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THE 6-TUBE ENTERTAINER

15 CENTS

1925

RADIO WORLD

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155-195

CHRISTMAS EVE., 1925

(Underwood & Underwood)

HOW TO CHOOSE THE MOST SUITABLE DIAL

A 5-Tube Receiver That Produces "Magic Music"

TRANSFORMER AND CHOKES FOR B ELIMINATOR

Type 5SS

5-Tube Tuned Radio Frequency

$45.00

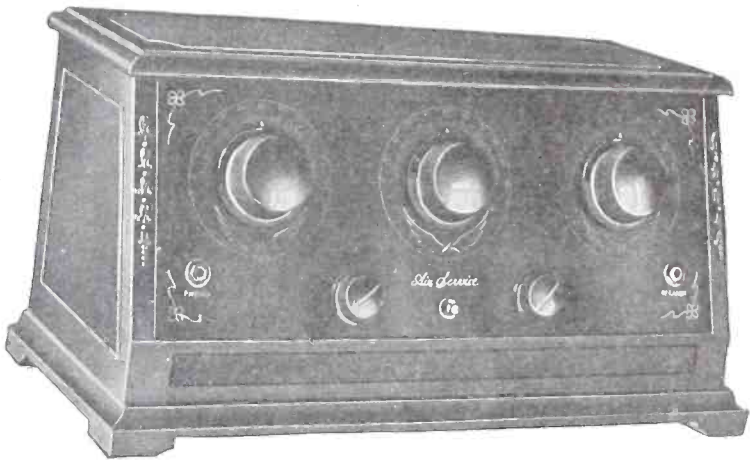
A·I·R
AMERICAN INTERSTATE RADIO
SERVICE
NEW YORK

Type 6RR

6-Tube, Resistance-Coupled Audio, Tuned Radio Frequency

$50.00

QUALITY



BEAUTY

The Air Service Receivers—both the 5-tube type, 5SS, and the 6-tube one, 6RR—contribute something of vital importance. They unite low price with the highest quality of performance and alluring beauty of appearance.

Both receivers are self-neutralized by an ingenious and efficient method, so that tuning is accomplished without the slightest trace of a squeal, even to the reception of far-distant stations. To enhance the tuning simplicity, straight line frequency condensers are used in both models.

The sets differ in their audio amplifiers. Those desiring to use only a 5-tube set get just as much volume, but the 6-tube model amplifies the audible notes a little more evenly and is particularly designed for those who delight in orchestral music.

The sockets are of original design and permit the interchangeable use of either the standard U. V. type tubes or the new UX base tubes.

As for beauty, the front panel is Bakelite, with the dial calibrations and design engraved in gold. The three beautiful tuning knobs have ornamental pointers to indicate the numerical setting to bring in stations. The sub-panel also is Bakelite, as no refinement was omitted that would add to the sturdiness of the receivers. The two tone cabinet is an imposing furniture effect.

In performance these receivers rank with the best as to selectivity, sensitivity and volume.

American Interstate Radio Service

183 GREENWICH STREET, NEW YORK CITY

Distributors, Jobbers, Dealers, write for special trade terms

RADIO WORLD

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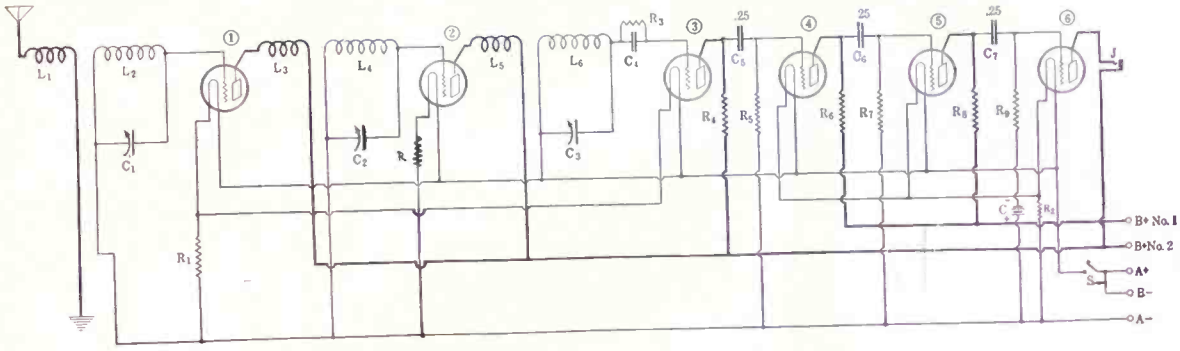
The Lemnis Entertainer



THE WIRING DIAGRAM. The set is designed to operate only the speaker. Tubes 4 and 5 should be hi-mu, while a power tube may be used in the last stage (6). In that case, if the lo-mu type is used, drawing ½-ampere, R2 should be a No. 1 Amperite, which passes one ampere. Otherwise use a ¾-ampere ballast.

