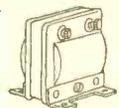
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 sands upon thousands of Radio
 fans who have written for our
 catalogue, who have been sur-

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 the standard Radio equipment
 can be sold without the usual
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For 53 years we have sold quality
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 The Oldest Mail Order House is Today the Most Progressive
 Chicago Kansas City St. Paul Portland, Ore. Oakland, Calif. Ft. Worth
SATISFACTION GUARANTEED OR YOUR MONEY BACK

New Wavelengths Are Assigned to KDKA, WSAI, WMH, WREO

WASHINGTON.

NEW wavelengths have been assigned to three class B stations by the Radio Bureau of the Department of Commerce in carrying out its reallocation plan. The changes are:

KDKA—East Pittsburgh, Pa...	309	326
WSAI—Cincinnati, Ohio.....	326	309
WMH—Cincinnati, Ohio.....	326	309
WREO—Lansing, Mich.....	286	288

As can be seen, the two Cincinnati stations have been given the wavelength formerly used by KDKA, while KDKA now operates on the wavelength formerly used by WSAI and WMH. In other words, geographical location was responsible for the change. Under the present arrangement, which is on an experimental basis, a station in the East can be placed much closer to 326 meters with Cincinnati stations on it than would be the case with Pittsburgh operating on it, because of the distance. The same thing applies to 309 meters; the Radio Bureau desires to assign a wavelength close to it to a Western station. Less separation is required with Pittsburgh on 309 than would be the case with Cincinnati there.

The purpose of the reallocation plan which is gradually being put into effect is to reduce the separation between stations as much as possible in order to create new channels for stations which are expected to require licenses during the next month or two. At present the separation amounts to 10 kilocycles. By shifting the stations about the Radio Bureau hopes to reduce this to 9, 8 or even 7 kilocycles.

All of the shifts which are being made are on a purely experimental basis. If new channels are created by them with-

out increased interference, they may become permanent.

NEW BROADCASTERS

THREE stations have been granted licenses to come on the air as class B. Two of these are new stations, while one was formerly in class C. Three new class A stations have also been licensed by the Radio Bureau. The new stations follow:

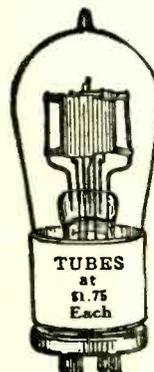
Call	Owner and Location		
KFUJ	Hoppert Plumbing & Heating Co., Breckenridge, Minn.	242	50
WOCL	Hotel Jamestown, Jamestown, N. Y.....	275	15
WORD	Peoples Pulpit Ass'n, Batava, Ill.	278	500
KTHS	New Arlington Hotel Co., Hot Springs, Ark.....	375	500
WPG	Municipality, Atlantic City	296	500
Transfer Class C to B			
WNAC	The Shepard Stores, Boston, Mass.	280	500

24 STATIONS QUIT

TWENTY-FOUR stations were discontinued during December, while during the same period twenty-four new stations were licensed. The discontinued stations follow:

Call	Station
KDZR	Bellingham Publishing Co., Bellingham, Calif.
KFAV	W. J. Virgin, Medford, Ore.
KFBE	R. H. Horn, San Luis Obispo, Calif.
KFBS	Trinidad G. & E. Co., Trinidad, Colo.
KFKZ	Nassour Bros. Radio Co., Colorado Springs, Colo.
KFOF	Rohrer Elec. Co., Marshfield, Ore.
KFPN	Mo. Nat'l Guard, Jefferson City, Mo.
KFPO	Mo. Nat'l Guard, Denver, Colo.
KFQK	Democrat Leader, Fayette, Mo.
KFQO	Meier Radio Shop, Russell, Kan.
KFRG	Cleveland High School, St. Louis, Mo.
KFRI	Reynolds Radio Co., Denver, Colo.
KGG	Hallock & Watson, Portland, Ore.
KJS	Los Angeles Bible Institute, Los Angeles, Calif.
KQP	Apple City Radio Club, Hood River, Ore.
WABP	Robert F. Weinig, Dover, Ohio.
WBL	T. & H. Radio Co., Anthony, Kan.
WEBU	Deland P. & M. Co., Deland, Fla.

WIAB	Johnson Garage, Rockford, Ill.
WLAW	N. Y. Police Dept., New York, N. Y.
WPAR	Ward Battery Co., Beloit, Kan.
WQAF	Sandusky Register, Sandusky, Ohio.
WQAX	Radio Equipment Co., Peoria, Ill.
WRL	Union College, Schenectady, N. Y.



