

LOOP WORKS ANY SET, EVEN CRYSTAL By **Chester Charlton**

RADIO WORLD

Title Reg. U. S. Pat. Off.

VOL. 6. NO. 3. ILLUSTRATED EVERY WEEK

Thirteen Practical Stunts for Home Constructors

By *Herman Bernard*

The Simplest 3-Tube Set

By *Wainwright Astor*

Wave's Peak or Bust (Radio-Frequency for the Beginner)

By *N. N. Bernstein*

A 2-Tube-and-Crystal Reflex

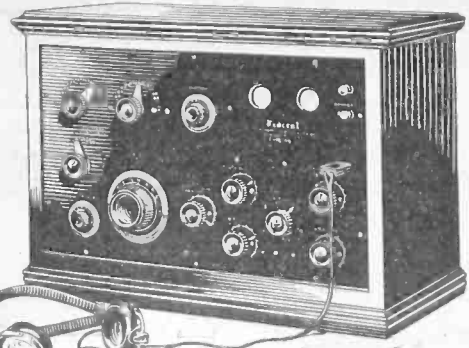
By *Byrt C. Caldwell*

Photo of Radio Industries' Banquet

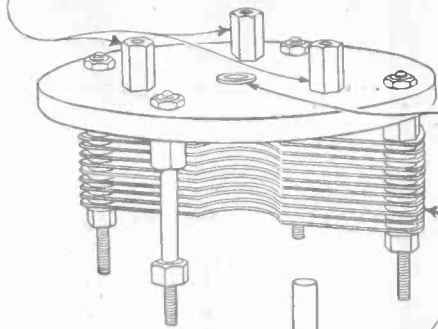


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Original three point suspension assuring perfect alignment which prevents buckling or short circuiting of plates and affords 7/16 inch air dielectric between condenser head and panel. Template furnished with each condenser.



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Exclusive female cone bearing, machine centered and provided with "star" spring to compensate for wear.

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"Star" spring of special tempered steel to automatically correct alignment and maintain positive electrical contact.

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LOOK at this illustration—see for yourself the eleven distinctive features in the construction of the Federal Condenser. Every feature is a distinct point of superiority—essential to clear, sharp tuning and clear reception. You can get the outstanding advantages of

Federal Tone and Federal Selectivity in your pet hook-up *only by insisting* on Federal Parts. There are over 130 Federal Standard Radio Parts bearing the Federal iron-clad performance guarantee. Use them—for your own protection and enjoyment.

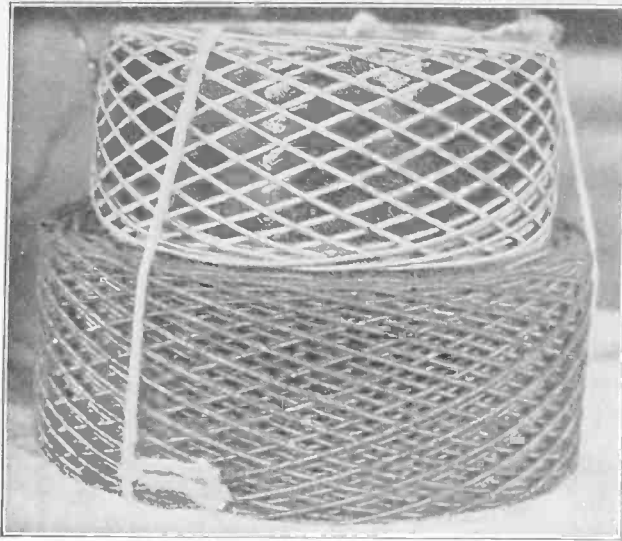
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Standard RADIO Products



(Foto Topics)

GRAPHIC photo showing the difference between a honeycomb coil and a duolateral coil. The honeycomb coil is on top. Its windings seem to constitute only a single layer, though there are two layers in this 25-turn coil. The reason is that the two layers are wound so that one wire is exactly parallel with and atop of that on the corresponding under layer. But the lower coil, which has 75 turns, is of duolateral design, that is, each succeeding layer is so wound that its corresponding turns of wire are to one side of the turns of the under layer. One wire of a given layer is centered over two wires of the preceding layer. The duolateral coil reduces the distributed capacity present in the honeycomb variety.

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Do not accept inferior so-called hard rubber panels that are not RADION and that do not have the insulating values of RADION.

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18 STOCK SIZES
Mahogany and Black

3/16 x 6 x 7	3/16 x 7 x 21
3/16 x 6 x 10½	3/16 x 7 x 24
3/16 x 6 x 14	3/16 x 7 x 26
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3/16 x 7 x 9	3/16 x 7 x 48
3/16 x 7 x 10	3/16 x 8 x 26
3/16 x 7 x 12	1/4 x 8 x 40
3/16 x 7 x 14	1/4 x 10 x 36
3/16 x 7 x 18	1/4 x 20 x 24



Look for this stamp on every genuine RADION panel. Beware of substitutes and imitations!

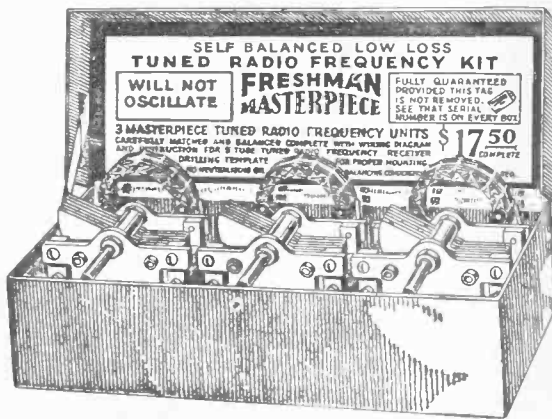
RADION

Panels, Dials, Knobs, Sockets, Insulators

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It's Easy to Build

a five tube radio frequency receiver when you use the Freshman Masterpiece Kit



No Neutralizing or Balancing Condensers Required

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VOLUME SIX OF
RADIO WORLD

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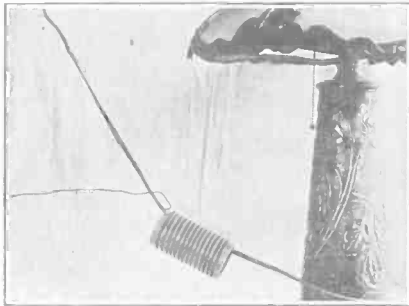
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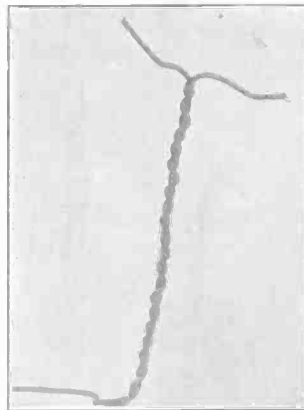
Recipes for Cooking Up Some Stunts in Your Home

13 Little Thrills for You

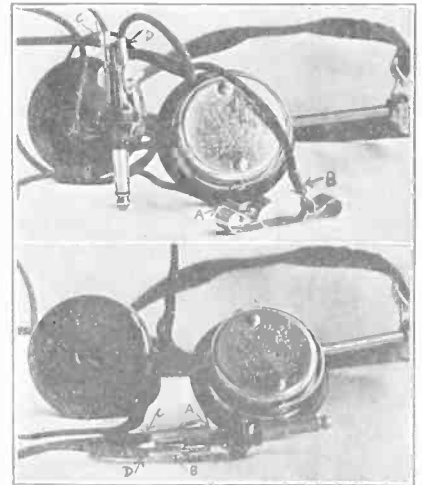
By Herman Bernard



TESTING DEVICE—Even the humble hatpin may be used in testing for short or open circuits. In photo the positive A is connected to a clip on the pin, the negative A going to one side of the buzzer, the other side of the buzzer to another pin. The beaded tips are good insulators. A fixed condenser is in foreground, prior to a short-circuit test.



SMALL VARIABLE CONDENSER—By twisting two insulated pieces of wire together, as shown, you make a condenser. The insulation and air between turns is the dielectric. Lamp cord or bell wire may be used or any other large-sized wire. By adding more twists the capacity is increased, and by reducing the number it is lowered. This is a serviceable neutralizing condenser.



MULTIPLE PHONES—Top photo shows right way to connect two or more sets of earphones, i. e., in series, which lowers resistance. One of the tips of each phone (C) goes to the plug, as does one tip (D) of the other set of phones. The free tips (A and B) are connected by a clip. Bottom photo shows wrong way, i. e., parallel connections, both tips of both phones going to the plug.

HERE is an assortment of suggestions for solving difficulties or providing substitute means of accomplishing results or introducing novelties that will be gratifying to the experimenter:

1. Two hatpins, wire, a buzzer and two clips provide an excellent testing device handy in hunting for short circuits, etc. The beaded tips of the hatpins are excellent insulation and it is these one should grip in making tests. The buzzer may be bought in any electrical store and is inexpensive. The connected wire should be stranded and insulated, e. g., lamp cord. One wire goes from the positive post of a dry cell to one hatpin, another from the negative to one side of the buzzer and the third from the remaining uncon-

nected side of the buzzer to the other hatpin. A fixed condenser may be easily tested for a short circuit, denoted by the buzzing sound. Here is where silence is gratifying.

2. Two pieces of insulated wire may be twisted together, say 4 or 5" strips of No. 18 insulated. The terminals at one end are connected in a circuit, the other terminals remaining free. By untwining one decreases capacity, but twining more wire one increases capacity. This device may be used as a neutralizing condenser.

3. Phones in multiple connection should be in series; for lower resistance, hence better volume, not in parallel. Say two phones are used. Do not

A Baker's Dozen of Tests to Delight Any Experimenter Who Likes Odd Tricks That Really Work

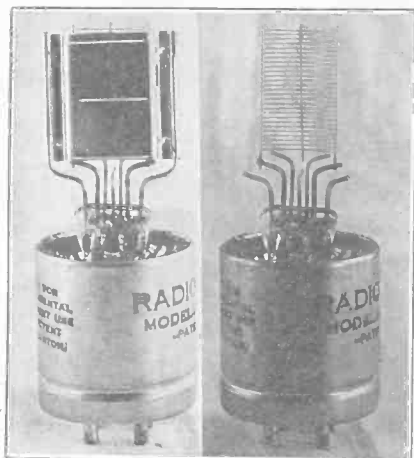
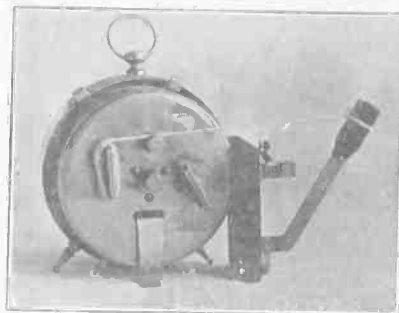
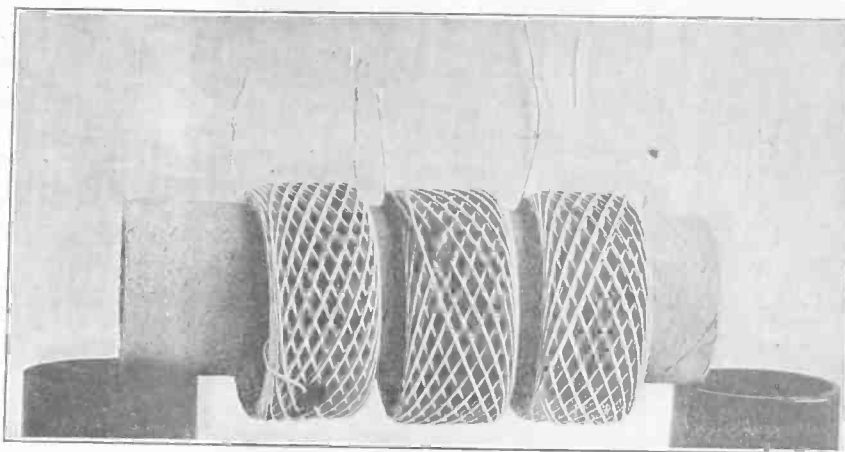


PLATE AND GRID of a vacuum tube. The plate, at left, is solid. The grid is a thin zig-zag wire, thus accounting for the familiar circuit symbol.



AN RF TRANSFORMER may be made of honeycomb coils. A good way is to put a 25-turn coil in the middle of a cardboard tubing and two 35-turn coils at the ends. Connect the outside coils in series. The coupling may be as shown or may be closer.

place one tip of each phone in the plate lead and the remaining tips in the B+ lead, but connect only two tips in the plug, one tip of each phone going to plate and B+ respectively, the two remaining tips being connected together, preferably by a clip.

4. A radio-frequency transformer for a tuned stage may be made of three honeycomb coils. A 25-turn coil is placed in the center of a 2" cardboard tube. At either end is a 35-turn coil. The terminal of one 35-turn coil (the wire emerging on the outside of the winding) is connected to the beginning of the other 35-turn coil (the wire emerging from under the winding). The middle coil is the primary. The free leads of the 35-turn coils go to the variable 23-plate condenser. Distance between coils should not exceed 3/8". Close coupling is all right. The tubing may be omitted and the coils tied together with linen thread.

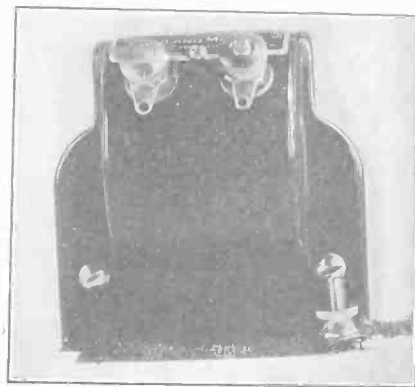
5. One may learn much about the vacuum tube by carefully breaking the glass from a burnt-out tube, the plate is solid metal. The grid is zigzagged thin wire. The electrons flow from the negative grid to the positive plate.

6. The frame of an audi-frequency transformer may be grounded to rid a set of AF howls caused by magnetic feedback or inter-capacity action or eddy currents. These are short-circuited to the ground.

7. As electrons in a tube flow from negative to positive, if a magnet is placed against the tube glass, at the plate side, the attraction of electrons is greater, that is, the flow increases. Greater signal strength and sensitivity are obtained.

8. A burnt-out tube may be utilized by breaking away all the glass and elements and attaching a

GROUNDING the frame of an audio-frequency transformer often has the effect of ditching stray impulses, such as those arising from magnetic coupling between the secondary and other inductive parts of the set, and preventing capacitive feedback which may be the cause of audio howls in a set. In some makes of audio-frequency transformers the laminations on which the core is built may be grounded instead of the frame. Often greatly improved results in clarity are obtained.



flashlight bulb socket to the base. Two wires connect the socket terminals to the filament leads in the base. Thus, is 1 1/2-volt A batteries are used, an A battery circuit may be tested. If a tube "goes" it will be only a cheap flashlight one, not a radio tube.

9. A fixed condenser in parallel with a coil boosts the wavelength. Thus if your set fails to reach the higher waves you have that remedy. A small variable condenser may be used. This gives vernier effect. If an untuned primary is to be boosted a .001 mfd. fixed condenser will set your dial readings back about 5 degrees. If a tuned primary is to be shunted the condenser should be .0001 or less, or the twisted wire device may be used.

10. A battery clips are handy, especially on storage batteries, for then you do not soil your hands with corrosion. The leads may be soldered to the

Hints for Home Consumption

end of the clips and the clips clipped to the battery terminals. Mark one clip + and join it to the red post of the storage battery.

11. A vernier may be made from a dowel (a small round wooden stick) and a circle of rubber such as is used to prevent a pencil from falling out of your

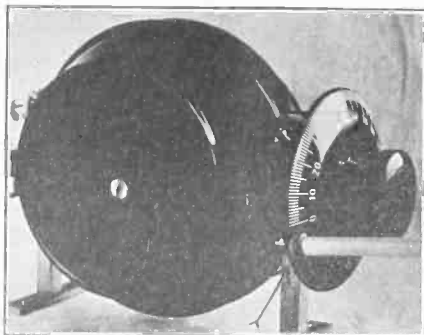


ELECTRONS are supposed to flow from negative to positive, hence the positively charged plate attracts them from the grid. By placing a magnet, as shown, on the plate side of the bulb the electronic flow is facilitated. This device was popular several years ago, but it draws laughs nowadays from newcomers in radio who do not think such a thing possible.



A TEST LAMP may be used in this fashion, the lamp socket being placed on the base of a destroyed tube

A VERNIER effect may be successfully obtained by using a dowel at the end of which is a circular band of rubber, such as is used most commonly for keeping a pencil or fountain pen from falling out of your pocket. The dowel is a short wooden rod. The rod is rotated, with the rubber held against the periphery of the dial. Thus a much finer control is obtained than is possible from the unaided hand



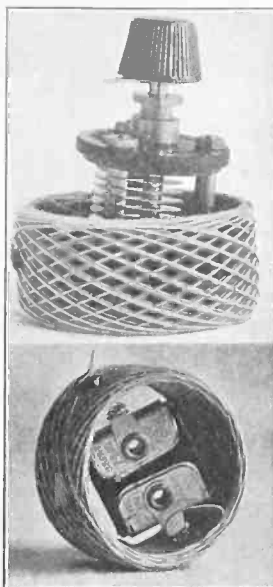
pocket. Slip the rubber collar on the end of the stick and turn the dial by rotating the stick, with the rubber collar against the dial rim.

12. If you want to be awakened in time to tune in the 7:30 A. M. setting-up exercises broadcast from some enterprising station, you can be awakened by an alarm clock (that is, I hope you can) and the alarm clock can get your set going. Tune in to the station the night before, disconnect your A battery switch, connect the switch to the winding arm of the alarm clock with string, and when the arm turns, on account of the bell ringing, it will pull the switch and—get up, you lazy bones!

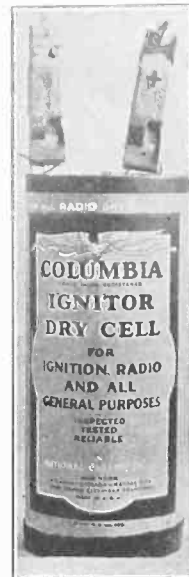
13. For an aerial, put 20 or 30 turns of wire on a tubing and slide the tubing over the electric lamp cord. Connect one end of the wound wire to the set.

The C Battery Is No Panacea

SOME fans believe that a C battery always will improve results. The efficiency of an audio frequency amplifier is not always improved by a C battery. If the plate voltage is not high a C battery will produce no improvement, but is likely to cause distortion. The advantage of a C battery is that it makes it possible to use a higher B battery voltage, giving an increased volume with minimum distortion. The chief purpose of a C battery is to reduce distortion. It also reduces consumption of the B battery current.



INCREASING WAVELENGTH may be accomplished with a fixed or small variable condenser across the coil terminals, i. e., in parallel with the coil. The small variable condenser really serves as a vernier



CLIPS may be attached to A battery terminals to facilitate connections. This is most important when storage batteries are used.

Why Coil Never Is Pure Inductance

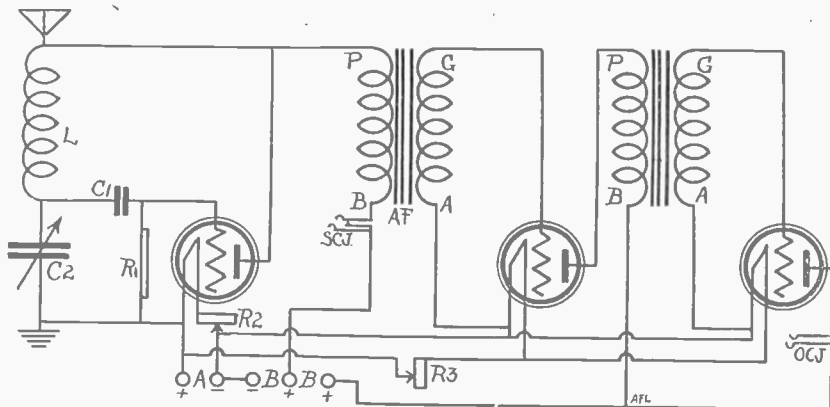
IN each turn of wire wound in the form of a coil with insulation between the windings there exists an electrical quality known as "distributed capacity." When there are a great number of parallel turns the capacity is greater. Two electrical conductors which are at different potentials have capacity between them. The electrical energy is stored up in the insulating material between the turns of wire. The turns of wire act as two plates of a small condenser. This results in a series of small capacities distributed along the length of the coil, and these capacities added up make the total or "distributed capacity" of a coil. Therefore, a coil is not a pure inductance because it has capacity across the terminals equal to its distributed capacity. In calculating the wavelength of a coil not only the amount of wire must be considered but also the resistance and distributed capacity.

Sodion Tube Needs No Grid Leak

A **NEGATIVE** charge of electricity does not accumulate around the grid of the Sodion tube as it does on the grid of ordinary vacuum tubes. The purpose of a grid leak in connection with vacuum tubes is to serve as a path for the negative charges to leak off the grid automatically. Since there is no tendency for negative charges to gather on the grid of the Sodion tube, a grid leak is not required. If the Sodion tube is used in a standard circuit the grid leak should be removed. If it is left in the circuit the operator should reverse the A battery connections so that the grid return connects to the negative terminal of the socket. This wire generally connects to the positive filament terminal in ordinary vacuum tube detector sets.

1-Dial DX Set Works Speaker

FIG. 1.—Wiring diagram for a single-dial set, operating a loud speaker. As it is regenerative it is good for DX. It is a simple circuit to wire and may be accommodated on a 7x7" panel. It is an inviting circuit for any one who desires to make his first 3-tube set. The veteran would prefer something fancier. The circuit was devised by Colpitts and named for him. Regeneration is controlled by the rheostat R2. R1 is the grid leak, which should be variable for 199 or 299 tubes, 1/2 to 10 megohms.



THE A+ and A- are shown, with the B- and the A- connected (lower left of diagram). Then, reading to the right, are two B+ posts. The first is the B+ for detector, the last the B+ for amplifier. Two 45-volt batteries are connected, the - of one to the + of the other. The remaining minus goes to A-, the remaining plus to O.C.J. and B of the second AFT (at right, top). The tap for the detector is taken from one + post of the B battery whose - lead goes to A-. B- may go to A+ instead.

By Wainwright Astor

THE simplest possible 3-tube set, comprising a detector tube and two stages of transformer-coupled AF, is still a very efficient one. A single dial is used. As the circuit is regenerative, and as all regenerative circuits must have some method of varying the regeneration, the rheostat, R2, is used for that purpose. The set is selective enough for all ordinary needs, produces good signal quality and considerable volume, especially if 201A, or 301A type tube is used. The set works well with 199 or 299 tubes, also with the 11 and 12 tubes. As the rheostat R3 controls the two audio-frequency tubes, those at extreme right in Fig. 1, its resistance should be about half as much as would be necessary if only one tube were controlled thereby.