By Edward Spiegler

WHAT makes a rado frequency amplifier circuit over-oscillate?

An amplifier over-oscillates because of a combination of circumstances, including the capacity effect between the grid and plate elements of the tubes and the stray coupling between coils in respective stages.

In tuned radio frequency amplifiers we have transformers connected between the various tubes. The primary coil, consisting of a few turns of wire, is connected in the plate circuit, while the secondary is in the grid circuit of the succeeding bulb.

Coil Design

Now, taken by itself the primary coil is to small to cause a regenerative feedback such as would a variometer in the plate circuit. However, if the secondary is coupled very closely to the primary and is then tuned by its variable condenser, the effect on the plate circuit will be somewhat like that of a variometer, and a feedback likely will take place through the tube capacity.

The extent of this feedback depends on the actual amount of the tube capacity and the general design of the R.F. transformer. A carefully constructed instrument, with a fairly small primary and a judicious degree of coupling between primary and secondary, will give a fair quantity of feedback, but not enough to cause over-oscillation.

Some amount of feed-back is quite desirable, as it corresponds to decided amplification, but if it causes over-oscillation, the set will squeal badly, will distort the received voice or music and may even fail to bring in the program.

Self-Neutralization

The purpose of all circuits of the neutralizing and balancing variety is to provide a speck on the strength of feedback. What most of them do is to introduce in the circuit a counter feedback current, of the same or nearly the same strength. The effect of the two opposing currents is to cancel each other.

The other extremely influential factor in producing over-oscillation—the magnetic feedback between the radio frequency transformers themselves—is generally the predominating contributor. With plain solenoid coils great care must be taken that they are mounted at a certain angle or distance in relation to one another, otherwise they will react and cause strong oscillation possibly beyond the control of any neutralizing arrangements. Radio frequency transformers having confined magnetic fields are of decided advantage, as they avoid a great deal of this trouble. A set involving no particular neutralizing scheme, but a brace of well designed coils works in an entirely satisfactory manner.

The writer recently designed a new transformer which he believes is ideal for radio frequency circuits because of its completely self-confined magnetic field and its general efficiency. It is called the Gen-Win Lemnis-Coil, deriving the name from the resemblance of the winding form to the shape of the mathematical sign, the lemniscate. The coils were used in a specially designed quality receiver, called The Entertainer, consisting of two stages of tuned RF amplification, tube detector and three stages of resistance coupled audio.

LIST OF PARTS

Three .00035 mfd. Amsco SLF allocating variable condensers, C1, C2, C3.
Three Lemnis Coils, L1L2, L3L4, L5L6.
One No. 120 Style Z Amperite, R1.
One No. 1A Amperite, R.
One ¾-amp. ballast, R2.
One .00025 mfd. Dubilier grid condenser, C4.
One Cole Meggit 2-meg. grid leak, R3.
Five 0.1 meg. Meggit resistors, R4, R6, R7, R8, R9.
One 0.5 meg. resistor, R5.
Three .25 mfd. Dubilier bypass condensers, C1, C6, C7.
One A battery switch, S.
One single-circuit jack, J.
Six Amsco standard sockets.
Three Amsco vernier dials.
One 7x24" panel.
One Amsco binding post strip.
One 8x23" baseboard.

Fine Results Assured

The Entertainer makes a fine all-round radio set possessing the qualities of selectivity, volume, sensitiveness, and above all things, perfect tone. Using the standard system of three dials, with the additional refinement of automatic filament control, it is a delightfully simple set to use, and once constructed with the proper parts, involves no complex technical operations. You simply pull the battery switch, set the dials according to the log sheet figures, and then listen to the music that floats out of the loudspeaker.