SAVE \$2.25
ON COST OF NEW TUBES BY HAVING YOUR OLD TUBES REBUILT AT \$1.75 EACH.

Guaranteed equal to new. Send us your tubes by parcel post. We return them parcel post, C.O.D., and try to maintain 24-hour service.

HARVARD RADIO LABORATORIES
200 Old Colony Ave.
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TUBES at \$1.75 Each

A written Guarantee protects you



\$59

A Five-Tube Tuned Radio Frequency Set

Distributors and dealers write for profitable proposition

AMEREX ELECTRIC CORP.

232 GREENWICH STREET
NEW YORK, N. Y.

You Will Get

100%

Efficiency

from your set if you keep tabs on your storage batteries with the

Perfection HYDROMETER

(Scientifically Perfect)

It's in the float. If the name PERFECTION is not on the float it is not a genuine PERFECTION.

Scientifically made for instant, accurate battery testing. Will not leak. The ribbed, acid proof rubber connections prevent rolling and breakage.

\$1.00

List Price

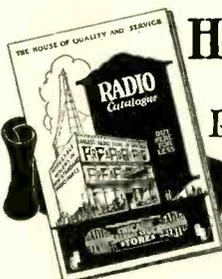
Attractive Discounts to Dealers.

Bemco Manufacturing Company

243 W. 55 St.
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The LARGEST RADIO STORES in AMERICA



Hook-ups!

All the latest and best kits in our new

RADIO CATALOG

FREE

NO other Radio Catalog includes such a complete assortment of the best and latest Knock-Down Kits, Parts and Accessories. You need this book—Write for your FREE copy today!

We Save You Money!

Our business is to buy up manufacturers' and government surplus stocks, jobber and dealer bankrupt stocks—but only brand-new, fully guaranteed, nationally advertised apparatus. Our catalogue crammed with bargains.



CHICAGO SALVAGE STOCK STORES

509 So. State St., CHICAGO, ILL., Dept. R.W. 8

Use of Spark by Amateurs Is Officially Opposed

WASHINGTON.

ABANDONMENT of spark transmitters by amateur radio stations because of interference to broadcast recep-

tion is urged by the Department of Commerce in new regulations governing their operation which have just been issued to all radio supervisors.

The new regulations, which specify future wavelengths for amateur stations, also compel them to observe silent periods between 8 and 10:30 p. m. daily and during church services on Sunday whenever they tend to interfere with broadcast reception.

The new amateur regulations provide: "WAVE LENGTHS: 150 to 200 meters, 75 to 85.7 meters, 37.5 to 42.8 meters, 18.7 to 21.4 meters, and 4.69 to 5.35 meters, are allocated to amateur stations.

"SPARK TRANSMITTERS: Amateur spark transmitters produce considerable interference and consequently are responsible for many complaints. Amateur owners of such transmitters should abandon their use as early as possible and adopt a system producing less interference. Until such change is made they will be permitted in the wavelength band between 170 and 180 meters and should have a decrement not exceeding .1."

Victor Company Expects Big Results

DISCUSSING the first broadcasting by Victor artists, Calvin G. Childs, a director of the Victor Company, said:

"While it is considered premature to make a forecast as to the probable outcome of what has been described as an experiment to determine the practicability of broadcasting concert and opera stars, officials of the Victor Company are viewing the future with optimism. It is believed radio audiences will be more eager than ever to see and hear the Victor artists as a result of the broadcasting experiment, and will attend their concert and operatic performances in even larger numbers than before."

Freshman Co. Moves Into Own Building

THE growth of the active radio business of the Charles Freshman Company, Inc., has compelled its removal to considerably larger quarters, the new twelve-story fireproof building at Nos. 240-48 West Fortieth Street, New York City, which is known as the Freshman Building.

Because of the increased space and additional equipment, it is expected that the production will be more than doubled.

The Freshman Company started in the radio

business with a single item—the "Antenna," a device that enabled the use of the house electric light wiring as an aerial. Now the firm manufactures nearly everything required in a receiver.



12 Cells
24 Volts
Solid Rubber Case

\$3.50 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 \$3.50. Regular Retail Price is \$5.50. 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—will last for years and can be recharged at a negligible cost. And you save \$2.00 by ordering now.