The coil L is a 100-turn honeycomb or duolateral.

Notice that the grid leak R1, instead of being connected as usual across the grid condenser C1, goes from the grid post of the detector socket to the A+. This is to keep the high voltage of the plate circuit off the grid, where it might paralyze the tube. The connection may be made from socket post to socket post. The leak normally would be 2 megohms, but if 199 or 299 tube is used as detector it must be above 3 megohms and a variable one, going up to 5 or more, should certainly be used.

Properly wired, this set is capable of good DX work, 500 miles being obtained on the loudspeaker without trouble, in cold weather.

Panel Layout

The detector rheostat is mounted at left, under the variable condenser dial, and the AF rheostat at right, on the panel, as shown (Fig. 2). The mounting holes are for fastening the baseboard to the panel with wood screws. The jacks are placed at right and left, near the top of the panel. The diagram gives the dimensions. The jack at left is for the detector circuit, so that earphones may be used.

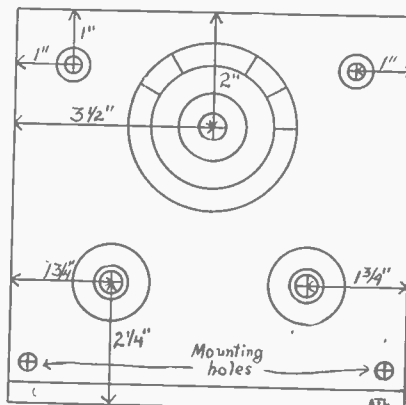
Assembly Plan

A terminal strip is used for connecting the leads from the set to the aerial and ground and the batteries. Holes are bored in the back of the cabinet to let these insulated leads emerge, and they should be preferably stranded insulated wire, like lamp cord. The position of the three sockets are shown (Fig. 3), with 199 or 299 tubes used. If other tubes are to be employed the sockets would be placed in the same relative position, only the filament posts on the sockets would be on the same plane, instead of diagonally opposite, which is a 199 and 299 characteristic.

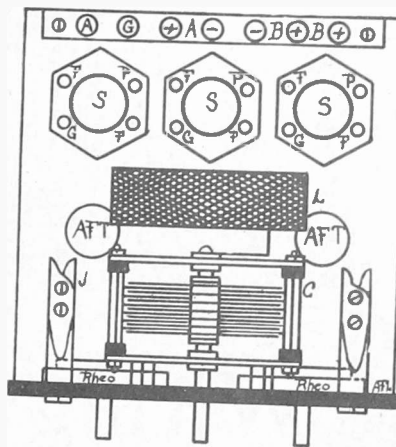
The coil is mounted in back of the variable condenser, preferably more than 1" away, to prevent interplay of currents between coil and condenser. AFT represents the audio-frequency transformers, which are merely symbolized, as they would take up more relative room than shown. However, all the parts fit on the baseboard, which is 6 1/2" wide by 7" deep. The rheostat at left is for the detector, the one at right for the amplifiers.

Wiring Directions

1. Connect the A- to one terminal of the detector rheostat, R2, the other leg of the rheostat going to the F- post of the detector tube socket, the socket at extreme left in Figs. 1 and 3. Connect the positive A battery post directly to the F+ post on the detector socket, then to one side of the amplifier



PANEL LAYOUT, showing also holes for mounting the baseboard to the panel.



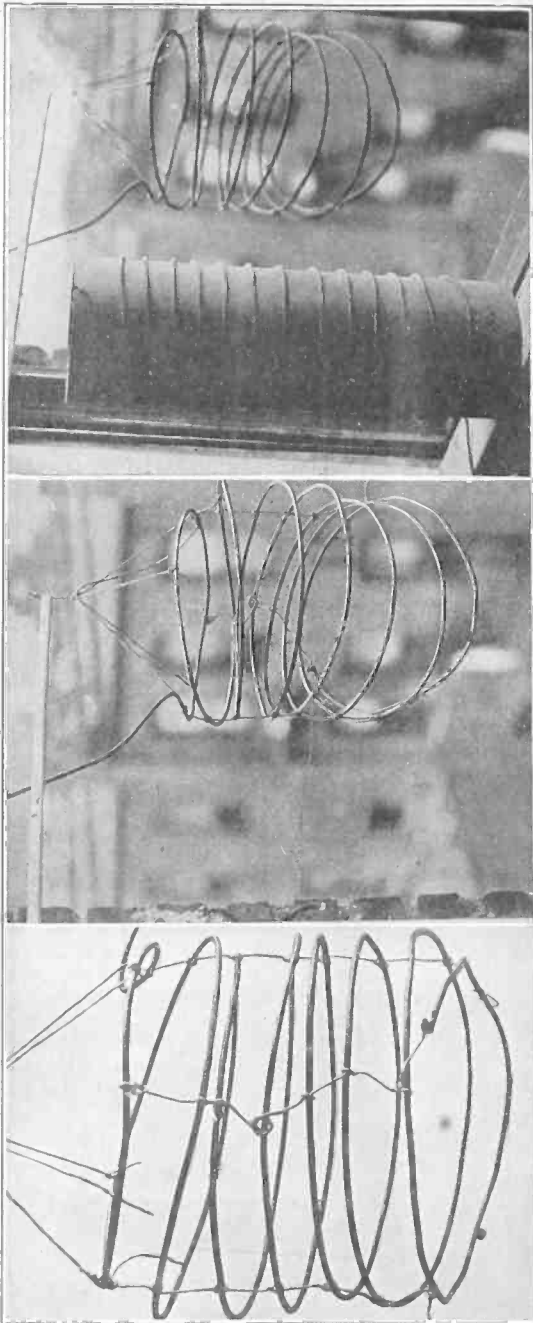
ASSEMBLY PLAN, with the audio-frequency transformers designated in the circles.

rheostat, R3. Connect the battery negative post directly to the F- posts of the amplifier tube sockets and join the remaining unconnected side of R3 to the F+ posts on these two sockets. Join the B- and A-. This completes the A battery wiring. Be careful that the F+ goes direct from the battery to the F+ post on the detector socket and that the negative A goes direct from battery to the F- posts of the amplifier sockets.

2. Connect the aerial to the beginning of the coil L. The beginning emerges from under the winding, the end from the top or outside layer of the winding. The aerial also goes to the plate of the detector tube and to the P post of the first AFT. All audio-frequency transformers are marked with either or both of the following sets of designation: P or P1, B or P2, G or S1, F or S2. P represents the primary and S the secondary, where numerals are used. Otherwise P means plate, B means B battery plus, G means grid and F means filament minus. Now connect the B of the first AFT to one side of the single circuit jack. The other side of the jack, the side to which the spring connects when the plug is out, goes to the B+22 1/2 volts.

(Concluded on next page)

Loop Makes Any Set Work



BOTTOM to top, Figs. 1, 2 and 3.



FIG. 4—Fan tuning in non-loop set that nevertheless worked well with Chester Charlton's loop method.

By Chester Charlton

YOUR aerial need not be conductively coupled to your set. If you follow my tip you can even get a crystal set to percolate—on a loop!

Fig. 1 shows a coil of No. 14 insulated wire, and how it is tied together with twine. The lead at left is from the regular aerial lead-in. Fig. 2 shows the inductance, mounted on a pole and held by the twine at right, attached to the coping or window ledge above. The lead-in is at left. Fig. 3 shows a $3\frac{1}{2}$ " diameter tubing in the foreground, giving an idea of how the energy is transferred by induction from the outside coil to the one on the tubing. This tubing coil is connected to your set, just as if it were the aerial lead-in. The ground connection may remain. Now, as for the loop. It is simply used instead of the tubing coil, if you have a loop in your home. The loop terminals may go to aerial and ground posts of your set (aerial and ground removed), or just one loop terminal to the set is aerial post, the other loop tip remaining free, and the ground connection remaining on your set. A fan is shown tuning in a regenerative set that would not operate on a loop alone, but which worked well my way.

Wiring Astor's 7x7" Circuit

(Concluded from preceding page)

If 199 or like tube is used bring this lead to B+45 volts. Connect the end of L to the stator or immovable plates of C2 and to one side of the grid condenser C1, the other side of C1 going to the grid post of the detector socket. (This lead goes to one side of the grid leak, R1, the other side of the grid leak going to A+) The ground is connected to A+ and also to the rotor or movable plates of the variable condenser. The wiring of the detector circuit is now complete.

3. The G post of the first AFT goes to the grid socket post, also marked G, and the F goes to the battery side of A—. As A— does not go through a rheostat in the amplifier circuit this connection may be made to the F— post of the first amplifier tube socket, the second tube from left in Figs. 1 and 3. The plate of this tube goes to P of the second AFT, the B of this AFT going to B+90 volts, i.e., the B battery lead at right in Fig. 1, bottom. This same 90-volt lead goes to the spring of the single open-circuit jack, OCJ. The G of the AFT goes to the grid post of the last tube socket and the F to the F— post of that socket. The plate of the third tube goes to the frame or right-angle of OCJ.

LIST OF PARTS

- One 100-turn honeycomb or duolateral coil (L).
- One 17-plate variable condenser (C2).
- One grid condenser, .00025, if fixed, but preferably of the variable type (C1).
- One grid leak, 2 megohms if fixed, but preferably of the variable type, from 1 to 5 megohms or higher (R1).
- Two audio-frequency transformers (AF).
- One rheostat to match the detector tube (R2).
- One rheostat of about half the value of that used for the detector, granting the same tubes are used in the AF (R3).
- One single closed-circuit jack, for detector (SCJ).
- One single open-circuit jack, for amplifier (OCJ).
- One storage battery, if that type tube is used, or if dry cells are used, 3 dry cells, each of the voltage required for running one tube.
- Two 45-volt B batteries.
- One 7 x 7" panel.
- One cabinet to fit.
- One $6\frac{1}{2}$ " wide by 7" deep baseboard.
- One 3" dial.
- One terminal strip with binding posts attached.
- 100 feet of aerial wire, 50 feet of No. 14 insulated lead-in wire, stranded No. 18 connecting wire, a brass angle or bus bar for mounting coil to condenser, screws, nuts, solder.

The 3-Circuit Regenerator, All Circuits Tuned, Is MY FAVORITE RECEIVER

Because—

"Its Tone Quality Is Superb"
"Its Volume Is Immense"

"Its Selectivity Is All One Needs"
"Its DX Powers Are Great"

—*"That's All I Ask."*

By Herbert E. Hayden

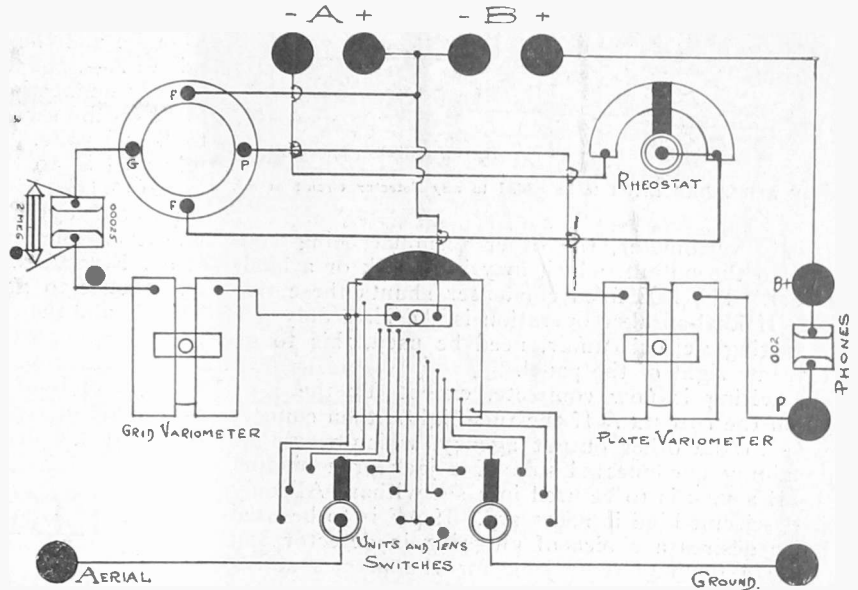
WHEN you ask a man what is his favorite receiver he usually has to stop awhile to think. But I can tell you right off the bat that mine is the 3-circuit tuner, with all circuits tuned. A variocoupler is used as the aerial tuning element and two variometers are used besides, one to tune the grid and the other to tune the plate. The regeneration is supplied through the action of the plate variometer, which when tuned to the same wave as the aerial inductance causes the transfer of energy from plate to grid to be accomplished capacitively, through the tube elements. Regeneration may be controlled, and thus radiation avoided. The plate variometer is left at zero while a station is tuned in by the aerial inductance and the grid variometer. By tightening the coupling of the plate variometer ever so gradually the point of maximum volume, soon easily recognized, is reached and the set is left tuned as it then stands. Occasionally some slight readjustment of the two other tuning elements may be necessary, however.

In any regenerative set one should tune in a station by the voice or music then being broadcast, and not by the whistle which one would hear by virtue of excess regeneration present while the tuning is being accomplished. Tune first and regenerate afterwards.

I like regeneration because it gives more volume and greater distance. It is about the equal of a stage of radio-frequency amplification ahead of a non-regenerative detector tube, hence you get the value of two tubes out of one tube, without reflexing. You cannot be so certain of making a good reflex set as you can of this one, for many experimenters do not find it easy to make a reflex reflex. It is easier to make a reflex regenerative, which it should not do.

Let us consider first the detector circuit, then two stages of audio-frequency amplification.

Use a 21" long panel, radion or bakelite. Many prefer radion, because it is easier to drill and cut. If you desire to include the two AF stages, use a 26" panel. These sizes are recommended because of the extreme desirability of keeping the variometers far apart. The variocoupler should be mounted in the center and the variometers with center shafts 8" from the coupler shaft. The detector rheostat may be placed between the variocoupler and the plate variometer, which is at right. If a terminal strip is used it should be in the rear of the set. A 20" baseboard should be used for a 21" panel and a 25" baseboard for a 26" panel. The strip would be affixed to the baseboard and the leads carried to the posts on the strip, outside connections being made with insulated wire carried from the posts through holes to be bored in the back of the cabinet. A



THE DETECTOR CIRCUIT (Fig. 1) of the variocoupler-two-variometer set, a favorite that has stood the test. The tube socket is at left, top. The aerial goes to one tap switch, the ground to the other. This circuit is selective and produces good quality of signal. It gets DX well. Dry cell tubes like 11 or 12 type, with 1½-volt A battery, may be used, or 199 or 299, with 4½-volts. Storage battery tubes work well.

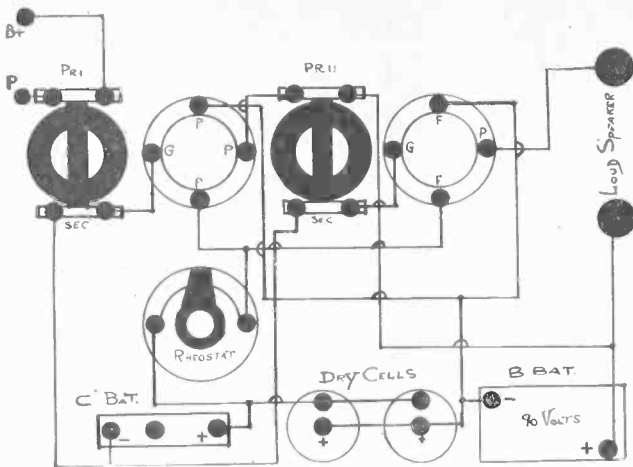
double tap switch may be employed on the coupler stator or two separate home-made switches used. The commercial double product is inexpensive and more convenient, as only two holes need be drilled to secure it to the panel.

The aerial and ground leads enter the cabinet either through the rear of the cabinet or from a panel binding post, as you prefer. Each lead goes to a metal connecting strip on each switch. This connecting strip connects with the movable switch arm and thence to the switch points, the points being connected to the tap loops on the coupler stator. Get a coupler that is tapped in units and tens, that is, tapped every turn for the first eight turns or so, then one every ten turns thereafter. The unit taps are those made to the aerial switch and the tens taps to the ground switch. The energy is transferred from the stator to the rotor of the coupler by mutual inductance. The beginning of the rotor goes to one terminal of the grid variometer and the end of the rotor to the A+. The remaining unconnected terminal of the grid variometer goes to one side of the grid condenser, the other side of that condenser going to the grid post (G) on the socket. (Fig. 1.) Across the condenser is a 2-megohm grid leak. The only other condenser used in the circuit is the .002 mfd. fixed condenser across the phones. Hence all tuning is by inductance, which is to be preferred as against capacity, because of the effect of inductance in building up the signal.

The A wiring consists of connecting the A- to one side of the rheostat, the other side of the rheostat to the F- post on the socket, and the A+ directly to the F+ post on the socket. B- and A+ are joined.

The P post on the socket goes to one terminal of

Wiring Two Stages of AF



THE AF AMPLIFIER circuit to be added to any detector circuit at all.

the plate variometer, the other terminal being connected to the output, which may be a jack or a binding post. The .002 fixed condenser shunts these two leads. If loud-speaker operation is the idea, only one jack, a single-circuit affair, need be used, this to go at extreme right of the panel.

The wiring is now complete, except for the B+. Turn on the rheostat. If the tube lights, then connect the B+ to the other output agency, which would be a remaining unconnected side of a jack or a binding post. If a jack is to be used in a set without AF only a single-circuit kind is necessary. If AF is to be used and one desires a choice of plugging in detector and AF, use a double-circuit jack for the phones and a single-circuit one for the speaker. An examination of the jacks you buy will reveal how they operate and how the connections are to be soldered to them. The set at this stage is ready for earphone reception, DX included.

As for the AF (Fig. 2), one rheostat controls the two AF tubes. The rheostats depend on the type of tube used. If the 11 or 12 type tube is used, 20 ohms for the detector and 10 or 15 ohms for the amplifier circuit suffice.

The parts for the amplifier should be arranged as shown in Fig. 2. The primaries and secondaries of the AF transformers are so marked; also the posts of

the sockets are designated F, G and P. Note that a C battery is inserted. The C+ goes to the A- and the C- to the F or S² post of each of the transformers. P¹ and P, P² and B, S¹ and G, S² and F are corresponding designations on AF transformers. P stands for primary and S for secondary.

The output of the detector, marked P and B in Fig. 1, go to the P and B leads in Fig. 2. The connections are as follows: The plate output of the detector goes to P¹ of the first AFT, the one at left, Fig. 2. The AFT may be recognized also by the heavy black circles, with thick black diameters. The P² is connected to B 22½ volts. G goes to the grid of the first AF tube and the F to the C-. C+ goes to the battery side of A-, not to the side of the rheostat opposite the battery connection. The P of the first AF tube goes to P¹ on the second AFT, P² of the second AFT going to B+ 90 volts. S¹ or G goes to the grid of the last tube and S² to the C-. Two dry cells are connected in parallel for the AF circuit, i. e., the like posts are connected together, plus to plus, minus to minus. The plus then goes direct to the F+ post on each of the two AF sockets. The A- goes through the rheostat and thence to the F- socket posts as in the detector. The B- and the A+ are connected. The output is taken from the P post on the last socket and from the B+ 90 volts. These two leads may go to one of each of the terminals of a single-circuit jack. The P goes to the frame or right angle of the jack, the B+ 90 volts to the spring or blade.

Efficiency from Separate B Cells

HOWLS in a radio-frequency amplifier can sometimes be attributed to a common B battery, because the wiring of one tube is mixed with that of another and interaction begins. If a radio-frequency amplifier is used it is a good idea to use separate B batteries for each tube. A common B battery can be used with the detector and audio amplifiers. Efficient Super-Heterodyne sets generally employ an individual B battery for the oscillator; another unit for the first detector and intermediate amplifier and another set for the second detector and audio amplifiers.

Fixed Condensers Short-Circuited by Using Too-Hot Iron

Most Common Cause of Failure Company Finds After Making Many Trouble-Shooting Tests—Tubes That Light But Don't Amplify Is Second Most Frequent Difficulty

A MANUFACTURER with a large service department that undertakes trouble-shooting reports that the outstanding result of the experiment has been to reveal that the troubles are not found in the large units of sets, like transformers and variable condensers. Usually the difficulties discovered are such things as short circuited fixed condensers, caused by the set-builder using an extremely hot soldering iron when soldering a wire to the condenser. This was the

commonest source of trouble. Next to it was using tubes which would light but could not amplify. These defective tubes when tested were found not giving any electron emission, hence no results therefrom were possible.

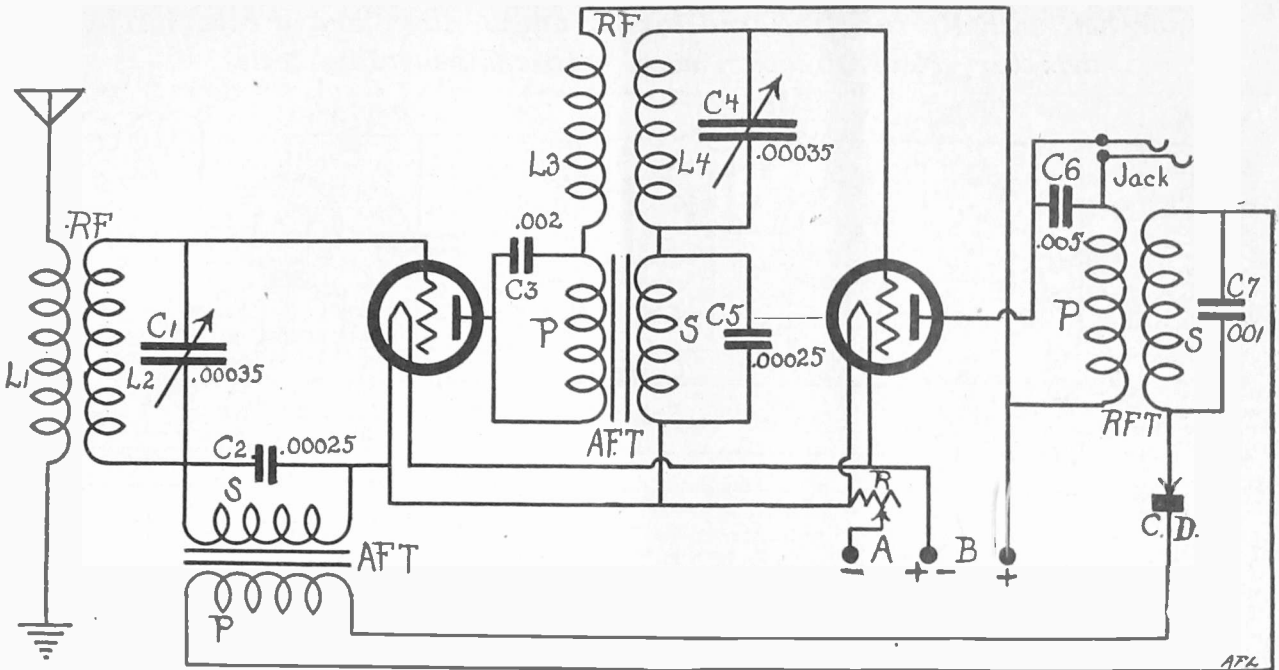
Another source of trouble was caused by taking liberties with the circuit itself and incorporating some of the builder's own ideas. Not infrequently trouble is experienced through using discarded parts from other sets in making a new one.