The actual construction of The Entertainer can be accomplished by any man possessing a rudimentary knowledge of the use of simple tools like the hand-drill, screwdriver, pliers and soldering-iron.

The parts employed are all standard, and will offer no difficulty in placement.

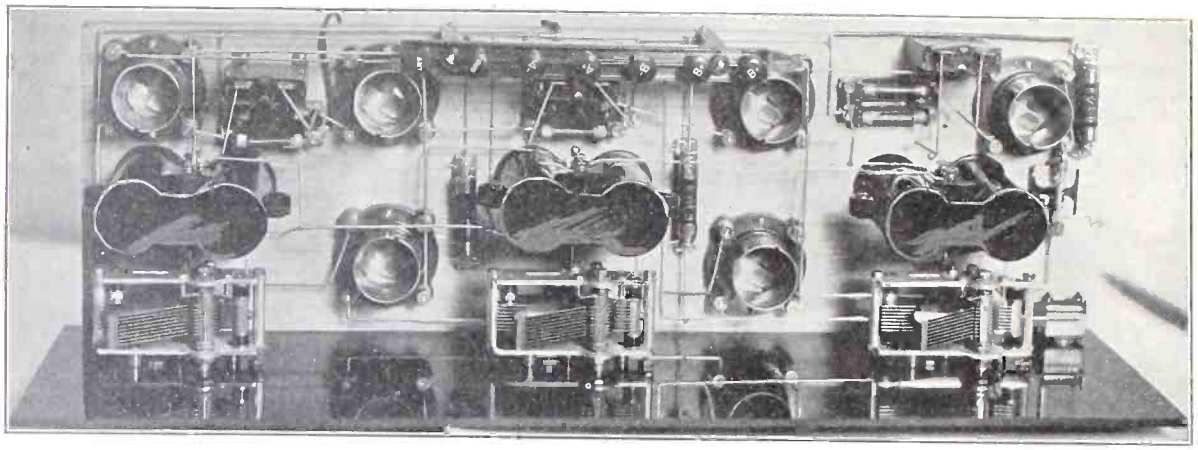
The variable condensers, dials and sockets used in the model set shown in the photographs were all of the Amsco make. The fixed condensers were all Dubilier and resistors and the resistance coupling units the product of A. B. Cole, (Meggit) the automatic rheostats were Amperites.

Panel Drilling

The first step in the construction work is the drilling of the panel. This is simple, as there are only five instruments to be mounted: the three condensers and the filament switch and telephone jack. The condensers are arranged along the horizontal center line of the panel, one occupying the exact middle position, the other two spaced in from the respective right and left hand edges, a distance of 3½". The battery switch goes in the extreme lower right hand corner, the jack in the lower left corner. Care should be taken that these two devices are mounted high enough to clear the wood baseboard, to the edge of which the panel itself is fastened by means of four one-inch, oval-head wood screws distributed along the bottom edge.

With the three condensers mounted, the panel should be laid aside and the baseboard fitted out as a separate unit. The

Set Is Self-Neutralized



THE TOP VIEW of the receiver. The binding post designations are legible.

constructor should not attempt to do all the work with the panel and board joined, as this makes the placement of some of the parts exceedingly awkward.

Tube Placement

The positions of the various parts are shown in the photographs. First the six sockets are screwed down. Those for the first and second radio frequency tubes are placed so that they will fit evenly between the variable condensers and about 1½" from the back of the panel. The slots for the bayonet pins of the tube bases should be faced toward the rear edge of the baseboard, and the binding posts will then adapt themselves to the most convenient connection.

One socket is secured in the extreme back right corner of the baseboard and another in the back left. A space of about 2½" is then measured off from the inside edge of each of these sockets, and two sockets fastened in position. This will leave a comfortable blank area along the back edge of the baseboard above which the binding post strip is then raised a distance of 2½" inches by means of two stiff brass brackets.

The socket in the back right hand corner, for the detector tube, should have its slot nearer the panel, to bring its grid post close to the right-hand condenser. The grid condenser is screwed to the baseboard directly in front of the grid post, while the 1-A Amperite is fastened alongside of the socket, just filling the space between the edge of the socket and the right-hand edge of the board.