A Superior Battery Equipped With Solid Rubber Case
Has heavy duty 2 1/8 in. x 1 1/4 in. x 1 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 fully, 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 per order is received. **EXTRA OFFER:** 4 batteries in series (96 volts), \$13.00. Pay Expressman after examining batteries. 5 per cent discount for cash in full with order. Send your order NOW and save \$2.00.

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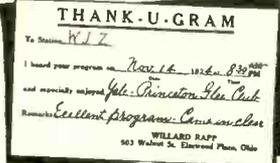
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Herman Bernard

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(Signed)

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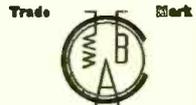
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Ultra-Vario Condensers

Cat.-No. 19, \$7.50

A multiple tuning condenser of rigid mechanical construction and high electrical efficiency.

What Condenser to Use With Cutout Coil

(Concluded from page 13)

dowel rods, but they should be of the same diameter as that of the dial hole, usually 1/4". The rod is slightly notched where the setscrew of the dial is to meet it.

With a tiny drill holes are bored in the rod so that pins may be inserted to prevent the rods from sliding. A hard rubber washer should be between each pin and the form, so that the form will not obstruct the rotor's smoothness of turning.

The rotor itself is made as was the stator, except that the diameter of the tubing is to be 2 3/4", or a little less, and the height 2 3/4". Using No. 26 wire, wind forty turns, twenty on one side of the shaft holes and 20 on the other, in the same direction as the secondary and primary were wound.

A radio-frequency transformer is easier to make than a coupler, since it consists

simply of the stator of the coupler. The general idea of such a radio-frequency transformer is shown in Fig. 10, except that this photo is a warning as to the primary. It emphasizes the condenser effect between turns of the primary when wound close to one another. The primary should be widely spaced, as explained heretofore.

The coils described may be used in almost any circuit. They will work fine in regenerative sets, reflexes, Superdynes, Super-Heterodyne tuners, Neutrodyne and straight radio-frequency sets. The reduction of losses makes for sharpness of tuning and thus enables one to bring in DX stations with greater ease. Also, the quality of the received signal is improved.

The tuning condenser, shunted across the secondary in each instance, should have a maximum capacity of .0005 mfd.,

normally 23 plates. This should cover from 195 to 555 meters, with a low-loss condenser. If condensers of smaller maximum capacity are on hand, more turns would have to be put on the secondaries, but the remaining windings would be the same. If a .00035 mfd. variable condenser is to be used, normally 17 plates, the secondaries should have 52 turns, and if a .00025 mfd. variable condenser is to be employed, normally 15 plates, the secondaries would have to consist of 60 turns. In the latter case the stator form would have to be 4" high. Only the .0005 mfd. condenser covered the whole wave band in tests.

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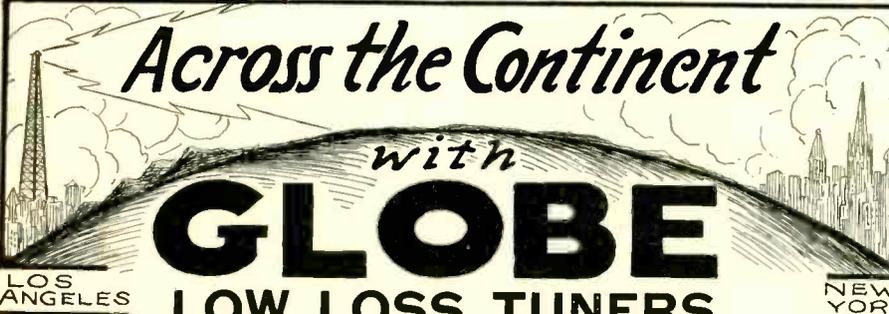
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LATEST PATENTS

MULTIPLEX transmission of messages by high-frequency oscillations (No. 1,518,401), invented by Heinrich Fassbender, of Germany.

ARC TRANSMITTER for wireless telegraphy (No. 1,518,439), invented by Alexander Meissner, of Berlin, Germany. Permits arc lamp transmitters to work between 300 and 600 meters.

DIAL (No. 1,518,473), invented by Herbert T. Whaler, Miami, Fla. Provides means for effecting adjustments of great precision which is releasable in order to permit a rough adjustment through a wide angle to be quickly made.

INTERCHANGEABLE battery system for radio sets (No. 1,518,508), invented by Harry Hart, of Chicago, Ill. Provides a double battery, one adapted to supply current to filaments in the tubes, the other battery, discharged, being recharged.