Many times these old parts were smeared with solder or dirt which made them unsuitable for further use.

High losses in variable condensers which had no cover to exclude dust explained difficulties in many instances. Some builders, too, did not realize that condensers should not be oiled. High losses also are caused by poorly soldered joints in jacks, or by using acids for soldering. One such joint when measured in the laboratory showed several hundred thousand ohms resistance. A joint like this would cause a high pitched whistle and other noises which would be blamed incorrectly to inter-transformer action.

The success attending the operation of service stations has resulted in a decision by the company to continue them permanently.

A Low-Loss 2-Tube Reflex



WIRING DIAGRAM (Fig. 3) of 2-tube-and-crystal reflex, comprising two stages of RF, crystal detector and two stages of AF. As this is the utmost that can be obtained from two tubes, and as the construction of any reflex requires great care, considerable attention must be bestowed on assembly and wiring. The values of the fixed condensers must be accurate. The circuit network serves also as an assembly plan, except that the second audio transformer, the one shown in center, should be nearer the panel. One rheostat is used to control both tubes. If the 201A or 301A type tubes is used this rheostat should be 15 ohms, and if the 199 or 299 type is used it should be 10 to 12 ohms. The crystal detector should be mounted on the B post of the first audio transformer, the one at the left, bottom, if the fixed type is used, but an adjustable crystal should preferably be mounted on the panel, above the second variable condenser (at right in Fig. 2, below).

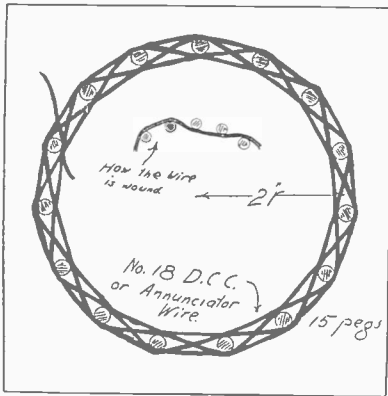


FIG. 1. (at left), Diagram for winding the coils. Fifteen pegs or dowels, are pushed into holes drilled on a wooden block in circular formation, the circle 4 in. in diameter. Double-cotton covered No. 18 wire is recommended. Note that the wire is wound in and out of every two dowel sticks. How the wire wound is clarified by the inset. The primary next is wound over the secondary, but separated from it by a strip of paper 1/2 in. in width. The primary has 10 turns

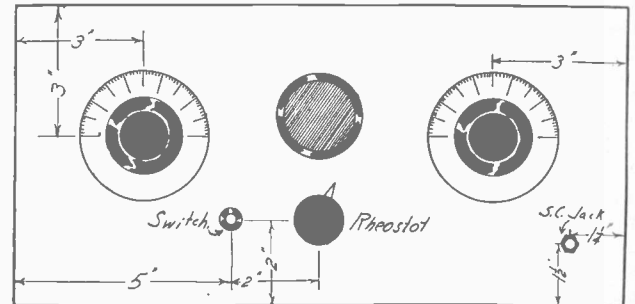


FIG. 2.—Panel layout of Caldwell's set. If a switch is used (not shown in wiring diagram) it should interrupt the positive A lead.

By Byrt C. Caldwell

THIS article describes the construction of a 2-tube receiver, made of low loss parts, which gives extraordinary results. The receiver employs two stages of radio-frequency amplification and two of audio-frequency amplification. A crystal detector is used. The receiver is the equal of most of the 5-tube receivers, giving good loudspeaker reproduction over great distances. The tone and selectivity are excellent. There are two dials, both set the same for any one station. Tuning is simple.

The tuned radio-frequency transformers are shown in Fig. 1. They are made as follows: On a wooden block, 5" square, draw a 4" circle. Mark this off into 15 or 17 equal divisions, bore holes on these divisions, and insert pegs in the block. The pegs are at right angles to the base. Use No. 18 DCC wire or annunciator wire. It is essential that the wire be well separated. For this reason enamelled or single-covered wire is not near as good as the double-covered. The wire should also be large for best results. (No. 18 or even larger.) Wind this wire on the form as shown. Wind it in and out of every two pegs. The insert in Fig. 1 shows just how this is done. Wind 45 turns. Wind a thin strip of paper, about 1/2" in width, around this, about at center, and on top of the paper, wind ten turns

of the same wire in the same direction. This is the aperiodic primary. Paint the coil with collodion and remove it from the form.

Fig. 2 shows the panel, 7" x 14". Use radion or formica. When the panel is fastened to the baseboard, the instruments are arranged as follows: The sockets are placed one in back of each variable condenser. The RF transformers are placed at right angles to each other, the first one so that the plane of the coil is parallel to the baseboard, the second perpendicular to the base. These, too, are placed in back of the condensers, but so as not to interfere with the tube sockets and to clear the condensers, panel, etc., by at least 1". They should be supported on brass angles so as to clear the base by 1". The audio transformers are placed close to their respective tubes. The iron core (fixed) RF transformer is placed on the edge of the base, near the jack.

The constructor should use low-loss condensers. The construction and placing of the inductances will complete the low-loss features of the circuit.

It is advisable to use a condenser kit when installing the fixed condensers, for although those specified usually have been found best in this particular circuit, different sets may require different capacities. **These fixed condensers are very important in a reflex set!**

Non-Radiating Regeneration

2-Tube Set, with RF tube reflexed for an audio stage, and a tube serving as detector—Neutralization used with compensating coils

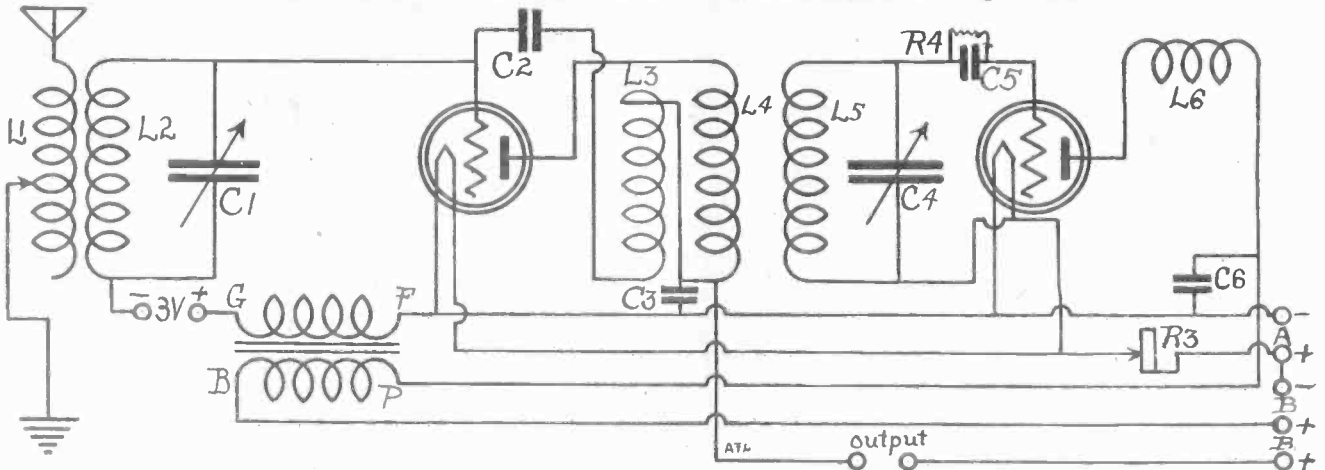


FIG. 3—Wiring diagram of the neutralized reflex. Two tubes are used, the first is the RF tube, then the detector, and the signal is passed back through the audio-frequency transformer to be amplified in the first tube at audio frequencies.

By Brewster Lee

MOST reflex circuits, unless made by experts, oscillate undesirably, due to inter-circuit coupling. This reflex circuit employs regeneration and also neutralized radio-frequency amplification. The neutralizing principle is basically the same as that used in the Neutrodyne.

All the coils are spider-webs and, wound on a 13-spoke form, 5½" diameter. L1 consists of 30 turns of No. 22 DCC wire with a tap taken from every fifth turn. L2 has 45 turns of the same size wire. Coils L3 and L4 are the self-balancing or compensating windings of the primary of the coupler. Both these windings are made at the same time, in the following manner. Measure off two lengths of 55 feet of No. 26 wire, place the two lengths side by side and wind them together as one wire on a spider web form, making 22 turns. Connect one of the outside leads to one of the inside leads, thus making in effect a 44-turn coil. L5 is the same as L2, having 45 turns of No. 22 wire. L6, the tickler coil, consists of 20 turns of No. 22 wire. Five spider web coils are used. To obtain maximum selectivity over all the broadcasting wavelengths, the tickler coil is made variable. This is done by passing a rod through a supporting bushing on the panel, and fastening coil L6 thereto as shown in the assembly plan, Fig. 1. Coils L3, L4 and L5 are fastened parallel to the baseboard. L1 L2 are mounted upright and to the right of C1 and the audio-frequency transformer. The radio-frequency tube is placed immediately behind the rheostat, and the detector tube placed behind the RF tube. The spider-web coupler just fits in nicely be-

tween the rear of variable condenser C4 and the binding post strip at the back of the baseboard.

Coils L1 L2, the RF coupler, may be moved back from the panel enough to provide room for the jack as shown in the panel diagram, Fig. 2. The five taps from L1 will be a little longer in this case. The rheostat is placed underneath the switch knob, and the knob controlling the tickler coupler is directly to the right. The jack is at the corresponding left hand position of the rheostat knob. The panel should be drilled exactly in accordance with the dimensions given on the diagram.

In assembling the set, first mount the condensers jack, rheostat, switch lever and tickler coupling rod onto the panel. Next place the audio-frequency transformer, sockets and fixed condensers. The spider-web coils are next put in place, and remember firmly to fasten the tickler coil to the rod. Use as little metal here as possible, preferably tying the coils tightly to the rod with thread. The binding post strip is placed at the rear of the baseboard and has marked binding posts. The panel is 16"x7"x3/16".

The wiring diagram, Fig. 3, shows the end of L3 connected to the neutralizing condenser C2 and the beginning of L4 connected to the plate. This may not be followed exactly as there is no difference which coil is connected to C2. It is important, however, to have L6 connected right, and the builder will have to reverse the leads of that coil if the circuit does not oscillate. Condenser C2 should be a small 3-plate condenser, as a higher capacity than that used for ordinary Neutrodyne circuits is necessary here. A 3-volt C battery is connected from the G post of the AF transformer to the outside end of L2. One rheostat, R3, regulates the filament temperature of both tubes. Careful neutralization of the RF tube is necessary for best results.

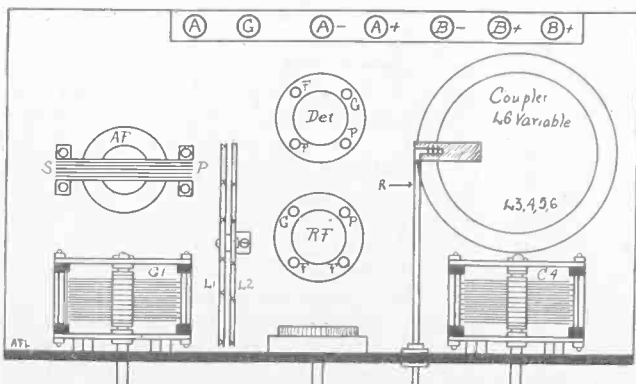


FIG. 1—Assembly plan of Lee's set. Rod R may be either a thin dowel stick or a length of ¼ inch hard rubber or bakelite round rod.

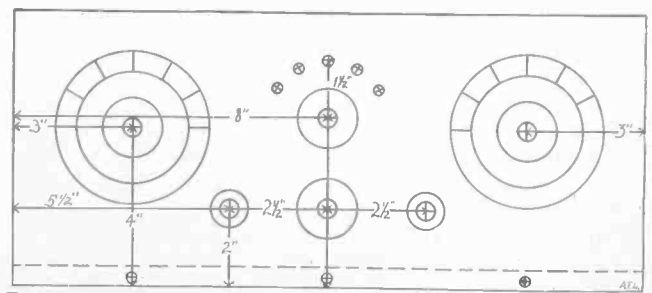


FIG. 2—Panel layout, 16"x7". The antenna tuning condenser dial is at the left, and the secondary condenser at the right. The rheostat is placed underneath the tap switch, and the tickler knob to the right of the rheostat.

Wave's Peak or Bust

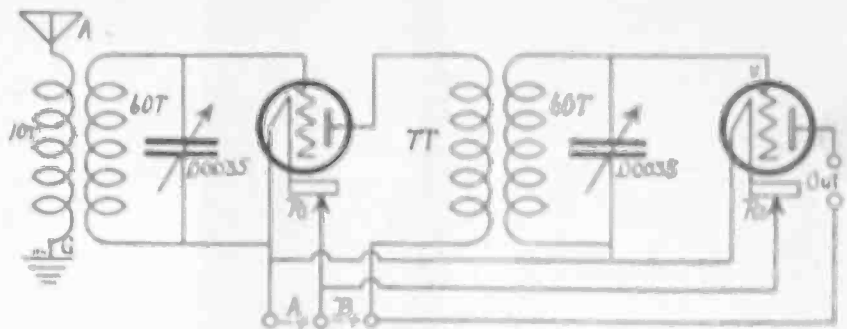
A Discussion of Radio-Frequency for the Beginner by a Noted Expert

By N. N. Bernstein

AFTER the beginner in radio has had some experience with the single-tube circuits as described in the October 4 issue of *RADIO WORLD* the desire is always present to increase the range and volume of the receiver. To this end amplification is necessary. Merely to increase the volume would not bring in greater distance. To obtain greater sensitivity the signal must be amplified before it is rectified by the detector tube. One or more vacuum tubes are required to do this, and the process is called radio-frequency amplification, because the signal is still inaudible. It is only after the signal is rectified in the detector tube that it can be heard in the earphones. The circuit for amplifying at radio-frequency is the same, in many respects, as the single detector circuit. In Fig. 1, P represents the primary and S the secondary of a fixed radio-frequency transformer. The fixed type of RF transformer usually has an iron core. The iron core has the effect of broadening the amplification peak of the transformer, thereby causing the transformer to function over a fairly large wave band. This is the necessary makeshift due to absence of a tuning control. The antenna is connected to one side of the primary, the ground to the other. One end of the secondary is connected to the grid and the other end to the negative A battery lead. In detector circuits the grid return, that is, the electrical lead going from the grid of the tube to the filament post of the same tube, is to the A+, but in all amplifiers that lead goes to the negative post. The binding posts in Fig. 1 marked "out," are connected to the detector tuning circuit, where the antenna and ground posts are. Of course, when using the radio-frequency amplifier the antenna and ground are not connected to the detector tuner. As the transformer in Fig. 1 will not cover all the broadcast wavelengths efficiently, it is desirable to tune this circuit variably. In that way your RF amplifier functions at a peak on almost all wavelengths, instead of only in a few.

In Fig. 2 we have a tuned radio-frequency circuit. The coil may be 60 turns of No. 22 wire, single or double cotton cover, and the condenser the variable type, say 17 plates, if the low-loss type is used. As in the simple detector circuit, the signal is tuned by the condenser, which allows only the wavelength of a desired station to pass on to the grid of the tube. A unit, such as represented in Fig. 2, will increase the ordinary range of a detector circuit as much as 100%. This form of RF is known as impedance, since no primary-and-secondary combination is used.

Fig. 3 is two stages of tuned radio-frequency amplification. The coils are what is popularly known as Neutroformers. The combination of a Neutroformer and a variable condenser makes a tuned radio-frequency unit. This transformer is different from the one represented in Fig. 1 because there is no iron core, the coils of wire simply being wound on $3\frac{1}{2}$ " diameter tubes. The primary and secondary windings may go side by side or one on top of the other. The ten turns are the primary of the first Neutroformer and are untuned. The signal passes through this primary circuit and is induced through air to the secondary circuit, where the tuning takes place. The .00035 mfd. condenser (17-plate) tunes the grid of the first tube to respond to the desired wave. A high B battery volt-



TWO STAGES of transformer-coupled tuned RF, such as used in the commercial Neutrodyne. The output is from the plate of the second tube; this lead going to the B+90 volts, through the primary of the RF transformer used in the detector circuit. The secondary is coupled inductively to the primary, that is, there is no metallic contact. The tuning element of the detector is an RF transformer, too.

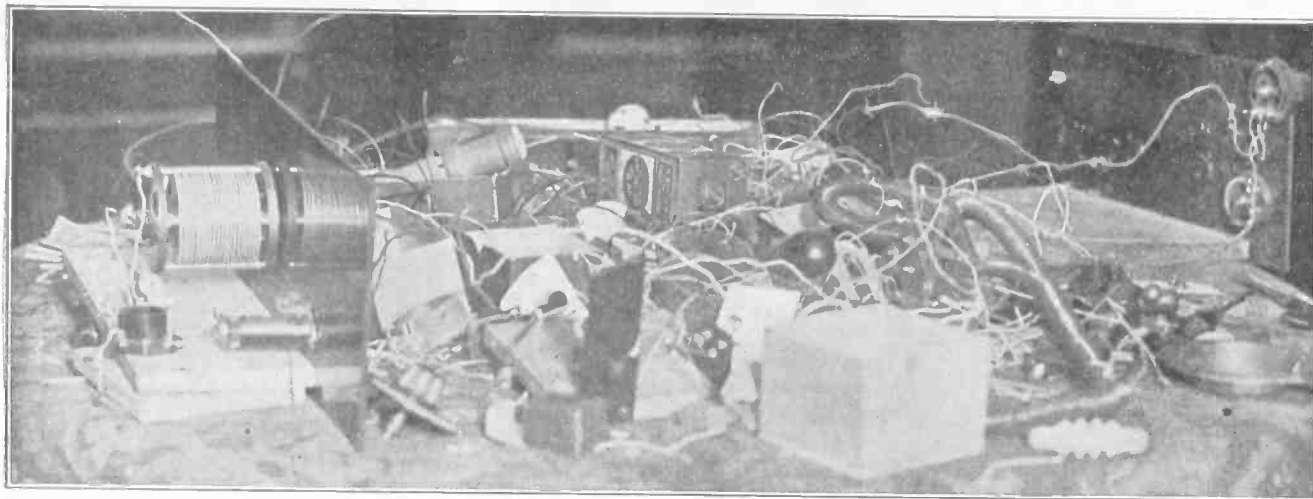
age, usually from 67½ to 90 volts, on the plate of the RF tubes effects a fairly high rate of amplification. This circuit increases the strength of the signals in the first tube. This amplified radio-frequency signal passes on to the second coil, which is composed of seven turns for the primary and sixty turns for the tuned secondary. This low number of primary turns is sufficient to induce the proper amount of energy into the sixty turns secondary. The number of turns in this primary may be increased, but in that case the circuit will have a tendency to oscillate, due to bringing the grid and plate circuits into resonance. The second condenser is tuned the same as the first one, thus tuning the signal again as in the first stage. The weak signal, so originally picked up and amplified by the first tube, goes through the same process again in the second tube with a correspondingly higher rate of amplification. Two steps of radio-frequency amplification, such as described, are the standard used in commercial Neutrodyne sets. The output of these tubes goes directly to the tuning element of the detector circuit, where the greatly increased signal is then rectified and brought out very loud indeed. A curious fact about radio-frequency amplification is that a strong signal from a nearby local station will not be amplified as much as a weak signal from a distant station. Therefore the weaker signal will have a greater amplification factor than a correspondingly strong signal. This is the reason for the great distance records made by tuned radio-frequency sets.

In matching coils and condensers for RF and detector stages it must be remembered that low-loss condensers of say 17 plates cover as effective a capacity range as a 23-plate condenser not of the low-loss type, and that low-loss coils give a greater amount of induction for the same number of turns.

This accounts for the failure of some experimenters to cover the broadcast band, although turn for turn and plate for plate the inductance directions and the capacity ratings seemingly were followed as given by the author. The fact is they were not.

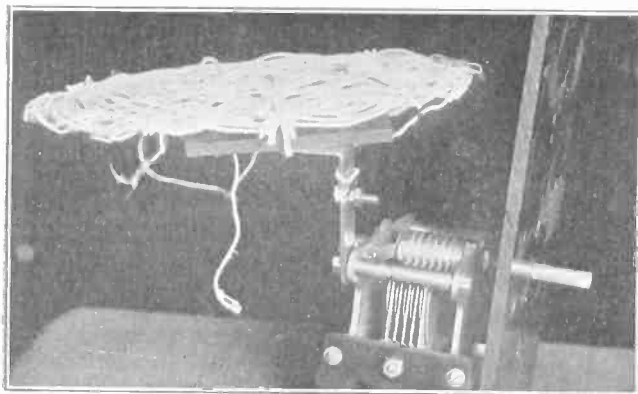
Many wonder just what the Neutrodyne circuit is, since it is described as two stages of RF, detector and two stages of audio-frequency amplification. There is some debate as to whether the Neutrodyne is entitled to rank as a circuit. The fact is that it is mainly a device for preventing the currents from running back and forth among tubes, this truaney playing havoc with stability so greatly desired in any circuit. The device is a neutralizing condenser, which is an ordinary condenser of small capacity. It is variable and is adjusted to the proper capacity, governed by the type of tube used and other considerations, and connected usually between the grid of one tube and

Chaos vs. Neatness at Workbench



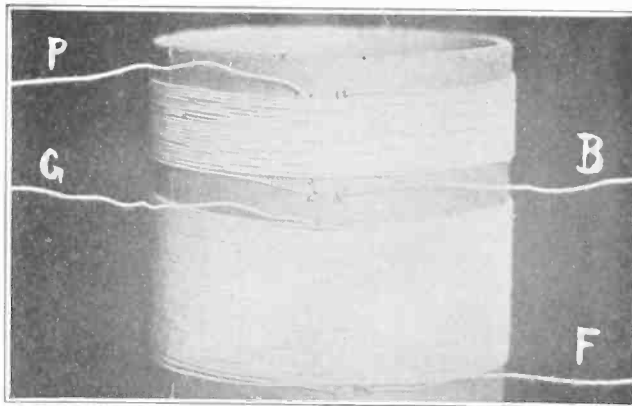
(Foto Topics)

THIS IS NO WAY to keep your parts, apparatus, equipment and wire, as if they were a lot of junk. When possible shelving should be used and your parts and equipment stored in regular places for ready access. By leaving things all jumbled up, as shown in this photo, considerable time is lost in hunting for what you want, your patience is sorely tried, and you do not get the fun out of home construction that is your due. It converts your hobby into a task. The careless fellow responsible for the above outrage even left a dollar bill on the table, extreme left background.



(Foto Topics)

A RADIO-FREQUENCY TRANSFORMER may be wound on a spider-web coil, the primary consisting of 12 feet, wound first, and the secondary of 50 feet, wound next, No. 20 double cotton covered wire being used. Linen thread or cord may be used to bind the windings of both coils, one such piece of thread circumscribing the apertures between spokes of the spider-web form. Then the form may be cut away. The secondary is connected to the variable condenser. The coil may be mounted as shown, a brass angle being fastened by one of the screws on the end plate of the condenser. The brass angle has holes in it that pass the machine screws most frequently used in radio, and corresponding holes are bored in the hard rubber so that the screws are passed through both the rubber and the brass angle, nuts securing the two together. The coil is then tied to the hard rubber strip. The coil is kept more than 1 inch away from the back of the panel and also more than 2 inches above the condenser plates. This is to conserve the signal strength. Both coil and condenser are low-loss.



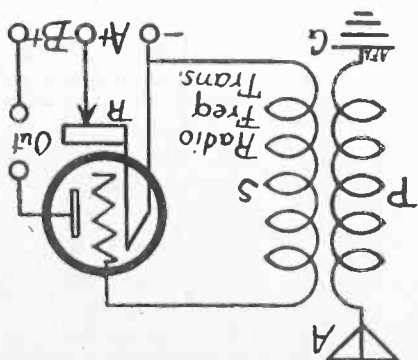
(Foto Topics)

ON A CARDBOARD TUBING a radio-frequency transformer may be easily wound. The winding is begun at top, $\frac{1}{2}$ " or less from the rim. The beginning is P and the end is B. This winding constitutes the primary. If used in a radio-frequency stage, P goes to the plate of the preceding tube and B goes to B+90 volts. If the transformer is used for tuning the aerial circuit, P goes to aerial and B goes to ground. The secondary winding is begun $\frac{1}{2}$ or $\frac{3}{4}$ " from the end of the primary. The beginning of the secondary is G, because it goes to the grid of the tube upon which the transformer functions. The end of the secondary is F, because, in amplifier circuits this lead, called the grid return, goes to the filament minus post on the socket. P is the only lead that ever goes to the preceding tube. The number of turns will vary with the purpose and the capacity of the condenser. Used as the detector tuning element in a reflex set, 20 turns of No. 20 double cotton covered wire will function as the primary.

Taking the IF Out of RF

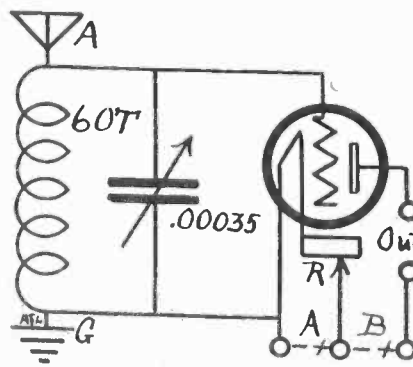
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grid coil of the succeeding tube. This balancing effect may be obtained without the use of neutralizing condensers, by preventing the magnetic fields from exchanging their charges and keeping unwanted capacity out of the coils. Phusi-formers, low-loss coil - and - condenser combinations, direction of coil winding and



THE PRIMARY and secondary of a fixed radio-frequency transformer are shown here, hooked up to a tube as the first RF stage, i. e., aerial and ground connected to the primary. Note that there is no tuning element, i. e., variable condenser, variometer, etc. An iron core in this small commercial device broadens the tuning

the use of a potentiometer are ways in which these results are attempted. Some of these ways are good, others not so good, and the Neutrodyne so far is holding its own. In the Neutrodyne and in some of its competitor circuits that use no external balancing device the coils are mounted at an angle to avoid or minimize the interplay of the currents so disastrous to fine results.



TUNED IMPEDANCE RF consists of a coil and variable condenser.

Boxing Coil for Outdoor Loop

The Radio University

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

PLEASE show me in a diagram how to put a honeycomb coil inside a doubly-protected box arrangement, so I may use my outdoor antenna as a loop and gain selectivity, as described in RADIO WORLD, issue of October 4.—Thomas Waldkind, Albany, N. Y.

A 25-turn honeycomb or duolateral coil (LI in Fig. 43) is placed inside a small wooden box, the leads being brought out through two holes bored in the box as shown. These holes are sealed with sealing wax. This contraption is placed in a slightly larger wooden box, where the process is repeated. Thus the coil is protected from the weather. The leads A and G go, respectively, to the end of the aerial farthest from the set and to the ground at that same point.

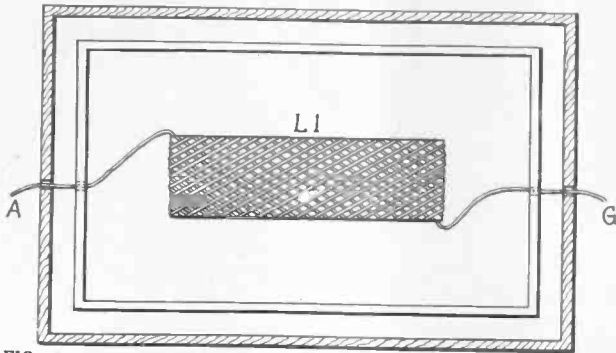


FIG. 43 (above) Showing how a coil is placed inside two boxes and sealed, for using your antenna as a loop.

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THE REFLEXED MAGNADYNE, A 3-TUBE NEUTRODYNE, by N. N. Bernstein, Technical Editor, issue of Sept. 13. Send 15 cents or start your subscription with that number. Radio World, 1493 Broadway, N. Y. C.

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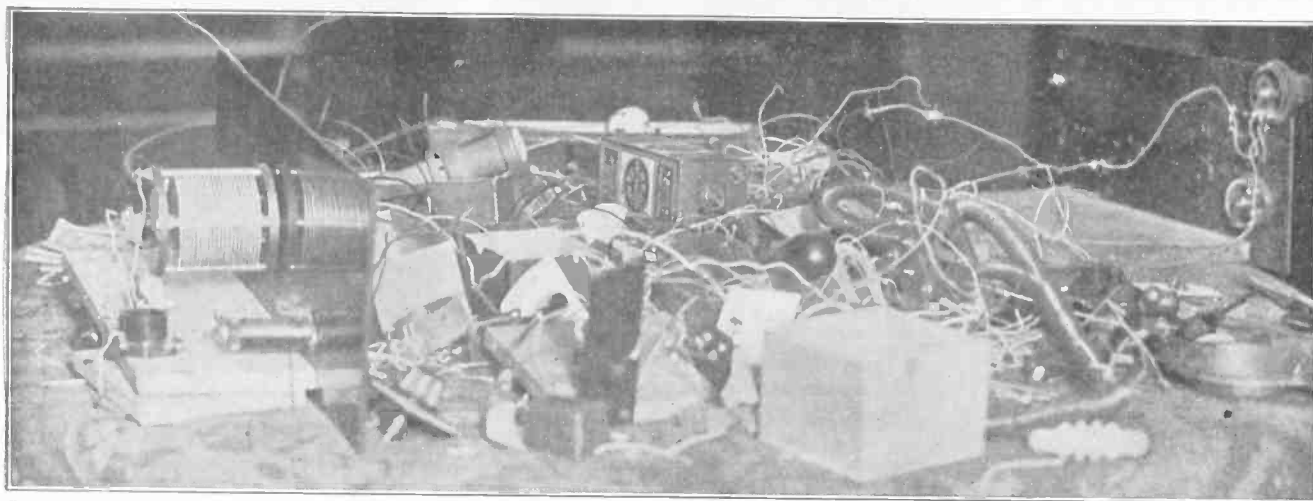
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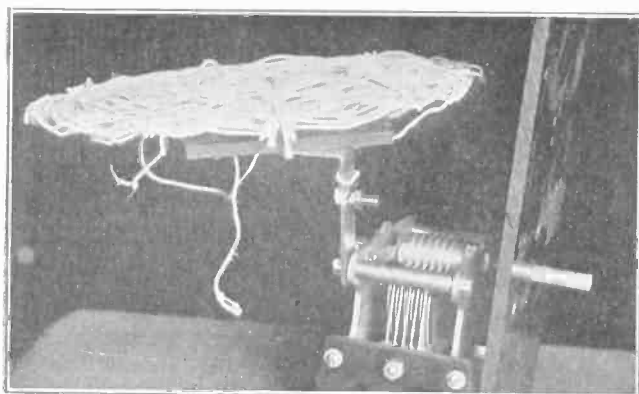
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Chaos vs. Neatness at Workbench



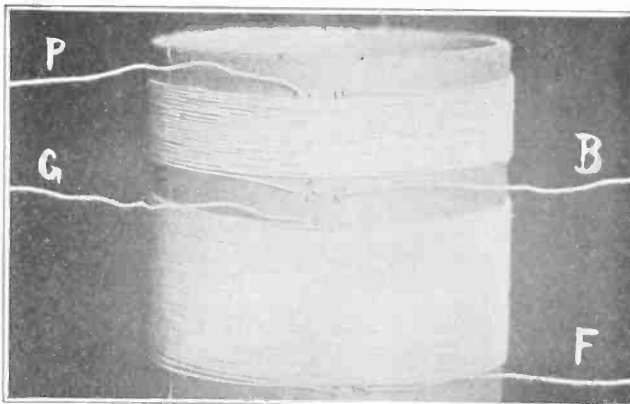
(Foto Topics)

THIS IS NO WAY to keep your parts, apparatus, equipment and wire, as if they were a lot of junk. When possible shelving should be used and your parts and equipment stored in regular places for ready access. By leaving things all jumbled up, as shown in this photo, considerable time is lost in hunting for what you want, your patience is sorely tried, and you do not get the fun out of home construction that is your due. It converts your hobby into a task. The careless fellow responsible for the above outrage even left a dollar bill on the table, extreme left background.



(Foto Topics)

A RADIO-FREQUENCY TRANSFORMER may be wound on a spider-web coil, the primary consisting of 12 feet, wound first, and the secondary of 50 feet, wound next, No. 20 double cotton covered wire being used. Linen thread or cord may be used to bind the windings of both coils, one such piece of thread circumscribing the apertures between spokes of the spider-web form. Then the form may be cut away. The secondary is connected to the variable condenser. The coil may be mounted as shown, a brass angle being fastened by one of the screws on the end plate of the condenser. The brass angle has holes in it that pass the machine screws most frequently used in radio, and corresponding holes are bored in the hard rubber so that the screws are passed through both the rubber and the brass angle, nuts securing the two together. The coil is then tied to the hard rubber strip. The coil is kept more than 1 inch away from the back of the panel and also more than 2 inches above the condenser plates. This is to conserve the signal strength. Both coil and condenser are low-loss.



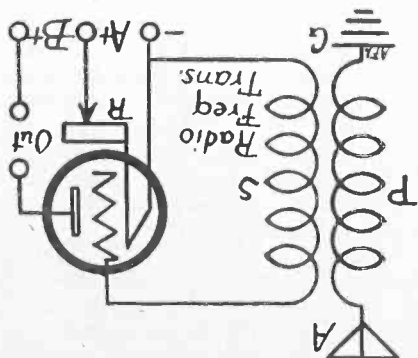
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ON A CARDBOARD TUBING a radio-frequency transformer may be easily wound. The winding is begun at top, $\frac{1}{2}$ " or less from the rim. The beginning is P and the end is B. This winding constitutes the primary. If used in a radio-frequency stage, P goes to the plate of the preceding tube and B goes to B+90 volts. If the transformer is used for tuning the aerial circuit, P goes to aerial and B goes to ground. The secondary winding is begun $\frac{1}{2}$ or $\frac{1}{4}$ " from the end of the primary. The beginning of the secondary is G, because it goes to the grid of the tube upon which the transformer functions. The end of the secondary is F, because, in amplifier circuits this lead, called the grid return, goes to the filament minus post on the socket. P is the only lead that ever goes to the preceding tube. The number of turns will vary with the purpose and the capacity of the condenser. Used as the detector tuning element in a reflex set, 20 turns of No. 20 double cotton covered wire will function as the primary.

Taking the IF Out of RF

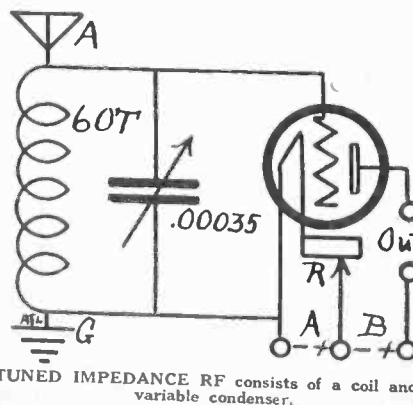
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grid coil of the succeeding tube. This balancing effect may be obtained without the use of neutralizing condensers, by preventing the magnetic fields from exchanging their charges and keeping unwanted capacity out of the coils. Phusi-formers, low-loss coil - and - condenser combinations, direction of coil winding and



THE PRIMARY and secondary of a fixed radio-frequency transformer are shown here, hooked up to a tube as the first RF stage, i. e., aerial and ground connected to the primary. Note that there is no tuning element, i. e., variable condenser, variometer, etc. An iron core in this small commercial device broadens the tuning

the use of a potentiometer are ways in which these results are attempted. Some of these ways are good, others not so good, and the Neutrodyne so far is holding its own. In the Neutrodyne and in some of its competitor circuits that use no external balancing device the coils are mounted at an angle to avoid or minimize the interplay of the currents so disastrous to fine results.



BALANCED IMPEDANCE RF consists of a coil and variable condenser.

Boxing Coil for Outdoor Loop

The Radio University

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

PLEASE show me in a diagram how to put a honeycomb coil inside a doubly-protected box arrangement, so I may use my outdoor antenna as a loop and gain selectivity, as described in RADIO WORLD, issue of October 4.—Thomas Waldkind, Albany, N. Y.

A 25-turn honeycomb or duolateral coil (L1 in Fig. 43) is placed inside a small wooden box, the leads being brought out through two holes bored in the box as shown. These holes are sealed with sealing wax. This contraption is placed in a slightly larger wooden box, where the process is repeated. Thus the coil is protected from the weather. The leads A and G go, respectively, to the end of the aerial farthest from the set and to the ground at that same point.

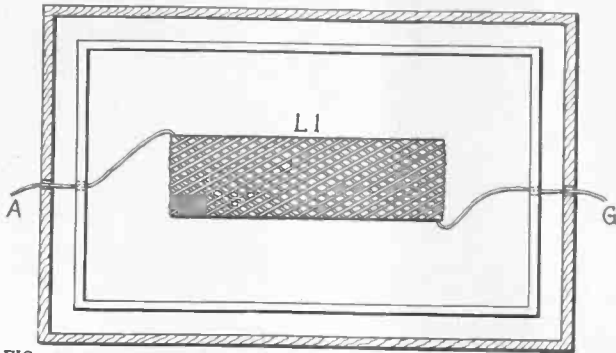


FIG. 43 (above) Showing how a coil is placed inside two boxes and sealed, for using your antenna as a loop.

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Mix Reports

Radio Industries Give Mac



(Foto Topics)

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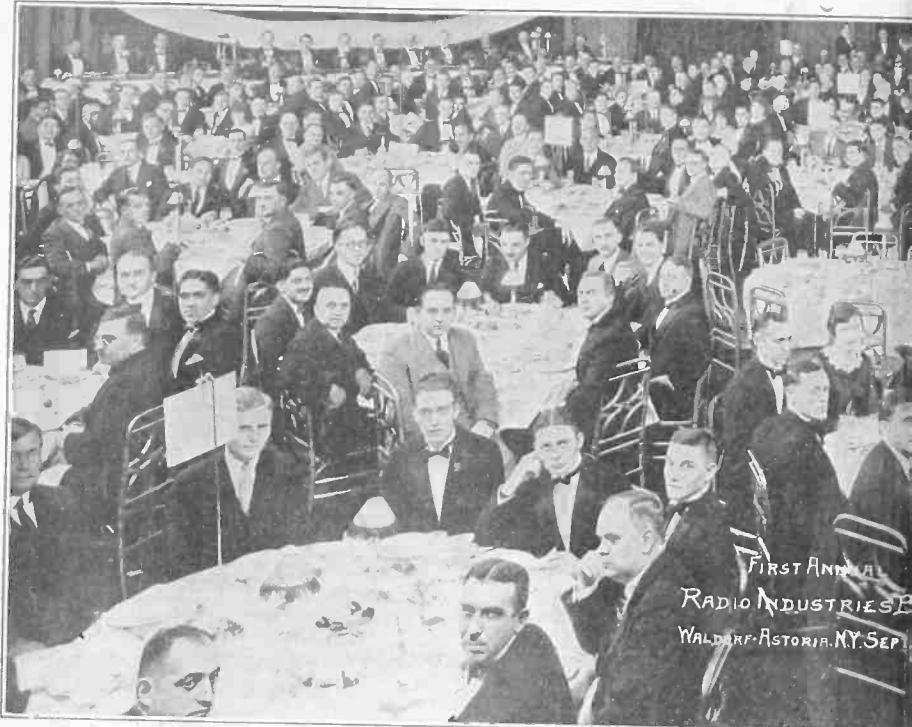


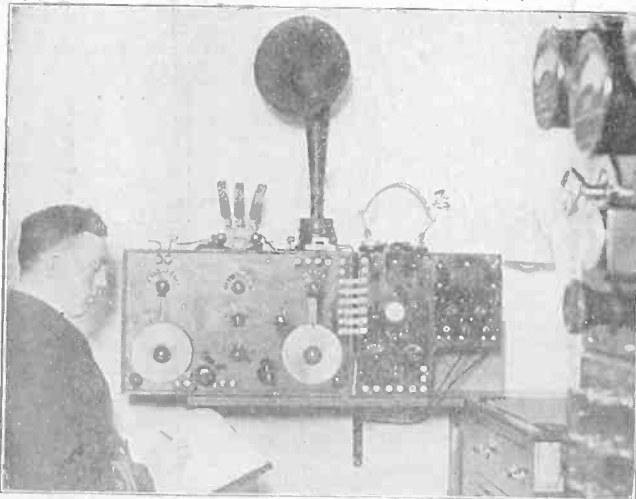
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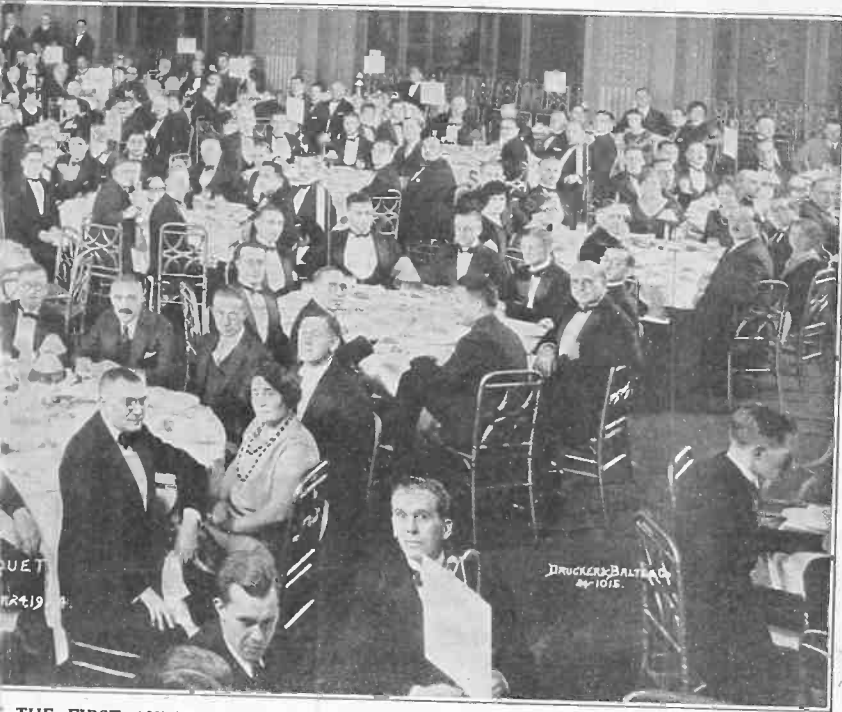
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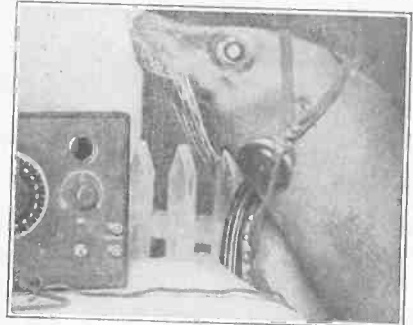
HERE is a handy way sockets on on

Millan Ovation at Banquet

Animal Tests



THE FIRST ANNUAL BANQUET OF THE RADIO INDUSTRIES, held in the ballroom of the New York City, during the week of the first annual Radio World's Fair. Sitting at the dais, the guests, including the speakers. At extreme right at that table sits J. Announcer, an official of the Haynes-Griffin Radio Service, Inc., New York City retailers. Fifth B. MacMillan, the noted Arctic explorer, who, when he got up to speak, was given a two-minute and applauding all the while. He was the guest of honor. Only a few days before he had a four-year quest in the Arctic. At MacMillan's right sits Paul B. Klugh, executive chairman of Broadcasters, who was toastmaster. At Klugh's right sits David Sarnoff, vice-president of the Radio. RADIO WORLD was represented at the banquet by Fred S. Clark, manager, and Herman but their photographic identities are submerged in the shadowed background at right. Some of the women folk, who added to the attractiveness of the scene. The banquet was a great success, about every one of them remaining to the bitter end. (Drucker & Baltes, 106 W. 43d St., N. Y. C.)



emble a Super-Heterodyne, with the eight and the transformers beneath.



THE RADIO is used as a means of applying intelligence tests to animals. Nobody, however, has been able to convince these noble beasts that speech and music actually come over the air. Animals seem to think we're trying to fool 'em. At top, right, is a bear, using earphones, as is the trained seal in the photo below that one. Above we see a dog listening to a speaker. The tests proved that the dog is radio's best friend, as he is man's, and that an uneducated bear has even more intelligence than a trained seal. (Photos by Underwood & Underwood.)