ELECTRICAL measuring apparatus (No. 1,518,543), invented by Harry Nyquist, of New York, and assigned to the American Telephone and Telegraph Company. Provides a circuit arrangement adapted to indicate the presence and to determine the type of harmonics produced by apparatus connected into the circuit.

RADIO telephone and telegraph apparatus (No. 1,518,564), invented by Theodore S. Cole, of New Haven, Conn. Provides an improved vacuum tube system and storage battery device therefor in which may be incorporated therein as many as possible of the advantages of present dry and storage batteries, and which will be free from noise in the plate circuit, and which utilizes a battery with a low ampere hour capacity.

CONDENSER AND HOLDER (1,520,027), invented by A. Atwater Kent, of Ardmore, Pa., and assigned to the Atwater Kent Mfg. Co. This invention provides a condenser unit or structure having terminal strips communicating with the different armatures or plates of the condenser and extending longitudinally of the unit exteriorly thereto and then transversely.

RADIO signaling system and apparatus therefor (No. 1,518,633) invented by Rupert Even Carpenter, of Purley, England.

RADIO Telegraph System (No. 1,518,656), invented by Earl C. Hanson, Washington, D. C. Provides an arrangement for initially recording and subsequently transmitting telegraph signals automatically by radio.

Signaling System (No. 1,518,682), invented by Walter R. G. Baker, of Schnectady, N. Y., and assigned to the General Elec. Co. Keeps the generator oscillating at all times during vacuum tube transmission, and to provide means whereby the

frequency of the oscillations generated will be maintained constant in spite of the detuning of the storage circuit.

RADIOPHONE amplifier (No. 1,518,744), invented by Alfred N. Martin, of New Dorp, N. Y. Amplification of transmitted sounds free from annoying or undesirable tonal effects.

RADIO Telegraph system (No. 1,518,655), invented by Wendell L. Carlson and Earl C. Hanson, of Washington, D. C. Provides an arrange-

ment for receiving high speed signals transmitted from a radio station operated at wave lengths ranging from 30,000 to 60,000 meters, without the use of the Heterodyne principle, or any other method heretofore utilized.

VARIABLE CONDENSER (1,520,329), invented by C. S. Cherpeck, of Chicago, Ill. Variable condenser in which capacity of the same may be varied through quite a wide range, and which variation shall be manually controlled so as to enable the operator to make very delicate adjustments for proper tuning and variation of wavelengths.

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2. Dielectric Losses
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 - (b) Volume leakage or resistivity.
 - (c) Dielectric absorption or hysteresis.
3. Skin-effect in the plates and elsewhere in the condenser.
4. Eddy-currents in metallic parts of condenser.

Every conductor of electricity has resistance, whether it be an ordinary wire or the plates in a condenser. Moreover, every place where two conductors are joined together, as for instance at soldered or clamped joints, has an amount of resistance depending upon how good the electrical contact is between the two conductors which are to be joined. These resistances occur in a condenser in the material of the plates, in the pig-tail connection in the surfaces in contact between plates and washers, in soldered joints at these places when solder is used, or in the contact between some soft metal and the plates when the plates are set into slots in hollow bars into which the metal is forced under pressure. These resistances are in general very small at low frequencies of the order of 1,000 cycles. The resistance of the joints, etc., will not change considerably with the frequency, but the resistance of the plates themselves will change a great deal with the frequency. This is considered under item skin effect.

Dielectric losses are divided into three parts, as listed above. It is not necessary to say much about items (a) and (b), excepting that it is a very difficult matter to make a leakage current flow through an ordinary condenser unless very high voltages are impressed. With ordinary laboratory apparatus the voltage required to obtain measurable leakage

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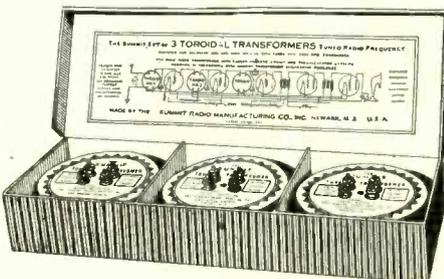
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currents is almost as high as the spark-over voltage of the condenser, that is, in the neighborhood of four to five hundred volts. It is hardly necessary then, to consider the leakage current that would flow through the condenser in an ordinary radio receiver, where the voltages are measured in microvolts. This takes into account both the surface and volume leakage.