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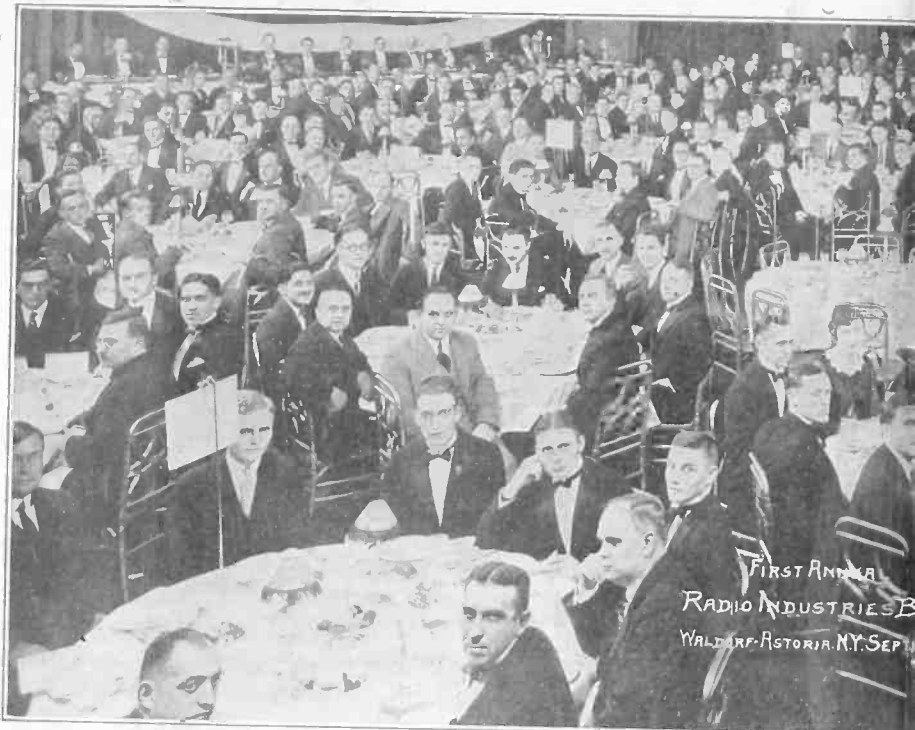


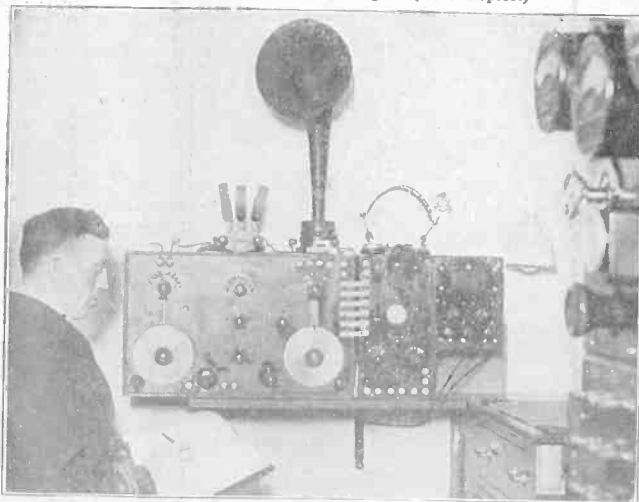
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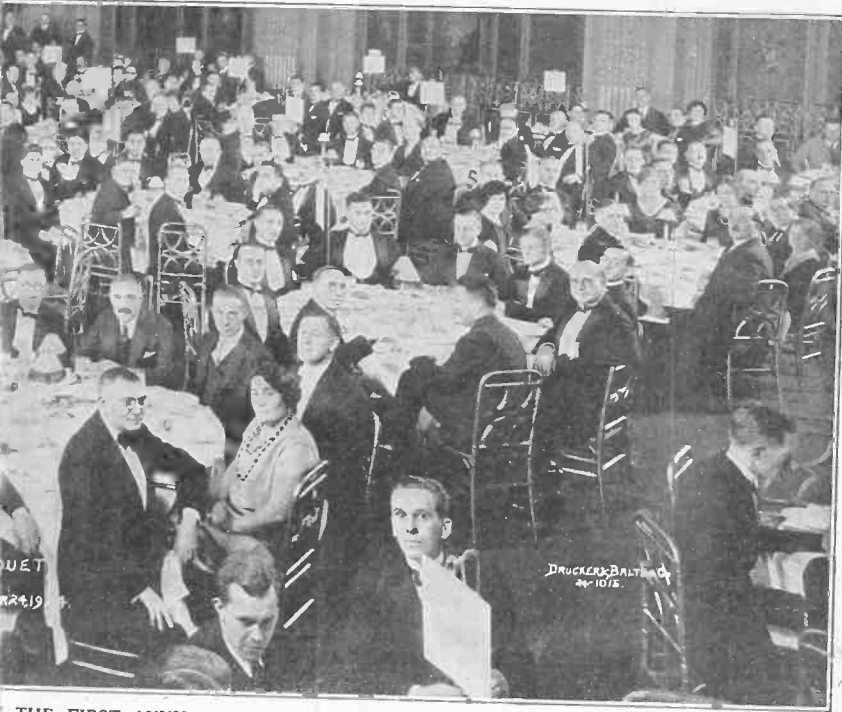
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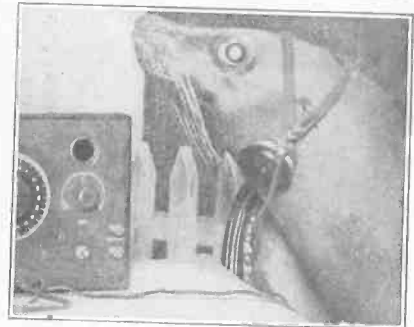
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Millan Ovation at Banquet

Animal Tests



THE FIRST ANNUAL BANQUET OF THE RADIO INDUSTRIES, held in the ballroom of the New York City, during the week of the first annual Radio World's Fair. Sitting at the dais, the guests, including the speakers. At extreme right at that table sits J. Announcer, an official of the Haynes-Griffin Radio Service, Inc., New York City retailers. Fifth B. MacMillan, the noted Arctic explorer, who, when he got up to speak, was given a two-minute and applauding all the while. He was the guest of honor. Only a few days before he had a four-year quest in the Arctic. At MacMillan's right sits Paul B. Klugh, executive chairman of Broadcasters, who was toastmaster. At Klugh's right sits David Sarnoff, vice-president of ca. RADIO WORLD was represented at the banquet by Fred S. Clark, manager, and Herman but their photographic identities are submerged in the shadowed background at right. Some of women folk, who added to the attractiveness of the scene. The banquet was a great success, about every one of them remaining to the bitter end. (Drucker & Baltes, 106 W. 43d St., N. Y. C.)



emblem a Super-Heterodyne, with the eight and the transformers beneath.



THE RADIO is used as a means of applying intelligence tests to animals. Nobody, however, has been able to convince these noble beasts that speech and music actually come over the air. Animals seem to think we're trying to fool 'em. At top, right, is a bear, using earphones, as is the trained seal in the photo below that one. Above we see a dog listening to a speaker. The tests proved that the dog is radio's best friend, as he is man's, and that an uneducated bear has even more intelligence than a trained seal. (Photos by Underwood & Underwood.)

BROADCAST PROGRAMS

Thursday, October 9

WRC, Washington, D. C., 469m—5:15 P. M., code instruction. 6:00 P. M., children's hour by Peggy Albion. 7:45 P. M., motoring talk. 8:00 P. M., Georgada MacFarigue, mezzo-soprano. 8:15 P. M., dance program, Better Ole Club Orchestra; J. E. S. Kinsella, baritone. 9:15, to be announced. 9:55 P. M., time signals.

KFNW, Shenandoah, Ia., 266m—7:30 P. M., concert, Riverview Club of Neb. City, Neb.

WWJ, Detroit, 517m—8:00 A. M., setting-up exercises. 9:30 A. M., "tonight's dinner" and a special talk by the Woman's Editor. 9:45 A. M., Public Health Service bulletins. 10:25 A. M., official weather forecast. 11:55 A. M., Arlington time. 12:00 Noon, music. 3:00 P. M., the Detroit News Orchestra. 3:45 P. M., weather forecast. 3:55 P. M., market reports. 8:30 P. M., Detroit News Orchestra; Graeme Gillies, bass. 10:00 P. M., dance music by Jean Goldkette's Orchestra, from Graystone ballroom. 11:00 P. M., Detroit News Orchestra.

KHJ, Los Angeles, 395m—12:30 to 1:15 P. M., Coy Barkley and Palace Ballroom Orchestra. 2:30 to 3:30 P. M., musical. 6:00 to 6:30 P. M., Hickman's Concert Orchestra. 6:30 to 7:30 P. M., children's program. 8:00 to 9:00 P. M., program of Radio Corporation of Southern California. 9:00 to 10:00 P. M., birthday program for Queen Titania. 10:00 to 11:00 P. M., Hickman's orchestra.

WABM, Saginaw, Mich., 254m—10:15 A. M., news items, market quotations. 11:30 A. M., vocation and shopping talk, "Tonight's Dinner" weather forecast. 2:30 P. M., weather forecast, talks for women. 6:00 P. M., news items, Saginaw market quotations, weather forecast. (The above broadcast every day except Sunday.) 8:00 to 10:00 P. M., orchestra.

WDAR, Philadelphia, 395m—11:45 A. M., daily almanac; organ recital; Arcadia Concert Orchestra. 2:00-3:00 P. M., orchestra; recital. 5:00 P. M., question period in series of educational talks, Peirce School of Business Administration; Samuel H. Alman, "Where Does Your Money Go?" 5:45 P. M., sporting results. 7:30 P. M., Dream Daddy.

KSD, St. Louis, Mo., 546m—Silent.

WQJ, Chicago, 448m—11:00 A. M. to 12 Noon, Home Economics of Helen Harrington Downing; Erna Bertrams, "One Dish Meal"; Eleanor Chalmers, "Dressing Your Children." 3:00-4:00 P. M., Cora Beeman, "Deep Fat Frying." 7:00-8:00 P. M., Ralph Williams and His Rainbo Garden Orchestra; Manuel Rodriguez, tenor; Kathryn Snyder, reader. 10:00 P. M. to 2:00 A. M., Ralph Williams and His Rainbo Skylarks; jazz songs.

WBZ, Springfield, Mass., 337m—11:55 A. M., time signals; weather reports; Springfield market report. 6:30 P. M., songs. 6:40 P. M., Leo Reisman, Hotel Brunswick Orchestra. 7:00 P. M., market report. 7:10 P. M., "At the Theatres," with A. L. S. Wood, dramatic editor. 7:30 P. M., Uncle Dave Cory's Jack Rabbit story. 7:45 music by Charles R. Hector, St. James Theatre Orchestra. 8:15 P. M., music from the Hotel Brunswick, Boston. 9:15 P. M., Jessie M. French, contralto; Maud Middleton, accompanist. 9:55 P. M., music from the Hotel Kimball studio, Springfield.

KYW, Chicago, 536m—6:30 A. M., morning exercises. 9:30 A. M., financial and commercial markets. 10:30 A. M., farm and home. 11:35 A. M., table talk by Mrs. Anna J. Peterson. 2:35-4:00 P. M., "Afternoon Frolic." 6:02-6:18 P. M., news, financial and final markets. 6:35-7:00 P. M., children's bedtime story, told by "Uncle Bob" (Walter Wilson). 7:00-7:30 P. M., concert from Congress Hotel. 7:00-7:10 P. M., Joska De Babary's Orchestra. 7:10-7:20 P. M., Paul Whiteman's "Collegians," direction A. V. Gauthier. 7:20-7:30 P. M., DeBabary's Orchestra. 8:00-8:20 P. M., "Twenty Minutes of Good Reading" by Rev. C. J. Perrin, S. J., Loyola University. 8:20-9:15 P. M., music; Marguerite Gotthardt, soprano; George D. Horne, baritone; Ruth McBride, pianist. 9:15 P. M., "Safety First" talk. 10:00-11:30 P. M., studio program.

KDKA, East Pittsburgh, Pa., 326m—9:45 A. M., markets; agricultural items. 11:55 A. M., time signals. 12:00 Noon, weather forecast; reports of Pittsburgh livestock market and wholesale produce markets. 12:15 P. M., Scalzo's Orchestra. 6:30 P. M., KDKA Little Symphony Orchestra, Victor Saudek, conductor. 7:15 P. M., the children's period. 7:30 P. M., late news. 7:40 P. M., livestock and wholesale produce markets. 8:00 P. M., program by National Stockman and Farmer. 8:30 P. M., Little Symphony Orchestra; Irma Carpenter, soprano; Mrs. Elme Sulzner, contralto. 9:55 P. M., Arlington time signals; weather forecast. 11:00 P. M., Pittsburgh Post studio concert.

WOC, Davenport, Ia., 484m—10:00 A. M., opening market quotations. 10:05 A. M., household hints. 10:55 A. M., time signals. 11:00 A. M., weather and river forecast. 11:05 A. M., market quotations. 12:00 Noon, chimes concert. 12:15 P. M., weather forecast (repeated). 2:00 P. M., Closing stocks and markets, including weekly report of wool markets. 6:45 P. M., sport news and weather forecast. 7:00 P. M., bedtime stories by Val McLaughlin. (1 hour), Palmer school radio orchestra. Erwin Swindell, conductor.

WEAF, New York City, 492m—11:12 A. M.,

music, talk market and weather reports. 4:5 P. M., Pauline Fierstein, soprano. Other music.

WMAQ, Chicago, 447.5m—4 P. M., sport results. 4:10 P. M., household hour, Mrs. Elizabeth O. Hiller. 4:30 P. M., music. 6 P. M., Chicago Theatre organ recital. 6:30 P. M., Hotel LaSalle orchestra. 8 P. M., railway talk. 8:45 P. M., automobile trails. 9 P. M., University of Chicago. 9:15 P. M., Whitney trio.

WIP, Philadelphia, 509m—1 P. M., Gimbel Tea Room orchestra, Ray Steen, director. 1:30 P. M., weather forecast. 3 P. M., artist students from the Philadelphia Musical Academy, David Sokolove, pianist; Cecil Sigelski, violinist, and Lena Weber Brocker, contralto; Flora Ripka, accompanist. 6 P. M., weather forecast. 6:05 P. M., music under Charles Sansone, featuring Richard Brothers. 6:45 P. M., livestock and produce market reports. 7 P. M., Uncle Wip's bedtime stories, Kiddie Klub. 8 P. M., "Timely Talks to Motorists," Gene Hogle. 8:15 P. M., Philadelphia police band, direction Lieut. J. Kiefer. 9 P. M., "Horse Show," by A. K. Johnson. 9:15 P. M., Eleanor Moore Shute, contralto; Louis Shenk, baritone; Flora Ripka, accompanist. 10:05 P. M., Harvey Marburger, vaudeville orchestra.

WHN, New York City, 360m—12:30-1:00 P. M., Strickland's orchestra. 2:15-3:15, Bob Schaefer entertainers. John DeDroit's orchestra. 4:00 P. M., Alfred Dulin, pianist. 4:14 P. M., Madeline Groff, soprano. 4:30 P. M., Victor Wilbur, baritone. 4:45 P. M., Loretta C. Lynch, "Tea Time Talk." 5:00 P. M., Hickey Hickson's jazz artists. 6:30-7:00 P. M., Olcott Vail, violinist; Stephen Balogh, piano. 7:00-7:30 P. M., Specht's orchestra. 9:30 P. M., Flo Williams, songs. 9:45 P. M., Melody male quartette. 10:00 P. M., Spear's orchestra. 10:30 P. M., Romano's Roseland dance orchestra. 11:00 P. M., Gene Austin, own songs. 11:15-12:00 P. M., Loew's vaudeville. 12:00-12:30 P. M., Parody Club orchestra.

WOO, Philadelphia, 509m—11:00 A. M., organ. 11:30 A. M., weather forecast. 11:55 A. M., time signals. 12:00, Tea Room orchestra. 5:15 P. M., organ, trumpets. 7:40 P. M., Sports results, police reports. 9:55 P. M., time signals. 10:02 P. M., weather forecast.

KFI, Los Angeles, 469m—5:00-5:30 P. M., news. 5:30-6:00 P. M., Examiner news bulletins. 6:45-7:30 P. M., Y. M. C. A. lecture, Bon Ton orchestra. 7:30-8:00 P. M., Harry Porter, baritone, Sylvia Marotta. 8:00-9:00 P. M., Los Angeles Grand Opera association, "Romeo and Juliet" with Thalia Sabanieva. 11:00 P. M., Beniamino Gigli, Millo Picco.

WEEL, Boston, 303m—7:00 P. M., Boston Edison Big Brother club. 7:30 P. M., musicale. 9:00 P. M., program from N. Y. studio.

WJZ, New York City, 455m—10:00 A. M., menu, Mrs. Julian Heath. 10:20 A. M., "The Progress of the World," talk. 10:50 A. M., Eleanor Gunn's fashion talk. 1:00 P. M., Nathan Abas' Hotel Pennsylvania orchestra. 4:00 P. M., specialty numbers. 5:30 P. M., agricultural reports; closing quotations N. Y. Stock Exchange. 7:00 P. M., Bernhard Levitow's Hotel Commodore orchestra. 7:55 P. M., John B. Kennedy. 8:00 P. M., Wall Street review. 8:10 P. M., N. Y. Univer. Air College; Prof. Charles V. D. Magoffin, "Facts, Fancies and Figures of Archaeology." 8:30 P. M., to be announced. 10:00 P. M., Hotel St. George trio. 10:30 P. M., Waldorf-Astoria dance orchestra.

WJY, New York City, 405m—7:30 P. M., Weekly French lesson. 8:00 P. M., organ recital. 9:00 P. M., Al Reiser's orchestra.

WEBB, Chicago, 370m—7:8 P. M., concert. 9-10, dance; Sidney Ellstrom, baritone; musical bits; Nick Lucas, songs. 11-12 P. M., dance; Harry Davis, baritone; trio; late revue.

WNYC, New York City, 526m—7:30 P. M., police alarms. 8:30 P. M., Rose Maza, pianist. 9 P. M., Navy band. 10:10 P. M., "The Book of the Hour—Old New York," by Edith Wharton; speaker, Professor Carter Troop. 10:30 P. M., police alarms. 10:30 P. M., Sam Perry and Herbert Clair, piano. 11 P. M., weather. 2 P. M., Ada Bessie Swan, cooking. 2:30 P. M., market prices. 2:40 P. M., music. 3 P. M., J. B. Bayley, "Rabies or Hydrophobia."

WLAG, Minneapolis, 417m—10:45 A. M., "Hallow'en Party." 2 P. M., world series. 4 P. M., magazine reading, "The Mazurka." 5:30 P. M., children's hour. 6 P. M., baseball. 6:30 P. M., Heiman's orchestra. 7:30 P. M., talk. 9 P. M., weather. 10 P. M., Hoo Hoo orchestra; glee club.

Friday, October 10

KFNW, Shenandoah, Ia., 266m—7:30 P. M., program by Thurman Iowa, direction Fred F. Flatt.

KFI, Los Angeles, 469m—5:00-5:30 P. M., news bulletins. 5:30-6:00 P. M., news bulletins. 6:45-8:00 P. M., organ recital. 8:00-9:00 P. M., Carl Edward Hatch. 9:00-10:00 P. M., program from Examiner Studio. 10:00-11:00 P. M., John Smallman night. 11:00-12:00 P. M., Ambassador Hotel Coconut Grove Orchestra.

WWJ, Detroit, 517m—8:00 A. M., setting-up exercises. 9:30 A. M., "tonight's dinner" and a special talk by the Woman's Editor. 9:45 A. M., Public Health Service bulletins. 10:25 A. M., weather forecast. 11:55 A. M., Arlington time. 12:00 Noon, music. 3:00 P. M., Detroit News Orchestra. 3:50 P. M., weather forecast. 3:55 P. M., market reports. 8:30 P. M., Detroit News Orchestra; Donald Pratt, baritone; Deora Wolfe, pianist.

WRC, Washington, D. C., 469m—3:00 P. M., fashion development. 3:00 P. M., Arthur McCormick, baritone. 3:20 P. M., "Beauty and Personality" by Elsie Pierce. 3:25 P. M., Current Topics. 3:35 P. M., piano recital. 3:50 P. M., The Magazine of Wall Street. 4:00 P. M., song recital. 5:15 P. M., time signals and

weather forecasts. 6:00 P. M., stories for children by Peggy Albion.

KHJ, Los Angeles, 395m—12:30-1:15 P. M., news and music. 2:30-3:30 P. M., music. 6-6:30 P. M., Art Hickman's concert orchestra from the Biltmore Hotel; Edward Fitzpatrick, director. 6:30-7:30 P. M., children's program, Prof. Walter Sylvester Hertzog on American history; Richard Headrick, screen juvenile; bedtime story, Uncle John. 8-10 P. M., Mullen & Bluet program. 10-11 P. M., Hickman's orchestra.

WDAR, Philadelphia, 395m—11:45 A. M., daily almanac. 12 Noon, organ; Arcadia concert orchestra. 2-3 P. M., concert orchestra; playlet. 4:30 P. M., dance. 5:45 P. M., sporting results. 7:30 P. M., Dream Daddy. 8 P. M., book review, Arnold Abbott; studio artists. 10 P. M., Morning Glory Club; Lanin's dance orchestra; studio artists.

KSD, St. Louis, Mo., 546m—8 P. M., Sixth U. S. Infantry band.

WQJ, Chicago, 448m—11 A. M. to 12 Noon, Mann and his Sunday dinner. 3-4 P. M., J. Downing, "Hallow'en Doughnuts"; Mrs. F. T. Sanger, "Rainier National Park." 7-8 P. M., dinner concert by Williams orchestra; Do. Schubert, soprano; Arthur W. Ward, tenor; Harry Geise, piano. 10 P. M.-2 A. M., a. a. p. Williams and Skylarks, songs and specialties.

WBZ, Springfield, Mass., 337m—11:55 A. M., time signals; weather; market report. 6 P. M., Westinghouse Philharmonic Trio. 7 P. M., market reports. 7:10 P. M., book review. 7:20 P. M., "What Types of Lighting Fixtures Give Best Service." 7:30 P. M., bedtime story. 9:55 P. M., time; weather. 10 P. M., J. K. Murray, tenor; Clara Lather, soprano. 10:30 P. M., to be announced. 11 P. M., Westinghouse Philharmonic Trio; Alwyn E. W. Bach; Katherine Gravelin, accompanist. 11:30 P. M., dance, McEnelly's singing orchestra.

KYW, Chicago, 536m—6:30 A. M., exercises. 9:30 A. M., news, financial and commercial markets. 11:35 A. M., table talk by Mrs. Anna J. Peterson. 12:30 P. M., "The Progress of the World," talk. 6-6:30 P. M., news, financial markets review of Chicago trade. 6:35-7 P. M., bedtime story by "Uncle Bob." 7-7:30 P. M., dinner concert from Congress Hotel. 7:10-7:20 P. M., DeBarbary's orchestra. 7:10-7:20 P. M., Whiteman's "Collegians." 7:20-7:30 P. M., DeBarbary's orchestra. 7:30-8 P. M., program from studio. 8:20-8:45 P. M., speeches, American Farm Bureau Federation. 9:30-10:30 P. M., revue. 10:30-10:45 P. M., stage revue. 10:45 P. M.-12:30 A. M., continuation of midnight revue. 12:30 A. M., organ solo, W. Remington Welch.

KDKA, East Pittsburgh, Pa., 326m—9:45 A. M., reports on markets; agricultural items. 11:55 A. M., time. 12 Noon, weather; reports Pittsburgh live stock and wholesale produce markets. 12:15 P. M., concert by Daugherty's orchestra. 6:30 P. M., organ, Paul E. Freeger. 7:15 P. M., children's period. 7:30 P. M., news. 7:40 P. M., reports primary livestock and wholesale produce markets. 8 P. M., "What Types of Lighting Fixtures Give Best Service," talk; "Football Coaching," Guy M. (Chalky) Williamson, University of Pittsburgh. 8:30 P. M., Westinghouse band, T. J. Vastine, conductor; Alice Smith, soprano; F. Robert Coe, baritone. 9:55 P. M., time; weather.

WHAS, Louisville, Ky., 400m—4:5 P. M., Alamo Theatre orchestra; police bulletins; weather; news. 4:55 P. M., local livestock, produce and grain market reports. 5 P. M., time. 7:30-9 P. M., "Dix Bluegrass Serenaders"; contralto solos, Mrs. M. E. Burchett, accompanied by Mrs. Harry Long; international Sunday school lesson; welfare talk; news; time announced at 9 o'clock.

WOC, Davenport, Ia., 484m—10 A. M., market quotations. 10:05 A. M., household hints. 10:55 A. M., time. 11 A. M., weather. 11:05 A. M., market. Noon, chimes. 12:15 P. M., weather (repeated). 2 P. M., stocks and markets. 6:45 P. M., sport news and weather. 7 P. M., Sandman. 7:20 P. M., "Girls Club Work," by Lulu Trengone. 8 P. M., musical (1 hour)—Ralph Jaenicke and his orchestra.

WEAF, New York City, 492m—11 A. M.-12 Noon, musical and talks; market and weather reports. 4:5 P. M., program for women, musical. 6-10 P. M., music from the Waldorf-Astoria; children's story by Blanche Elizabeth Wade; Edith Bailey, soprano; The Happiness Boys; Minnie Weil, pianist; Astor Coffee dance orchestra.

WMAQ, Chicago, 447.5m—4 P. M., sport results. 4:10 P. M., items for women. 4:30 P. M., musical. 6 P. M., organ. 6:30 P. M., orchestra. 8 P. M., Wide-Awake club, Mrs. Francis M. Ford. 8:30 P. M., musical geography, by Mr. and Mrs. Marx E. Oberndorfer. 9 P. M., program from Waukegan, Ill.

WGY, Schenectady, N. Y., 380m—11:55 A. M., time. 12:30 P. M., stock market. 12:40 P. M., produce market. 12:45 P. M., weather. 12:50 P. M., farm movement of lettuce. 2 P. M., music, "Hints for the Home Maker," courtesy Society of Electrical Development. 6 P. M., markets; news. 6:30 P. M., stories for children. 7 P. M., Sunday school lesson. 7:45 P. M., health talk. 7:50 P. M., Remington Typewriter band. 10:30 P. M., music by Remington Typewriter band.

WHN, New York City, 360m—2:15 P. M., songs. 2:30 P. M., songs. 2:45 P. M., Hitter's orchestra. 3:45 P. M., Uncle Robert's chat to children. 3:50 P. M., Mabel Livingston, children's poet. 4 P. M., Arthur Ball, tenor. 4:15 P. M., Joseph C. Wolfe, baritone. 4:30 P. M., recital, Genevieve Williams, soprano; Charles Strickland, pianist; Sam Steinberg, violinist. 5 P. M., Chas. B. Allen orchestra. 6:30-7 P. M., violin, Olcott Vail, accompanied by Stephen Balogh, piano. 7:30 P. M., Specht's orchestra. 9:30 P. M., Gregory's orchestra. 10 P. M., baseball statistics by Al Munroe Elias,

05 P. M., Cogert's revue, Sol. Hirsch, pianist; Deck Motta, Lillian Pitt, Ed. Bridges, Stella Weck. 10:20 P. M., Bob Emmerich, jazz pianist. 10:30 P. M., Henderson's orchestra. 11 P. M., Jack Morrisse, tenor 11:15 P. M., vaudeville. 11:30 P. M., Wooding's orchestra. 12-12:30 A. M., Parody Club orchestra.

WIP, Philadelphia, 509m.—1 P. M., music by Tea Room orchestra. 1:30 P. M., weather. 3 P. M., popular music, direction Harry Link. 4 P. M., "The Psychopathic Child," talk by Dr. N. W. Winkleman. 6 P. M., weather. 6:05 P. M., Jordan-Lewis dance orchestra. 6:45 P. M., livestock and produce reports. 7 P. M., Uncle Wip's bedtime stories; Kiddie Klub; Wallace Root, Honor Boy Scout, experiences at the Jamboree, Copenhagen.

WJZ, New York City, 455m.—10 A. M., menu, Mrs. Julian Heath. 10:20 A. M., arts and decorations talk. 10:50 A. M., fashions. 1 P. M., Zantio. 4:30 P. M., Leo Riggs, organist. 5:30 P. M., agricultural reports; closing quotations of N. Y. Stock Exchange; foreign exchange; 7 P. M., Lafayette Hotel orchestra. 8 P. M., all Street review. 8:10 P. M., N. Y. University. 9 Air College, Prof. Charles V. D. Magofin, president. Archaeological Institute of America, "Facts, Fancies and Figures of Archaeology." 8:30 P. M., May Singh Breen, banjo. 8:50 P. M., "Chats with the Editor," Earnest A. Zadig. 9 P. M., Breen, banjo. 9:15 P. M., Army Night, "Bonny," by Gen. Robert B. Davis; music, 16th Inf. band.

WJY, New York City, 405m.—7:30 P. M., Wynne's orchestra. 8:30 P. M., current topics, W. H. Allen. 8:55 P. M., "Income Taxes," Frank Shevit. 9:15 P. M., Democratic National Committee talk.

WEEI, Boston, 365m.—1 P. M., Chamber of Commerce luncheon. 7 P. M., Boston Edison Big Brother Club. 7:30 P. M., musicals. 11 P. M., dance. Dok Eisenburg and his Sifonians.

WAAM, Newark, N. J., 263m.—2 P. M., market prices. 2:10 P. M., Jimmy LaSelle. 2:40 P. M., American Radio Relay League. 2:45 P. M., music. 8 P. M., sports talk. 8:45 P. M., Ethel West, soprano. 9 P. M., Rosedale orchestra. 9:30 P. M., Imperial quintette, melodies. 10 P. M., Catellos dance orchestra, entertainers. 10:45 P. M., Harry Greenwood, stories.

WLAG, Minneapolis, 417m.—10:45 A. M., "Eat and Keep Young," Betty Crocker. 2 P. M., talk. 2:30 P. M., world series. 4 P. M., magazine reading. C. G. Milham. 5:30 P. M., children's hour, Ellen Nye. 6 P. M., baseball scores and sport hour. 6:30 P. M., Heiman's orchestra. 8 P. M., fire prevention talk. 8:30 P. M., Barrett's band. 9 P. M., weather.

WNYC, New York City, 526m.—7:30 P. M., police alarms. 8:30 P. M., Creighton Allen, pianist; 8:45 P. M., Arthur Baecht, violin. 9 P. M., Creighton Allen. 9:15 P. M., Arthur Baecht. 9:30 P. M., a talk on the Board of Estimate, by Peter McGowan. 9:40 P. M., recital. 10:10 P. M., "Arneo," by Col. H. Edmund Bullis. 10:30 P. M., police alarms. 10:35 P. M., Ward orchestra. 11 P. M., weather. 11:05 P. M., Ward orchestra. 11:30 P. M., Vaughan and Leath. 12 P. M., Martin orchestra from 'Ill Say She Is."

WEBA, Chicago, 370m.—7-8 P. M., concert; La Ponsa Musical College. 9-10 P. M., dance; Mann's Manship, soprano; Nick Lucas, songs. 11-12 P. M., dance; Winter Garden Four; Pdererick Agard, songs; Edgewater Beach trio.

Saturday, October 11

WLAG, Minneapolis, 417m.—10:45 A. M., girl's club. 2 P. M., Haskell Indians and U. of M. football game. 6 P. M., baseball and sport hour. 8 P. M., fire prevention talk. 8:30 P. M., Imperial quartet. 9 P. M., weather. 11 P. M., Heiman's orchestra.

WNYC, New York City 526m.—6:30 P. M., Wooding's Club Alabama orchestra. 7:30 P. M., police alarms. 7:35 P. M., Chateau Four. 8:30 P. M., Nazarene Chorus. 9:20 P. M., vocal program. 10:10 P. M., the screen—season's new plays, in-

WEBH, Chicago, 370m.—7-8 P. M., Edgewater orchestra. 10:30 P. M., police alarms. 11 P. M., weather, including "Conscience" and "Havoc," Ada Sterling, Beach Oriole orchestra; Helen Snyder, soprano; Radio Sunday School lesson. 9-10 P. M., dance; musical bits. 11-12 P. M., dance selections; Hawaiian Guitars; Marie Kelly, reader; Tom Malie and Jack Little, songs.

KHJ, Los Angeles, 395m.—12:30-1:15 P. M., program, Atwater Kent Radio Co., Uncle Remus. 2:30-3:30 P. M., music. 6-6:30 P. M., Hickman's orchestra. 6:30-7:30 P. M., children's program, Prof. Walter Hertzog, stories of American history; Maud Haskins, harp; bedtime story, Uncle John. 8-9 P. M., program of the Continental National Bank. 9-10 P. M., program of Greater Westlake Business Association. 10-11 P. M., Hickman's dance orchestra.

WDAR, Philadelphia, 395m.—11 A. M., organ. 11:45 A. M., daily almanac. 12 Noon, organ; features from studio; concert orchestra. 2-3 P. M., Arcadia concert orchestra. 4:30 P. M., studio artists. 5 P. M., Samuel H. Talman, "Where Does Your Money Go?" 5:45 P. M., sporting results. 7:30 P. M., Dream Daddy. 7:45 P. M., news for farm folks. 8 P. M., concert orchestra; E. E. Schermerhorn, "Fire Preventions." 8:15 P. M., Edwin Mathews, "Flowers and the Garden." 9:20 P. M., movie review. 9:30 P. M., Stanley Theatre, overture. 10 P. M., Arcadia Cafe dance orchestra; vaudeville, Fay's Knickerbocker Theatre.

KDKA, East Pittsburgh, Pa., 326m.—9:45 A. M., livestock markets; general market review; agricultural items. 11:55 A. M., time. 12 Noon, weather; Pittsburgh live stock and wholesale produce markets. 12:15 P. M., Daugherty's orchestra. 3 P. M., Pitt-West Virginia football game from Forbes Field, Pittsburgh. 6:30 P. M., concert. 7:15 P. M.,

children's period. 7:30 P. M., news. 7:45 P. M., Sunday school lesson, by Carman Cover Johnson. 8 P. M., sport review. 8:15 P. M., Heinz program. 9:55 P. M., time; weather.

KSD, St. Louis, Mo., 546m.—7 P. M., orchestral music and specialties from Missouri Theatre. WQJ, Chicago, 448m.—11 A. M.-12 Noon, H. F. West, "Pressure Cookers"; other speakers. 3-4 P. M., "Koffee" Klatsch, 300 ladies will be entertained in Rainbo Gardens. 7-8 P. M., Otis P. Jester, soprano; Mary House, pianist; William Molnaire, tenor. 10 P. M.-2 A. M., Ralph Williams and Skylarks; Jerry Suihvan; The Melodians; Geo. A. Little and Larry Shay; Marion Morgans, prima donna; Malie and Little; Lew Butler.

WBZ, Springfield, Mass., 337—11:55 A. M., time; weather. 6:30 P. M., Brunswick orchestra. 7 P. M., market report. 7:30 P. M., bedtime story. 7:40 P. M., Hotel Kimball trio, Jan Geerts, violinist and director; Arnold Janser, cellist; Lloyd Stoneman, pianist. 8:30 P. M., Women's Philharmonic orchestra. 9 P. M., Weltman Conservatory Jr. orchestra. 9:55 P. M., time; weather. 10 P. M., Albert Edwards, baritone.

KYW, Chicago, 536m.—6:30 A. M., exercises 9:30 A. M., news and comment financial and commercial markets. 10:30 A. M., farm and home service. 11:35 A. M., table talk by Mrs. Anna J. Peterson of Peoples Gas Co. 6:02-6:10 P. M., news, financial and final markets. 6:35-7 P. M., children's bedtime story, "Uncle Bob." 7-7:30 P. M., dinner concert from Congress Hotel. 7-7:10 P. M., DeBabry's orchestra. 7:10-7:20 P. M., Whiteman's "Colleagues." 7:20-7:30 P. M., DeBabry's orchestra. 8-8:58 P. M., music; Adeline Keller, soprano; Mildred Pike, contralto; George Morosoff, tenor; Sallie Menkes, accompanist. 9:05 P. M., Youth's Companion. 9:35-11:30 P. M., show.

WGY, Schenectady, N. Y., 389m.—11:55 A. M., time. 12:30 P. M., stock market. 12:40 P. M., produce market. 12:50 P. M., farm movement of lettuce. 8:30 P. M., dance; popular songs; football results.

WOC, Davenport, Ia., 484m.—10 A. M., opening market quotations. 10:05 A. M., household hints. 10:55 A. M., time. 11 A. M., weather. 11:05 A. M., market. 11:10 A. M., agricultural bulletins. 12 Noon, chimes concert. 12:15 P. M., weather. 12:17 P. M., closing markets. 6:45 P. M., sport news and weather. 7 P. M., Sandman's Visit. 9 P. M., orchestra (1 hour); Ralph W. Fuller, baritone.

WMAO, Chicago, 447.5m.—4 P. M., sport results 6:30 P. M., Hotel LaSalle orchestra. 8 P. M., Salvation Army band. 8:40 P. M., lecture, Dr. Max Heinius, Scandinavia. 9 P. M., theatre review.

WEAF, New York City, 492m.—1:45 P. M., play by play description of the Columbia-Wesleyan football game direct from Baker Field. 4 P. M., Clifford Lodge dance orchestra. 6-12 P. M., music from Waldorf-Astoria; stories for boys, by Fred J. Turner; Charles Wold, musical glasses; Josiah B. Free, baritone; Nancy McCord, soprano; Virginia Massellink, pianist; Rubi Davis, violinist; L. Wolfe Gilbert, pianist, and Abner Silver, singer; Count de Martini and his Hotel St. George concert orchestra; Vincent Lopez and his orchestra from Hotel Pennsylvania.

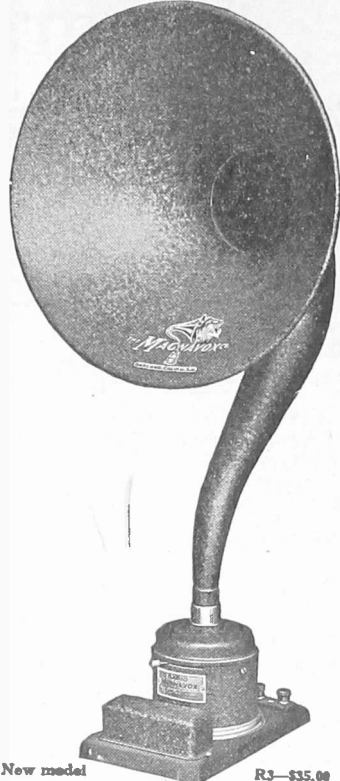
WHN, New York City, 360m.—2:15 P. M., Bert Dixon and Elmo Russo, songs. 2:30 P. M., Samuel Weber, blind pianist. 2:45 P. M., Blue Ridge entertainers. 3:45 P. M., Ellen Montague Cross Concert Company. 4:15 P. M., Elias Cohen, violinist; Ruben Kroll, pianist. 4:30 P. M., Kathryn Connelly, soprano. 4:45 P. M., boy's period. 5 P. M., Johnston-Davison orchestra. 6:30-7 P. M., violin solos by Olcott Vail; Stephen Balogh at piano. 7:30 P. M., Specht's orchestra. 7:30 P. M., Hotel Carlton Terrace orchestra. 8 P. M., "Personal Chats of Screen Life," by E. S. Colling. 8:15 P. M., Arthur Stone, blind pianist. 8:30 P. M., "Goodnight Children," by Elizabeth Morrison-Jones. 8:45 P. M., Tom Bracken and Bob King. 9 P. M., Pergola Brothers, accordion and banjo. 9:15 P. M., Jimmy Flynn, tenor. 9:30 P. M., "Columbus Day," by Jos. A. Lawson. 9:45 P. M., Fitzpatrick Bros., old-time medleys. 10 P. M., baseball statistics by Al. Munroe Elias. 10:05 P. M., Lillian Havel, soprano. 10:15 P. M., Victor Wilbur, baritone. 10:30 P. M., Chas. Degele, violinist; Segerer Brothers, zither. 11 P. M., Jimmy Clarke and his entertainers. 11:30 P. M., Henderson's Roseland dance orchestra.

WIP, Philadelphia, 699m.—1 P. M., organ, Karl Bonawitz. 1:30 P. M., weather. 3 P. M., play by play description of the football game Univ. of P. and Sfarthmore, from Franklin Field. 6 P. M., weather. 6:05 P. M., Hotel St. James dance orchestra. 6:45 P. M., livestock, and produce 7 P. M., Uncle Wip's bedtime stories, Kiddie Klub. 8 P. M., "The Ballet and Its Development in America." Florence Cowanova. 8:15 P. M., Zernsay orchestra, dance. 9 P. M., Mason-Hefflin male quartet. Roy MacClellan, Frederick Aime, Albert Hirst, Henry L. Booth, Natalie Heider, pianist; Flora Ripka, accompanist. 10:05 P. M., dance Hotel St. James orchestra. 11:05 P. M., organ, Karl Bonawitz.

WJZ, New York City, 455m.—4 P. M., music. 5:30 P. M., agricultural reports; closing quotations N. Y. Stock Exchange. 7 P. M., Waldorf-Astoria dance orchestra. 8 P. M., to be announced. 9 P. M., "The Cost to Business of Stolen Mail," by Owen A. Keen. 10:30 P. M., Hotel Astor dance orchestra.

WWJ, Detroit, 517m.—8:00 A. M., setting-up exercises. 9:30 A. M., "tonight's dinner" and a special talk by the Woman's Editor. 10:25 A. M., weather forecast. 11:55 A. M., Arlington time. 12:00 Noon, music. 3:00 P. M., Detroit News Orchestra. 3:50 P. M., weather forecast. 3:55 P. M., market reports and football scores. 5:00 P. M., football scores.

MAGNAVOX
Radio Products



New model R3—\$35.00

Current consumption in the new Magnavox Reproducer R3 is so low that it is an unimportant factor.

This feature, combined with the new Volume Control, makes the new R3 indispensable for use with every radio receiving set.

- Magnavox Reproducers**
- R2 with 18-inch curvex horn \$50.00
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One, two and three stage . . . \$27.50 to \$60.00

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Type A—six volt storage battery tube with standard base; requires no circuit changes . . . \$5.00

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

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Conference Paves Way for Better Programs All Over U. S.

RADIO WORLD

The Mag. U. S. Pub. Off.



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RATES—Page, 7 1/2 x 11", \$200.00; half page, 8 1/2 D. C. or 5 1/2 x 3", col., \$100.00; quarter page, 4 1/2 D. C., \$50.00; one col., 2 1/4 x 11", \$66.66. \$7.00 per inch. Per agate line, 50c. Times Discounts: 52 Consecutive Issues, 20%; 26 Times Consecutive, or E. O. W. One Year, 15%; 4 Consecutive Issues, 10%.

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OCTOBER 11, 1924

The Health of the Industry

THE fact that final figures show more than 150,000 persons attended the First Radio World's Fair during its seven-day run at Madison Square Garden, New York City, shows the splendid health of the industry. Public interest is the gauge and that interest ran high. What a winter this will be for the industry! The big Fall season already is well under way, and the trade is sending in enthusiastic reports.

It is well to remember that although the automobile industry is ten years older than the radio industry, no one yet has succeeded in running an automobile show in New York City from which it was necessary to close the doors each night against 5,000 to 10,000 persons, on account of a capacity house. And as for the phonograph trade—oh, well!

Hoover's Address Impresses Gathering—Interference, Advertising and Wavelengths Discussed

THE Third National Radio Conference, held here at the instance of Secretary of Commerce Hoover, grappled with the problems of making all stations a part of a national chain, wavelength allocation, interference, "indirect advertising," and other subjects brought up by Secretary Hoover in his address to the convention. He stressed the voluntary nature of the conference and the desire for solutions by agreement rather than by compulsion.

Concerning the chain idea, he said:

"Experimental broadcasting upon a national scale during the past year has now brought us to the stage where we know it can be done. The local material available for the local program is not in my view enough to maintain assured interest, and therefore maintain the industry, or to adequately fulfill the broadcasting mission. So far as the art has developed, I think we all agree that for accuracy and regularity of reception we can depend only upon the local broadcasting stations. My proposition is that the local stations must be able to deliver every important national event with regularity. The local station must be able to bring to its listeners the greatest music and entertainment of the nation, but far beyond this it must be able to deliver important pronouncements of public men, it must bring instantly to our people a hundred and one matters of national interest. To this it must add its matters of local interest. This can only be accomplished by regularly organized interconnection on a national basis with nationally organized and directed programs for some part of the day in supplement to more local material. The greatest advance in radio since our last conference is the complete demonstration of the feasibility of interconnection.

Monopoly Inconceivable

It has been possible to broadcast many national events over three-quarters of the United States during the past year, and the whole country has been covered twice. The service deserves the appreciation of the public, for it has demonstrated this great thing to be practicable.

"It is our duty to consider the possibilities and potentialities of interconnection as a regular daily routine of the nation. Unless it be systematically organized we cannot expect its continuation.

"It would be unfortunate indeed if such an important function as the distribution of information should ever fall into the hands of the Government. It would be still more unfortunate if its control should come under the arbitrary power of any person or group of persons. It is inconceivable that such a situation could be allowed to exist. But I am not now dealing with monopoly."