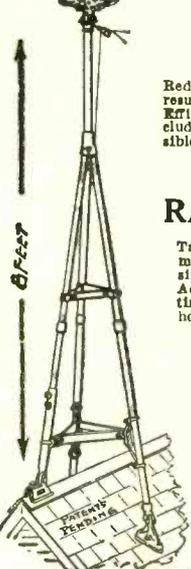
With regard to dielectric absorption (or hysteresis) this is generally not understood by the ordinary radio fan. Dielectric materials are supposed to be heterogeneous; a great number of infinitesimal condensers are scattered through it, the plates of these condensers being formed by the different parts of the material which differ in chemical or physical properties.

When a condenser is first connected to a source of voltage, there is a rush of current into it, which charges up the plates. In a condenser having an appreciable absorption a small current may continue to flow for a long time after the circuit is closed. This current bears no simple relation to the capacity of the condenser. It depends upon the material of the dielectric, the voltage across various part of the dielectric, and the frequency of the current. Obviously, the greater the frequency the shorter will be the charging period for these hypothetical condensers, and consequently the smaller will be the absorption current. It has been found that, for a given dielectric, the absorption effects decrease in proportion as the frequency increases.

This is a phenomenon that has been almost totally neglected by experimenters and designers of condensers. It is generally known that high frequency currents travel in the "skin" of the conductors. There is no reason why this same effect should not be present in condensers. It does exist, and to a very appreciable amount, as will be shown in various articles to be published soon in the different periodicals.

Skin-effect in conductors at low frequencies (1,000 cycles or less) is inappreciable. As the frequency increases, however, the apparent resistance of the conductor, due to this skin-effect, becomes very great. In the case of straight wires, it may make the wire act as if its resistance were often as great as 10 or 20 times its DC resistance. In coils it may be as great as 40 or 60 times the DC
(Concluded on next page)

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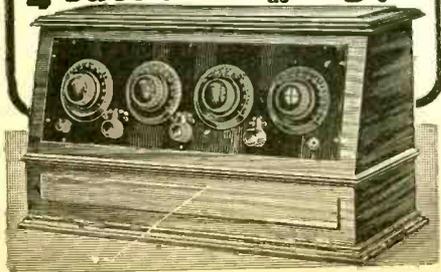
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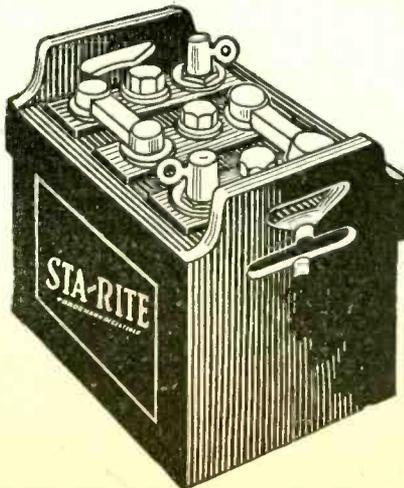
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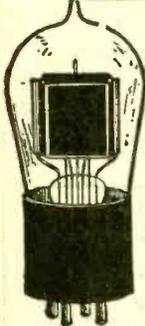
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CONDENSERS

(Concluded from preceding page)

resistance. Furthermore, the skin-effect is greater, the greater the diameter of the wire.

Skin-effect in flat conductors is still greater, in flat strips carrying high frequency currents the skin-effect becomes greater as the thickness of the strip is increased.

Although little quantitative work has been done along this line, there is no reason why this effect should not enter into the resistance of a condenser to a marked degree. As a matter of fact it will be shown later that the skin-effect in condensers exceeds in importance all the other sources of condenser losses put together, as is also true in the case of coils. It must be understood, however, that the condensers and coils mentioned here are those which are so constructed as to be worth using.

The nature and importance of eddy currents is well known to the power engineer, but the radio fan has, for the most part, forgotten that they exist. Eddy currents are currents set up in metal structures as a result of voltages being induced in these structures due to the proximity of a varying magnetic field. It is also known that a varying electrostatic field also carries with it a magnetic field, so that it is probable that considerable eddy currents may be generated in the metallic structures and end-plates of condensers. The value of the eddy currents depends upon the resistance of the metal in which they are generated, the strength of the magnetic field, and the frequency of the current to which the existence of this magnetic field is due. For a given material and strength of field, the higher the frequency, the greater are the losses due to the eddy-currents. These eddy-currents in condenser shields and end-plates may be very appreciable.