On the subject of broadcast ads, he said:

"I believe that the quickest way to kill broadcasting would be to use it for direct advertising. The reader of the newspaper has an option whether he will read an ad or not, but if a speech by the President is to be used as the meat in a sandwich of two patent medicine advertisements, there will be no radio left. To

what extent it may be employed for what we now call indirect advertising I do not know and only experience with the reactions of the listeners can tell."

As for a tax on receiving sets or other financing, he said:

"I do not believe there is any practical method of payment from the receivers. I wish to press for consideration the possibility of mutual organization by broadcasters of a service for themselves similar to that which the newspapers have for their use in the press associations, which would furnish programs of national events and arrange for their transmission and distribution on some sort of a financial basis just as the press associations gather and distribute news among their members."

Regarding congestion of the air, Secretary Hoover mentioned the 32 possible solution of assigning present Class C wavelengths to Class B stations, and other methods.

5,000 Watts and Up

Concerning power of stations he said: "Another question of importance is the limit of power to be used in broadcasting. Most Class B stations are now operating on 500 watts. A limitation of 1,000 watts is imposed in the license. I understand there are several stations erected or in course of construction which contemplate the use of power up to 5,000 watts, and I am aware of the suggestions of those who would go beyond even this. There is opposition to the plan. Its advocates tell us of the great advantages in the way of louder signals and more distant transmission, while opponents complain of interference and the drowning out of other stations. The latter fear is particularly acute when the powerful station is located in a congested receiving center. From the viewpoint of nation-wide broadcasting, the question becomes as to whether we should aim to cover a large territory through a single powerful station, or through a number of interconnected smaller ones. We must not stifle progress in any direction. We must not do anything that will interfere with the programs of local stations on which many of our people depend, nor with the wide selective range which they now have. It may be that both purposes may be accomplished without loss to either.

Regarding interference:

"One matter that must be dealt with sometime, but over which there is no means of control at present, is the interference from non-radio sources. We listeners have all experienced frequently and to our great disgust the squeals and roars which we are told come from electrical devices of various sorts in which there is no purpose to cause audible disturbance. Some branch of our radio industry certainly should investigate and study them. Harmonics, too, are troublesome."

On sticking to the assigned wave he said:

"It is useless to assign a station to a definite wave length if its signals go out not only on that one but on three or four others. Our amateurs, who make up by far the largest element in the radio family outside of the listeners as a whole, are particular sufferers since the harmonics from many stations have an especial tendency to invade the amateur band. Accurate and sharp transmission must be insisted upon."

Trade Review

New Rotor Control

ONE of the best vernier adjustment controls is marketed by Manufacturers' and Inventors' Electric Co., 29 Gold Street, New York City. It is called the Microtor and it provides refinement of rotor control. It gives infinite adjustment that brings in distance and gives the utmost clarity on local stations. It also has these advantages: Infinitesimal control of any rotor part, universal application to all standard dials up to and including 4", permits usual adjustment of dial by hand, enabling quick setting which is then refined by the Microtor; easy application by any one to all sets using dials.

(Tested and approved by RADIO WORLD)

Tri-Coil Transformer

THE Tri-coil radio-frequency transformer, manufactured by the Brooklyn Metal Stamping Company, 718 Atlantic Ave., Brooklyn, N. Y., is used extensively by great numbers of amateur and commercial set builders who use a straight radio-frequency amplifying circuit. This transformer uses a compensating coil arrangement on the primary which balances the plate circuit in which it is used. It is an effective product.

(Tested and approved by RADIO WORLD)

Uncle Sam Coil

THE Uncle Sam Coil Company of Plainfield, N. J., make a 3-circuit coil used in the popular

(Concluded on next page)

Coming Events

OCT. 14 TO 19, INCLUSIVE—Southwestern Radio & Electrical Exposition, Parkmoor Building, Dallas, Texas. Mailing address, Adolphus Hotel, Dallas.

NOV. 3-8—Third Annual National Radio Exposition, Grand Central Palace, New York City, under auspices of American Radio Exposition Co., 522 Fifth Ave., N. Y. C. Annual National Radio Convention in conjunction with show.

NOV. 11-14—Wisconsin Radio Exposition, Milwaukee.

NOV. 18-23—Chicago Radio Fair.

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

DEC. 1-7—Newark Radio Fair.

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

Business Opportunities Radio and Electrical

Rates: 40c a line; Minimum, 3 lines.

RADIO FACTORY ORGANIZED \$25,000, needs additional working capital; wants financial backing; consider services office or sales manager record; references; money secured. Box 1, RADIO WORLD.

WILL SELL GOING RADIO MANUFACTURING business, nationally established; very lucrative; \$25,000; wonderful opportunity; reason for selling. BOX 2, RADIO WORLD.

RADIO DISTRIBUTION AGENCY—Valuable exclusive sales rights for high-class sets, Eastern territory; incorporated; literature printed ready to start; price \$2,500. Box 3, RADIO WORLD.

RADIO "B" BATTERY FACTORY and business, well situated for Eastern markets; fully equipped; efficient staff; output contracted for by reputable dealers in key cities of East; outright sale, which will include formulas which have proven their superiority by yearly increased demand for product; reasonable terms can be arranged; a superlative opportunity and one that will stand closest investigation; banking and business references exchanged; quick action essential, as busy season at hand. Box 4, RADIO WORLD.

RADIO PARTS, STAMPINGS, SCREW machine parts, tools and dies manufactured, quantity production. Write or call Kings Manufacturing Co., Bush Terminal, Brooklyn, N. Y.

FOR RENT—RADIO STORE.

Best location in New York, in the centre of the radio market; visited by thousands of radio fans daily; act quickly. Box D. E. F., Radio World.

DELIVERY SERVICE FOR INDIVIDUAL corporation, will supply truck best fitted for clients' needs, under contract. Nolte, 312 West 21st, N. Y. C.

Sales at World's Fair Put at \$3,000,000

IRVING HOFFMAN MADISON SQUARE GARDEN

THE FAIR AFFORDED A FINE OPPORTUNITY FOR MANUFACTURER AND DEALER TO MEET AND DISCUSS THEIR PROBLEMS.

STATIONS WEAF, WJZ, WHN, AND WABG, BROADCAST THE PROCEEDINGS.

COMMISSIONER MILLS REPRESENTED MAYOR HYLAN.

JAS. F. KERR WAS THE MANAGER OF THE RADIO WORLD'S FAIR.

IT WAS ESTIMATED THAT 150,000 PEOPLE ATTENDED DURING THE SEVEN DAYS.

JUST WITNESS THE PLIGHT OF MR. EMERSON WHITE, HE TRIED TO TAKE HOME ALL HIS CIRCULARS ONE NIGHT.

OF COURSE NO RADIO SHOW WOULD BE COMPLETE WITHOUT THOSE FREAK SETS.

THE actual count of admissions to the first annual Radio World's Fair, held jointly in Madison Square Garden and the 69th Regiment Armory, nearby, places the number at 175,000 for the seven days it lasted. It is estimated 25,000 saw the show twice, hence 150,000 individuals visited it. Calvin Harris, of the show's executive staff, reports:

"Over \$3,000,000 worth of orders were booked by the exhibitors during the first six days of the show. Four companies succeeded in disposing of their entire 1924-1925 output, while three others actually oversold their maximum factory production for the coming year from ten to thirty per cent. Also, 3,600 radio dealers and jobbers from the United States and Canada attended the fair and close to 500 more came from South America, Europe and the Orient. General Manager James F. Kerr and Managing Director U. J. Herrmann have already completed arrangements for the 1925 Radio World's Fair which will be held in the New Garden soon to be erected by John Ringling and Tex Rickard. Although the new building will be twice the size of the present structure, Manager Kerr reports that 80 per cent. of the available exhibiting space already has been contracted for.

5 Neutrodyne Licensees in New Finance Plan

THE Independent Radio Manufacturers, Inc., announced that a number of Neutrodyne patents have adopted a new method for handling the financing of sales on the instalment plan. The arrangement was made with the Com-

mercial Investment Trust, Inc., of New York City. The Commercial Investment Trust makes collections direct. The dealer is required to obtain a minimum down payment equal to one-third the total value of the set and its accessories. This obviates the necessity of demanding cash for tubes and batteries. The Neutrodyne licensees who have already adopted the plan are F. A. D. Andrea, Inc., Freed Eisemann Radio Corp.; Garod Corporation; Wm. J. Murdock Co., and the Workrite Mfg. Company.

TRADE REVIEW

(Concluded from preceding page)

3-circuit regenerative circuit. The aperiodic primary is wound on the same tube as the secondary, and the tickler coil, which is wound on a

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SPECIALISTS**

Our Own Coils—guaranteed \$6.50
KIT (Fluwelllag Condensers, Coils and Diagram) 19.50
Complete Parts, Assembled with Diagram 65.00
Superdyne Advice Free. Mail Orders Solicited.

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

WANTED

Representatives, jobbers, dealers in every City, County, State and Country (correspondence confidential), to handle our new line of radio receiving sets—The Ultra Synchronyne VII and The Stracyn VIII. Something worth your while. Stanley's Perpetual Radio Bulb Fuse.

THE STANLEY RADIO COMPANY
2947 Lorain Avenue Cleveland, Ohio

ST. MARK'S RADIO CO.

A money order for \$5.95 will bring you a crystal set complete—including "Scientific" headphones, aerial wire, aerial clamp, lead-in wire and neat, substantial cabinet.

All Standard Radio Parts in Stock
Mail Orders Solicited

ST. MARK'S RADIO CO.
29 THIRD AVE. NEW YORK

**Bankrupt Stock
Cunningham Regenerative one
tube long range sets**

\$10.50 each

Prepaid While They Last
Formerly Sold at \$32.50

No Circulars. Order from This Ad.

S. A. TWITCHELL CO.

1930 Western Ave. Minneapolis, Minn.

New! **Metallic
Grid Leak
DURHAM**

ANOTHER important advance in radio—the development of a practical METALLIC high resistance for grid leak and resistance coupling! This is the invention of two professors in chemistry and electricity at a large eastern university.

The new DURHAM Metallic Resistance Unit is a rare metal deposited on glass by means of a complicated process developed after months of scientific research.

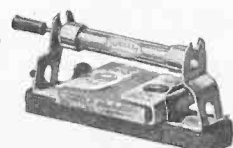


Accurate-Permanent-Noiseless
Tested and guaranteed accurate, every DURHAM unit is noiseless and non-inductive. You can depend upon them absolutely. They are the biggest little things in radio.

DURHAM Fixed or Variable Resistance Units (grid leaks) fit standard holders. But you will find the new style base more convenient. Three styles take care of plain mounting, grid leak and condenser mounting and double base for resistance amplifiers.

PRICES:—

Fixed, 28 sizes
50c-75c
Variable 75c
Mounts
30c-40c



**GET THIS
RESISTANCE AMPLIFIER BOOKLET**

Complete details for construction of the most perfect type of amplification. Coupling resistances and grid leaks for detector and two stages cost less than one good transformer. Send 10c for this useful booklet about the "biggest little thing in radio"

DURHAM & CO., Inc.
1930 Market St., Philadelphia,

rotor, is placed at the top of the tube near the end of the secondary. The coil is efficient for both local and DX reception.

(Tested and approved by RADIO WORLD)

**New and Selective
Tuning Unit**

A NEW tuning unit, called the Ever-Ready Tuning Unit, is being marketed by the Ever-Ready Radio Co., of 1861 86th St., Brooklyn, N. Y. The Unit will make a complete set with 3 tubes, sockets and transformers. The engineers who have worked to perfect the Ever-Ready Tuning Unit are among the best known in the country. The Ever-Ready Tuning Unit will bring in long distance stations without interference, while local stations are in operation with much volume.

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100 Will Exhibit at Dallas
THE Southwestern Radio & Electrical Exposition, to be held in the Parkmoor Building, Dallas,

WANTED

Factory Distributors. Tremendous profits in distributing newly invented, much needed Radio device. Patented. Sells for only 50 cents retail. Market several million yearly. Big repeats. Nationally advertised. Write at once for new sales plan.

RADIO EQUIPMENT COMPANY
20-W Stuart St. Boston, Mass.

Clear-O-Dyne

Four and Five Tube Sets

No set of an equal number of tubes will do more, yet the price is very moderate.

The Clearstone Radio Co.
Essex Place and McMillan St.
CINCINNATI, OHIO

WE REPAIR

RADIO TUBES

WD-11 .. \$2.50	DV-2 .. \$2.50
WD-12 .. 2.50	DV-5A .. 2.50
UV-200 .. 2.50	UV-199 .. 2.50
UV-201 .. 2.50	C-299 .. 2.50
C-300 .. 2.50	UV-201A .. 2.50
C-301 .. 2.50	C-301A .. 2.50
DV-6 .. 2.50	Marconi .. 2.50
DV-1 .. 2.50	Doorhead .. 2.50
UV202 Transmitter .. \$4.00	
G302 Transmitter .. \$4.00	

Mail orders solicited and promptly attended to.

Dealers and agents write for special discounts.

H. & H. RADIO CO.
P. O. Box 22-B

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Distributors for
Well Known Radio Manufacturers
Standard nationally advertised radio merchandise always on hand for prompt delivery.

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SUPERHETERODYNE KIT**

The Richardson "Self Evident" wiring system makes it possible for a 10-year-old child to build a 9 tube Superheterodyne.

And other Products of Merit

**fits Grid Leak
any mounting**

**FRESHMAN PLUNGER
TYPE VARIABLE GRID LEAK**

was designed especially for the non-technical set owner who can replace in an instant the fixed grid leak with this new, efficient cartridge type Variable Grid Leak: without requiring the change of a single wire.

At your dealer
or by mail post-
paid. Write for
free catalogue.

65c

106-7th Ave.
New York



Texas, October 14 to 19, inclusive, under the direction of the Southwestern Radio Jobber's Association, will have approximately a hundred exhibitors, many of whom have already reserved their space, representing every type of radio receiving set, as well as the various accessories and batteries that are now on the market.

NEW TUBES

Exchanged or Repaired

FOR OLD

\$2.25

Send any type or make
of tube in any condition
199, 201A, 12, 200.....

We will replace your old Burnt-out or Bad Tube with another of similar type and guarantee it to function as well as any Standard Tube made.

Our Tubes are made in all types—201A, 200, WD 12, WD 11, 199, etc. Any tube that does not oscillate and amplitly will be replaced Free of Charge if Filament is not burned out.

CRESCENT SALES CO.

985 Third Avenue New York, N. Y.

Mail Orders Promptly Filled.

**HARP
TUBES
\$1.00**



REGULAR PRICE

\$3.75

6 V., 1/4 Amp. Det.

Royal Mfg. Co.

206 BROADWAY
cor. Fulton St., N. Y.

The New Type 54

**Sleeper
MONOTROL**

Reg. U. S. Pat. Off.

Grimes Inverse Duplex System

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

23 other important improvements.

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

SLEEPER RADIO CORPORATION
434 Washington Street Long Island City, N. Y.

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303 Atkins Ave., Brooklyn, N. Y.

SPECIAL!!

**5 TUBE NEW COCKADAY
4 CIRCUIT TUNER with
Resistance Coupled Amplifier KIT**

FREE GENUINE BAKELITE PANEL
Drilled and engraved, worth \$8.00, with all orders for this Kit received up to January 1st, 1925.

PARTS In this Kit are exactly as specified and recommended by Mr. Cockaday in the October issue of Popular Radio, also featured in our new catalog.

WIRED This set wired complete in **\$85.00**
genuine mahogany cabinet...

We specialize in Cockaday Kits

WRITE FOR OUR NEW CATALOG
containing 28 pages, unexcelled bargains in standard nationally advertised radio accessories, parts, sets, kits.

Orders over \$5.00 will be shipped prepaid. Money orders or C. O. D. Not insured unless insurance charges included. Write for Price List.

ANY "DYNE" YOU WANT

The Dynoflex, one stage of tuned RF, crystal detector and one stage of reflexed AF, Aug. 9 issue.

The Magnadyne, a Low-Loss Neutrodyne. Issues of Aug. 16 and 23.

A Low-Loss Superdyne, 5 tubes, including 3 stages of resistance-coupled AF. Issues of Aug. 23 and 30.

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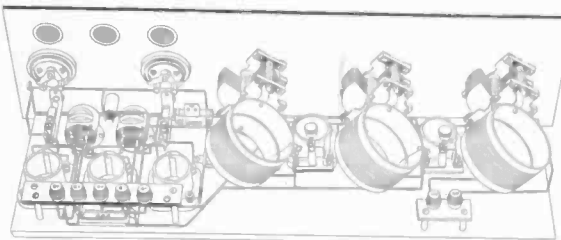
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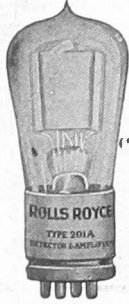
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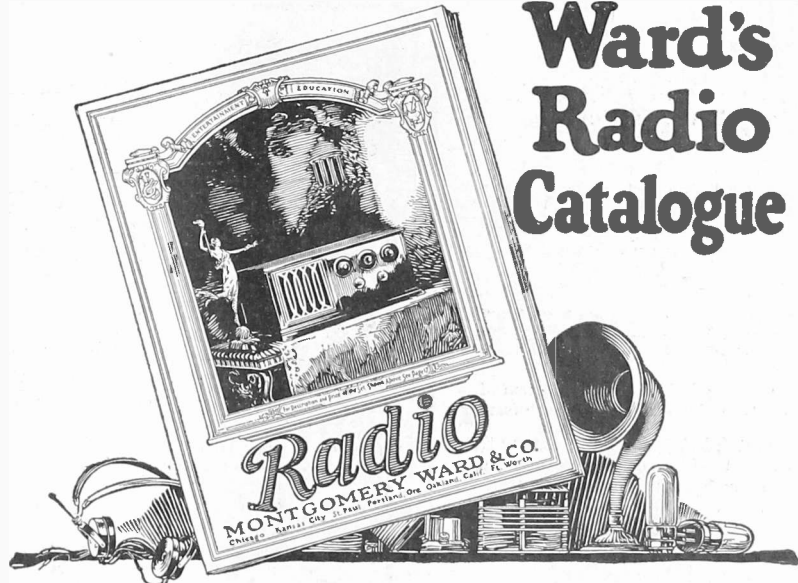
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Programs

Saturday, October 11, Continued from page 19

WEEL, Boston, 246m—Silent Night.
KFNF, Shenandoah, Ia., 266m—7:30 P. M., program by John G. Woodard Candy Co., Council Bluffs. 10:30 P. M., seedhouse frolic
KFI, Los Angeles, 469m—2:00 P. M., Los Angeles Grand Opera Company, "Amico Fritz," with Tito Schipa, Thalia Sabanieva and Giuseppe de Luca, and "Gianni Schicchi" with Giuseppe de Luca, Myrtle Donnelly and Jose Mejica. 5:00-5:30 P. M., news bulletins. 5:30-6:00 P. M., news bulletins. 6:45-8:00 P. M., dance orch. and Basil Webb lecture on India. 8:00-9:00 P. M., Raymond Instrumental Trio. 9:00-10:00 P. M., program

from Examiner Studio. 10:00-11:00 P. M., Packard Radio Club. 11:00-12:00 P. M., Ambassador Hotel Cocoanut Grove Orchestra.
WRC, Washington, D. C., 469m—5:15 P. M., code instruction. 6:00 P. M., children's hour by Peggy Albion. 8:00 P. M., song recital by Fany Shreve Heartsill, soprano. 8:15 P. M., to be announced. 8:30 P. M., Francis P. Heartsill, bass. 8:45 P. M., to be announced. 9:35 P. M., time signals.

Sunday, October 12

WLAC, Minneapolis, 417m—8 P. M., Mrs. Mel-accompanist; Elsie Wolf, piano; Marion Bernstein violin A. Campbell, contralto; Eleanor Freemantel, Bearman, violin. 9 P. M., weather.
WBAP, Fort Worth, Tex., 476m—11 A. M., church services. 4 P. M., concert from Rialto Theatre. 11-12 P. M., concert.
WQJ, Chicago, 448m—10:30 A. M., Dr. Preston Bradley's sermon and services People's Church. 8-10 P. M., Williams orchestra in concert; Iandon Bros., guitar; Lancaster Smith, bass; Mrs. Lancaster Smith, accompanist; The Premier quartet; James Whalen, tenor.
WHO, Des Moines, Ia., 526m—7:30-9 P. M., music. The Bankers Life radio orchestra, W. L. Marsh, dir.; Kathryn Fletcher, Helen Birmingham, Mrs. La Vere Braucht, Gladys McMahon.
WDAF, Kansas City, Mo., 411m—Baseball scores at 3:30, 4, 4:30 and 5 P. M. 4-5 P. M., music.
KGO, Oakland, Cal., 312m—11 A. M., service First Baptist Church. 3:30 P. M., Little Symphony orchestra. 7:30 P. M., service of First Baptist Church.
WHAS, Louisville, Ky., 400m—9:57 A. M., organ. 10 A. M., church service, Broadway Baptist Church; H. U. Goodwin, organist; Mrs. O. W. Edinger, Miss Angeline McCrocklin, Charles H. Barnes, Jr., William Cornwall. 4-5 P. M., Vesper song service.
KPO, San Francisco, 423m—11 A. M. to 12 Noon, undenominational and non-sectarian church services; Dr. William P. Bentley, pastor First Christian Church; Wm. Edward Johnson, soloist; organ by Theo. J. Irwin. 8:30-10 P. M., concert by Seiger's orchestra.
KFI, Los Angeles, 469m—10:45 A. M., L. A. Church Federation service. 6:45-7 P. M., Paul Reese musical talks. 7-8 P. M., Metropolitan Theatre program. 8-9 P. M., Ambassador Hotel concert orchestra. 9-10 P. M., program, studio.
WIP, Philadelphia, 509m—7:30 P. M., Holy Trinity Church service. 9:30 P. M., concert by Ben

Stad symphony orchestra; Karl Bonawitz, organ.
WGY, Schenectady, N. Y., 380m—10:45 A. M., service First Methodist Church, Schenectady, N. Y., sermon by the Rev. Dr. Philip L. Frick. 7:30 P. M., service of the First Methodist Church, Schenectady.
KFNF, Shenandoah, Ia., 266m—3:00 P. M., sacred concert. 6:30 P. M., song service.
WWJ, Detroit, 517m—11:00 A. M., services at St. Paul's Episcopal Cathedral, broadcast from the cathedral. 2:00 P. M., Detroit News Orchestra.
KGW, Portland, Ore., 492m—6:00 P. M., church services, by Portland Council of Churches.
WEEL, Boston, 246m—4:00 P. M., organ recital; Boston Chamber of Commerce; musicale. 7:30 P. M., Mark Strand Theatre program, New York City.
WOAW, Omaha, Neb., 526m—9:00 A. M., radio chapel service by Rev. R. R. Brown. 9:00 P. M.,

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STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912.

Of Radio World, published weekly at New York, N. Y., for October 1, 1924.

State of New York,
 County of New York, ss:

Before me, a Notary Public, in and for the State and County aforesaid, personally appeared Roland Burke Hennessy, who, having been duly sworn according to law, deposes and says that he is the Editor of the Radio World, and that the following is, to the best of his knowledge and belief a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor managing editor, and business managers are: Publisher, Hennessy Radio Publications Corporation, 1493 Broadway, N. Y. C.; editor, Roland Burke Hennessy, 1493 Broadway, N. Y. C.; managing editor, Herman Bernard,

1493 Broadway, N. Y. C.; business manager, Fred S. Clark, 1493 Broadway, N. Y. C.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent. or more of the total amount of stock): Hennessy Radio Publications Corp., 1493 Broadway, N. Y. C.; Roland Burke Hennessy, 1493 Broadway, N. Y. C.; Mrs. Mary McArthur, Statler Hotel, Cleveland, Ohio.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent. or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear on the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear on the books of the com-

pany as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest, direct or indirect in the said stock, bond or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown in the caption of this form, is weekly. (This information is required from daily publications only.)

ROLAND B. HENNESSY, Editor.

(Sworn to and subscribed before me this 26th day of September, 1924.)

KARL E. GOTTFRIED,
 Notary Public, New York County, New York County Clerk's No. 180, New York Co., Register's No. 6165, Term expires March 30, 1926.

Note.—This statement must be made in duplicate and both copies delivered by the publisher to the postmaster, who shall send one copy to the Third Assistant Postmaster General (Division of Classification), Washington, D. C., and retain the other in the files of the post office. The publisher must publish a copy of this statement in the second issue printed next after its filing.

Programs, Continued

musical chapel service, North Presbyterian Church; Rev. James M. Hamilton, pastor; Hugh E. Wallace, choir director; Mrs. Deyo Crane, organist.

WCBD, Zion, Ill., 345m-8:00 P. M., vocal and instrumental sacred music, Glen R. Sparrow, Paul Stewart, Gerald Mason, Wm. C. Dunn, Daniel Mascor.



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THAT GREAT SUPERDYNE CIRCUIT

The Editors decided recently to bring RADIO WORLD'S Superdyne articles strictly up-to-date, and the Superdyne Circuit was, therefore, fully covered in descriptive story and diagrams in RADIO WORLD dated Aug. 31 and 30, 1924. These two copies sent on receipt of 20 cents. Also the July 5 issue contained an article about "Trouble Shooting for the Superdyne," mailed on receipt of 15 cents or start your subscription with any number. RADIO WORLD, 1493 Broadway, New York City.

Monday, October 13

WFAA, Dallas, Tex., 476m-10:30 A. M., weather report and forecast; highway condition bulletin; produce market report and Wall Street review. 12:30 P. M., Dr. Ellis W. Shuler, Southern Methodist University, on "Texas History in the Rocks." 2:30-3 P. M., Dallas livestock market, late general markets, sports, news. 3:30-4, 4:30-5 P. M., Agriograms, health bulletins, Texas market news, sports, news. 5:30-6 P. M., bedtime story and fairy tale by Mary C. Toomey. 8:30-9:30 P. M., Mozart Choral Club, Earle D. Behrends directing. 6:45-7 P. M., sport news and information bulletins. 9:30 P. M., weather report and forecast.

The above is substantially every-day program for WFAA. Only night programs are published for remaining dates of week.

WQJ, Chicago, 448m-11 A. M.-12 Noon, Earle Hart Miller, "Furnishing the Small House or Apartment"; Agnes May Allen, "Your Favorite Restaurant Recipes"; Marcia Meadows, "Furnishing the Living Room." 3-4 P. M., Helen Harrington Downing, "Three Meals a Day"; silent night for Chicago.

KPO, San Francisco, 423m-12 Noon, time; scripture. 1-2 P. M., Seiger's orchestra. 4:30-5:30 P. M., Seiger's orchestra. 5:30-6:30 P. M., children's hour. 7-7:30 P. M., Seiger's orchestra. 8-9 P. M., organ, Theodore J. Irwin. 9-10 P. M., contralto, Mrs. Mark T. H. Shwayder; piano, A. M. G. Vermaas; tenor, Gwynn Jones; book review, George Douglas. 10-11 P. M., Bradford's band.

WHO, Des Moines, Ia., 526m-Sciota McAdow Herndon, soprano; Charlotte Van Ginkle Dye, acc.; D. H. Welis, tenor; Jennie Hines, acc.; Scotch Kiltie band; also artists from the Drake Conservatory, direction Dean Holmes Cowper. 11:15-12 Noon, organ, by L. Carlos Meier.

WDAF, Kansas City, Mo., 411m-baseball scores at 3:30, 4, 4:30 and 5 P. M. 3:30-4:30 P. M., trio. 5-5:30 P. M., Boy Scout program. 5:50-6 P. M., marketgram, weather, time. 6-7 P. M. (School of the Air), piano tuning in number; The Tell-Me-a-Story Lady; Fritz Hamein's Trianon Ensemble. 8-10 P. M., minstrels and orchestra. 11:45 P. M.-1 A. M. (Nighthawk Frolic), The "Merry Old Chief" and the Plantation Players.

WGY, Schenectady, N. Y., 380m-Earl Rice, piano; Isabelle Franklin, soprano; Frederick A. Clinnick, cornet; Walter Reagles, tenor.

WHAS, Louisville, Ky., 400m-4-5 P. M., selections by the Alamo Theatre orchestra; police bulletins; weather; humor; readings; news. 4:55 P. M., livestock, produce and grain market re-

ports. 5 P. M., time. 7:30-9 P. M., WHAS is silent on Monday nights.

KFI, Los Angeles, 469m-5-5:30 P. M., news. 5:30-6 P. M., news. 8-11 P. M., Los Angeles Grand Opera, "Traviata," with Claudia Muzio, Jose Mojica, Giuseppe de Luca.

KGO, Oakland, Cal., 312m-1-30 P. M., N. Y. and S. F. stock reports and weather. 3 P. M.,

(Continued on next page)



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Programs

Monday, October 13, Continued from preceding page

music; Parent-Teacher Association speaker. 4:53-5:30 P. M., Halstead's dance orchestra. 5:30-6 P. M., Aunt Betty stories and Kiddies Klub. 6:45 P. M., stock reports, weather, S. F. produce news, baseball scores, news. 8 P. M., educational pro-

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gram; courses in agriculture, music, economics and literature; music by Arion Trio. 10-1 A. M., dance by Halstead's orchestra; soloists.

WBAP, Fort Worth, Tex., 476m—10 A. M., 10 A. M., opening market quotations. 11 A. M., weather forecast; livestock reports; cotton and grain quotations. 12 Noon, market. 1 P. M., market. 2 P. M., close on cotton, grain and cottonseed oil; Dun's and Bradstreet's financial reviews. 6 P. M., Port of Missing Men; baseball scores. 6:30 P. M., sport review. (The above part of the program applies to all week days, except Saturday.) 7:30-8:30 P. M., artists from the Majestic Theatre. 9:30-10:45 P. M., concert by the Foster Merrill Music House, Hereford, Texas.

WHAZ, Troy, N. Y., 380m—9:00 P. M., concert by Columbus Club Italian Band; solos. 12:00 P. M., transcontinental and international program by the Campus Serenaders, Rensselaer Polytechnic Institute students' dance orchestra. **WMC, Memphis, Tenn., 500m—12:30 P. M.,** noon-day programme by the Skyline Serenaders playing at the Shrine Roof Cafe. 8:30 P. M., Monday evening request programme by the Gayoso Hotel Orchestra.

WOAW, Omaha, Neb., 526m—6:00 P. M., half-hour or dramatics. 6:30 P. M., Randall's Royal Orchestra. 9:00 P. M., program from vocal studio of Walter B. Graham, baritone; Regina Franklin, accompanist. 10:00 P. M., Wow! dance program, Pat's Melody Boys.

KFNF, Shenandoah, Ia., 266m—Silent Night.
KGW, Portland, Ore., 492m—11:30 A. M., weather forecast. 5:00 P. M., children's program. 7:15 P. M., markets, weather, news bulletins and police reports. 8:00 P. M., Elks Quartet; Ernest Crosby, Ross Fargo, Charles Thomson, Walter Hardwick, Matt Howard, piano; also Elsie Cramer, Margaret Notz, Marie Chapman McDonald, violinist.

WCB, Zion, Ill., 345m—8:00 P. M., Zion Band, assisted by Dorothy Bull, Ralph Bull, Erma Reynolds, Evelyn Uhlík, Mark Whiteside, Bessie Wiedman, Lillian Detienne.

Tuesday, October 14

WBAP, Fort Worth, Tex., 476m—7:30-8:30 P. M., concert. 9:30-10:45 P. M., concert of old-time music by the Tom Bean Fiddle Band. (See WBAP, Oct. 13)

WDAF, Kansas City, Mo., 411m—Baseball scores at 3:30, 4, 4:30, 5 and 6 P. M. 3:30-4:30 P. M., trio. 5-5:30 P. M., child talent. 5:50-6 P. M., marketgram, weather, time. 6-7 P. M. (School of the Air), piano tuning-in number; The Tell-Me-A-Story Lady; Hanlein's Trianon Ensemble. 11:45 P. M.—1 A. M. (Nighthawk Frolic), The "Merry Old Chief" and the Plantation Players, Hotel Meuhlebach.

KGO, Oakland, Cal., 312m—N. Y. and S. F. stock reports and weather. 4-5:30 P. M., concert orchestra. 6:45 P. M., stock reports, weather, S. F. produce news, baseball scores, news. 8 P. M., "E. M. S. Pinafore," the KGO Opera Company, direction Carl Anderson; Arion Trio. 10 P. M.—1 A. M., dance, Halstead's orchestra.

WGY, Schenectady, N. Y., 380m—7:45 P. M., Chinese night, music, tour through New York Chinatown of quarter of a century ago by Edward H. Smith. 11:20 P. M., organ recital by Stephen E. Boisclair.

KFI, Los Angeles, 469m—5-5:30 P. M., news. 5:30-6 P. M., news. 6:45-8 P. M., organ. 8-9 P. M., Hotel Ambassador orchestra. 9-10 P. M., studio. 10-11 P. M., Don Meaney motion picture night.

KFO, San Francisco, 423m—12 Noon, time; scripture. 1-2 P. M., Seiger's orchestra. 2:30-5:30 P. M., Seiger's orchestra. 5:30-6:30 P. M., children's hour. 7-7:30 P. M., Seiger's orchestra. 8-10 P. M., Jack I. Thomas, tenor. 10-11 P. M., Bradford's band.

WHAS, Louisville, Ky., 400m—4-5 P. M., Alamo Theatre orchestra; police bulletins; weather; humor; readings; news. 4:55 P. M., livestock, produce and grain reports. 5 P. M., time. 7:30-9 P. M., Happy Hoosier Harmonists, Charles Harris, director; Carson Bard, Stumpe Meyer, Emil Stein, Kenneth Robison, Albert Koehler; news, time at 9 o'clock.

WFAA, Dallas, Tex., 476m—12:30-1 P. M., address, DeWitt McMurray. 8:30-9:30 P. M., Elizabeth Gay Jones, pianist; Dallas artists. 11-12 P. M., Adolphus Hotel orchestra, dance. (See WFAA, Oct. 13)

WQJ, Chicago, 448m—11 A. M.—12 Noon, John Mehan, "What Football Will Do for Your Boy";

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KFNF, Shenandoah, Ia., 266m—7:30 P. M., concert, Henry Field Seed Co.

WOAW, Omaha, Neb., 526m—5:00 P. M., "Advice to Lovelorn," by Cynthia Grey. 6:25 P. M., dinner program from WOAW's Studio, Shenandoah, Ia.

KGW, Portland Ore., 492m—11:30 A. M., weather forecast. 12:30 P. M., concert. 5:00 P. M.,

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Programs, Continued

children's program. 7:15 P. M., markets, weather, news bulletins and police reports. 8:00 P. M., agricultural lecture. 8:30 P. M., concert by Civic Music Club.

Wednesday, October 15

WHO, Des Moines, Ia., 526m-7:30-9 P. M., Bankers Life Orchestra; Margaret Leech, soprano; Jack Eberhart, baritone.

WFAA, Dallas, Tex., 476m-12:30-1: P. M., Musicale by the Red-Headed Girl. Station WFAA will be silent for the remainder of the day. (See WFAA, Oct. 13.)

WBAP, Fort Worth, Tex., 476m-7:30-8:30 P. M., musical concert by the Hemphill Heights Masonic Lodge No. 1164. 9:30-10:45 P. M., dance music by the Texas Hotel Orchestra. (See WBAP, Oct. 13.)

WDAF, Kansas City, Mo., 411m-3:30, 4, 4:30, 5 and 6 P. M., baseball scores. 3:30-4:30 P. M., trio. 5:50-6 P. M., marketgram, weather, time signals. 6-7 P. M., (School of the Air); piano; address, health; address, meat; the Tell-Me-a-Story Lady; Hanlein's Ensemble. 8:15 P. M., Federated Music Clubs. 11:45 P. M.-1 A. M., (Nighthawk Frolic). The "Merry Old Chief" and Bobbie Kuhn's K. C. A. C. Orchestra.

KGO, Oakland, Cal., 312m-1:30 P. M., N. Y. and S. F. stock reports and weather; music. 4-5:30 P. M., concert orchestra, Hotel St. Francis. 6:45 P. M., stock reports; weather; S. F. produce news; baseball scores, and news items. Silent night.

WHAS, Louisville, Ky., 400m-4-5 P. M., Alamo Theatre orchestra; police bulletins; weather; humor; readings; news. 4:55 P. M., livestock; produce and grain market. 5 P. M., time. 7:30-9 P. M., concert by Keith Kanard and his Kentucky Ramblers; news at 9 P. M.

WGY, Schenectady, N. Y., 380m-6:30 P. M., adventure story.

KFI, Los Angeles, 469m-5:53-30 P. M., news. 5:30-6 P. M., news. 6:45-7:30, detective stories and concert. 7:30-8 P. M., 1-act play, "The Stranger." 8-9 P. M., studio. 9-10 P. M., studio. 10-11 P. M., Hollywoodland orchestra. 1-12 P. M., Ambassador Hotel orchestra.

KPO, San Francisco, 423m-Noon, time signals. 1-2 P. M., Seiger's orchestra. 2:30-3:30 P. M., Fisher's Amphians. 4:30-5:30 P. M., Seiger's orchestra. 5:30-6:30 P. M., children's hour. 6-7:30 P. M., Seiger's orchestra. 8-11 P. M., Bradfield's band; songs by Woolsey sisters.

KNF, Shenandoah, Ia., 266m-7:30, Harmonica concert.

KGW, Portland, Ore., 492m-11:30 A. M., weather forecast. 12:30 P. M., Bill Darby's Orchestra. 5:00 P. M., children's program. 7:15 P. M., markets, weather, news bulletins and police reports. 8:00 P. M., program, courtesy Elizabeth Hoben. 10:00 P. M., George Olsen's Metropolitan Orchestra (two hours).

WMC, Memphis, Tenn., 500m-12:30 P. M., program by the Skyline Serenaders. 8:30 P. M., Silent Night.

Thursday, October 16

WBAP, Fort Worth, Tex., 476m-7:30-8:30 P. M., concert. 9:30-10:45 P. M., Dot Echols Frolics. (See WBAP, Oct. 13.)

WFAA, Dallas, Tex., 476m-12:30-1 P. M., Charles E. Osborne, "Fit for Every Fight." 8:30-9:30 P. M., Walter J. Fried, violinist, and Dallas artists. 11-12 P. M., organ with orchestra. (See WFAA, Oct. 13.)

WDAF, Kansas City, Mo., 411m-3:30, 4, 4:30, 5 and 6 P. M., baseball. 3:30-4:30 P. M., trio. 5:50-6 P. M., marketgram; weather; time signals. 6-7 P. M., (School of the Air); piano; Edgar Allan Linton, talks on world travels; reading, Miss Cecile Burton, poems and essays; the Tell-Me-a-Story Lady; Hanlein's Trianon Ensemble. 8:15 P. M., 1 A. M., (Nighthawk Frolic). The "Merry Old Chief" and the Plantation Players, Hotel Muehlebach; Eddie and Bobbie Kuhn's K. C. A. C. orchestra.

KGO, Oakland, Cal., 312m-1:30 P. M., N. Y. and S. F. stock reports and weather. 4-5:30 P.

M., concert orchestra, Hotel St. Francis. 6:45 P. M., stock reports; weather; S. F. produce news; baseball scores; news. 8:00 P. M., Mid-Pacific Hawaiian quartet; address, "The Bolshevism of the Bee," by Rev. George W. Phillips; songs; music. 10 P. M.-1 A. M., dance music program by Henry Halstead's orchestra and soloists, Hotel St. Francis, San Francisco.

WGY, Schenectady, N. Y., 380m-7:45 P. M., new books, by William F. Jacobs. 8:00 P. M., radio drama, "The Path of Glory," by Rabbi Goodman Lipkind, presented by WGY writers; WGY orchestra. 11:20 P. M., organ. KFI, Los Angeles, 469m-5:53-30 P. M., Evening

Herald news bulletins. 5:30-6 P. M., news. 6:45-7:30 P. M., Y. M. C. A. lecture. 7:30-8 P. M., Harry Porter, baritone, and Sylvia Marotta. 8-9 P. M., concert orchestra. 9-10 P. M., studio. 10-11 P. M., Spanish program.

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Yours Radio, KFI

GENERAL ELECTRIC COMPANY

Pacific Coast Broadcasting Station
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KGO
Sept. 4, 1924.

Mr. Vincent T. Kenney,
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We are glad to confirm your reception of our late program from the Hotel St. Francis on the morning of August 27th.

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Yours very truly,
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Radio Broadcasting Pub. Dept.

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PHILADELPHIA.

CHARGES of infringement and conspiracy made in applications for injunctions sought by Dr. Lee De Forest were joined in a series of suits against the Westinghouse Electric and Manufacturing and Westinghouse Lamp companies. The applications were filed in the Federal

Court by the De Forest Radio Telephone and Telegraph Company. Similar actions making the same general charges were filed in Delaware against the Radio Corporation of America.

The complaints allege the generic patents of Dr. De Forest on oscillators, detectors, amplifiers, the three electro audio or vacuum tube and certain other of his essential radio inventions have been infringed upon in equipment made or sold by the three defendants. Further charges concerning an alleged trade agreement now in force, under which the Westinghouse interests manufacture 40 per cent. of the transmitting, receiving and miscellaneous equipment sold by the Radio Corporation, much of which embodies alleged infringements on De Forest letters patents, are made. Samuel E. Darby, Jr., of Darby and Darby, New York, counsel for the De Forest interests, said that the actions were based on previ-

ous decisions which had upheld the inventor's patents. He said: "We have asked for an accounting of all profits accruing to the three defendant corporations and injunctions that will prevent future infringement."

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**RADIO WORLD'S
Broadcast University**
*Questions and Answers On
the Air Every Wednesday Eve-
ning at WLS, the Sears-Roebuck
Station, Chicago — Department
Conducted by Mat H. Friedman,
RADIO WORLD'S Chicago Repre-
sentative.*

I AM SURE that many radio fans like myself
are puzzled about the kind of radio-frequency
amplification to use. I understand that the trans-
former type would be desirable if one could get
one to amplify equally well on all wavelengths.
But I also know that a fixed transformer will not
do that. But suppose we should use two stages,
each one with a different wave band, could the
amplification be improved on all wavelengths?
In the tuned type, are the windings of the trans-
formers critical? I note that most of them use
about 20 turns for the primary and about 60 for
the secondary. Could I use 40 turns for the
primary and 50 for the secondary? Are the tuned
type more selective than the transformer kind?—
P. E. Miller, 1252 N. Campbell St., Chicago.

Your method of broadening the peak of the
coupled transformers is not practical, because
should the first stage be under the wave received,
and the second stage be over the wave received,
tuning sharply and efficiently would be defeated.
In the first stage you would not be tuning to the
station properly, and in the second stage the
transformer would be trying to amplify a signal
that is weakened by poor tuning in the first place.
The windings of the tuned type of transformers
are critical to a degree, and when more than one
stage is used the number of turns on each trans-
former should be the same in order that the con-
densers tune to the same dial numbers in step.
Forty turns on the primary of a transformer
would be too much because it would tune the
plate circuit into resonance with the grid circuit
and cause oscillation. Fifty turns on the secondary
would not be enough to enable the circuit to tune
to the higher broadcast wavelengths without the
use of very large condensers. The tuned type of
transformers are much more efficient and are much
sharper tuned than the fixed type.

I WISH to build a separate 2-stage audio ampli-
fier, and I have all the parts necessary for stor-
age battery connections. I would like a diagram
showing how the connections go, and also show a
double circuit-jack after the first stage.—J.
Handwerker, 1624 Park Place, Brooklyn, N. Y.
Fig. 43 is the circuit you ask for. The two bind-
ing posts at the left go to the detector output
posts. Up to 100 volts may be used on the plates
of the amplifiers.

I WAS greatly interested in the article by Lieut.
Harry F. Breckel in the August 30 issue, dealing
with radio-frequency amplification. After reading
many articles on the subject I find that all agree
that tuned RF is the best. They also agree that
the fixed transformer coupled type can be made

to function better by shunting a condenser across
the windings. Lieut. Breckel says a 23-plate
should go across the secondary. Other articles
call for a 5-plate condenser across the primary.
If an untuned transformer is used with a 23-plate
condenser across the secondary, what should the
natural wavelength of the transformer be? When
using two stages of RF amplification, one fixed
and the other tuned, which should be placed in
the first stage?—R. E. Miller, 1252 N. Campbell
St., Chicago, Ill.

By your first question it is understood that
you refer to the fixed transformers which are
usually not tuned, but whose wavelength factor
is predetermined for definite wavelengths. If so,
that transformer, in order to tune upwards, for
the broadcast wavelengths should have a natural
fundamental of 200 meters. The condenser would
then boost the wavelength up close to 600 meters,
provided one with 23 plates is used. The same
applied to the other RF transformers, like the
Neutroformers, which have a fundamental of about
200 meters. Tuning the primary, especially when
that primary is in the plate circuit of the pre-
ceding tube, is poor practice, as it will bring
the plate into resonance with the grid circuit at
times and will cause uncontrollable oscillation. It
is the usual practice to place the untuned RF
stage first, and the tuned stage of RF directly
before the detector when using a combination of
both, but it works either way.

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**WINDING A LOOP ON A PHONOGRAPH
RECORD**, by Herbert E. Hayden, Sept. 13 issue.
Radio World, 15 cents.

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