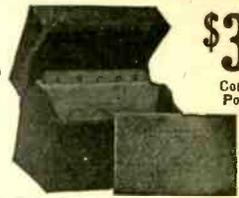
Now as to the relative importance of these various items. At very low frequencies, dielectric absorption is considerable, while the other items contributing to the resistance of a condenser are very small. Due to this absorption the resistance may run as high as several hundred ohms. As the frequency increases, the absorption decreases regularly, while the skin-effect increases slowly at first, and later very rapidly, as we reach the higher frequencies. Added to this we have the losses due to the eddy currents.

Let us suppose, for instance, that a condenser at 1,000 cycles has a resistance of 200 ohms. This is almost wholly due to dielectric absorption, for we can, with good reason, expect the conduction losses to be very low. If the only loss in condensers were due to absorption, then this condenser should have a resistance of 0.2 ohm at 1,000,000 cycles. But as the frequency was increased, the other effects began to become appreciable, and later serious, so that at radio frequencies, the resistance of the condenser may be several ohms.

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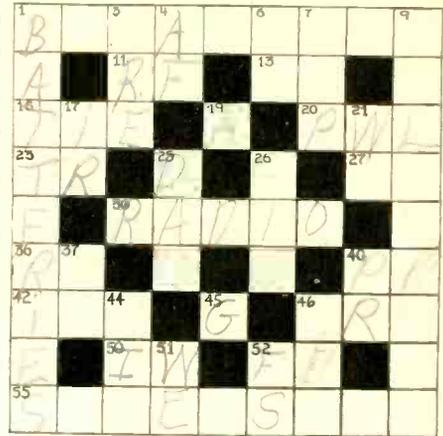
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Radio Cross-Word Puzzle

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Horizontal

- 1—Radio stations—programs.
- 11—Abbreviation for radio frequency.
- 13—In amateur parlance, the abbreviation for "old man."
- 16—Do not— an aerial to a metal pole.
- 19—The abbreviation for aerial.
- 20—The abbreviation for the Pacific Wireless League.
- 23—Initials of an ex-President of the U. S.
- 25—The abbreviation for dielectric is—.
- 26—The abbreviation for watts.
- 27—"The" in French.
- 30—The greatest hobby in the world.
- 36—Abbreviation for radio waves.
- 42—Abbreviation for interrupted continuous waves.
- 45—Abbreviation for ground.
- 46—The international abbreviation for "increase power" is—.
- 50—The abbreviation for international wireless is—.
- 52—Abbreviation for filament switch.
- 55—The name of a wonderful circuit.

Vertical

- 1—To feed the plate and filaments of the tubes you must have—.
 - 3—Galena is obtained from lead—.
 - 4—Abbreviation for audio frequency.
 - 6—Abbreviation for company.
 - 7—Abbreviation of term used in measuring current.
 - 9—Synonym for earphones.
 - 17—Abbreviation for internal resistance.
 - 21—Abbreviation for wavelength.
 - 25—During the— distance reception is not very easily accomplished.
 - 26—Call letters of a station in McKeesport, Pa.
 - 37—Abbreviation for wound coils.
 - 40—First and last letters of power.
 - 44—Call of a station in Philadelphia, Pa.
 - 46—International abbreviation for "change the wavelength to."
 - 51—Abbreviation for Western Electric.
 - 52—Abbreviation for filament switch.
- (Last week's solution will be published next week)

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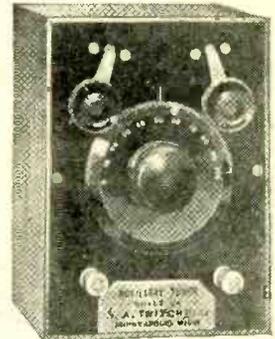
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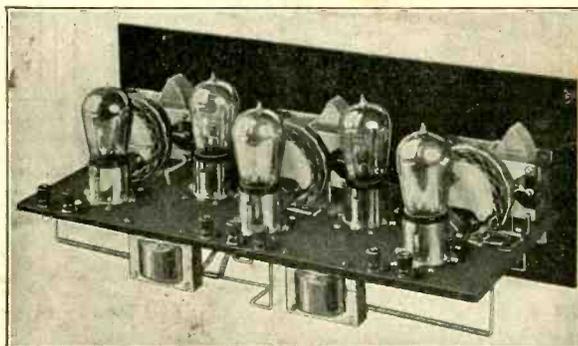
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