The Coil Positions

One coil is screwed down in back of each of the three variable condensers on the panel. To the right and just a little in front of the center coil is then fastened down the ½-ampere Amperite, while in the corresponding position on the left the ¾-ampere one ballast is secured. With the completion of this step, all the parts of the set are in place, except the bypass condensers and resistors in the audio stages, placed as shown in the photograph.

The panel, it must be remembered, is still unfastened to the baseboard. At least ninety per cent of all the wiring involved in the receiver can be done with the panel removed, an advantage not to be under-rated in the matter of convenience.

Wiring Directions

The first wiring step is that covering the filament posts of the sockets. This is simple and will give no trouble. It will be noted that R controls the detector tube alone, R1 the two radio frequency tubes, and the ballast R2 the three audio amplifier bulbs. Connect the F+ posts of all sockets. The only wires of this step which must await the installation of the panel are the two running to the filament switch.

The audio section comes next. Each stage is a repetition of the other. There are no binding posts for the C battery, but instead a short length of twisted double flexible wire is used. The C battery itself, being small, can be kept on the table in back of the set. It has a value of 4½ volts.

The audio circuit can be completed up to the wiring of the telephone jack, because the jack is on the panel.

The primary posts of the first coil are marked 1 and 2 on the coil itself. Connect 2 to aerial and 1 to ground. The connections are made through the terminal strip. The secondary posts are marked 3 and 4. Connect 4 to the grid post of the socket between the first and second variable condensers, while 3 is joined to the left-hand filament post in the socket, which is connected to the negative side of the A battery.

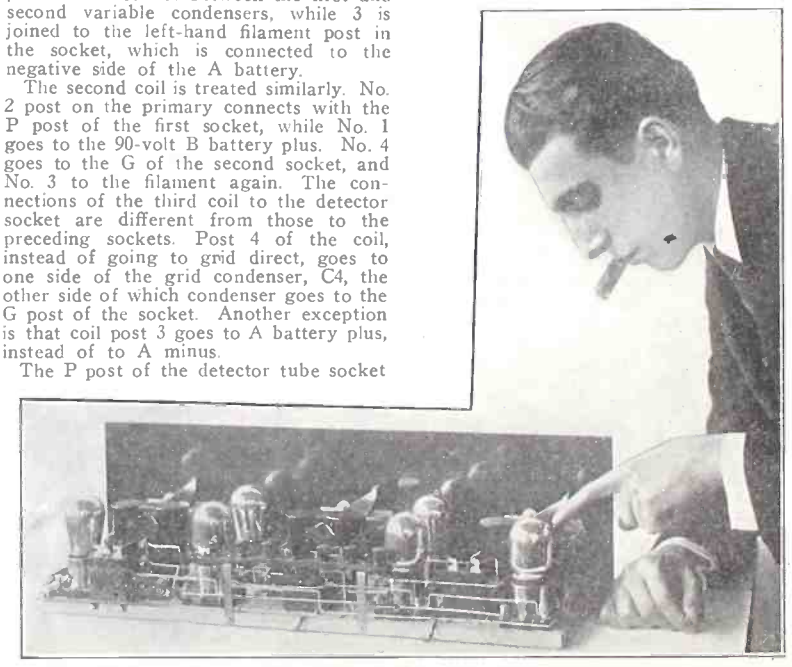
The second coil is treated similarly. No. 2 post on the primary connects with the P post of the first socket, while No. 1 goes to the 90-volt B battery plus. No. 4 goes to the G of the second socket, and No. 3 to the filament again. The connections of the third coil to the detector socket are different from those to the preceding sockets. Post 4 of the coil, instead of going to grid direct, goes to one side of the grid condenser, C4, the other side of which condenser goes to the G post of the socket. Another exception is that coil post 3 goes to A battery plus, instead of to A minus.

The P post of the detector tube socket is wired to one side of the first .25 mfd. fixed condenser and also to one side of the first coupling resistor, R4. The rest of the audio amplifier is simple. Resistors R4, R6, R7, R8 and R9 are all .1 megohm, while R5 is .5 megohm.

The three Lemnis Coils are designated as L1L2 for the first coil, L3L4 for the second, and L5L6 for the third.

The Finishing Touch

To the terminals of the variable condensers on the panel pieces of flexible wire about five inches long are soldered, and the panel itself is then screwed permanently in place against the baseboard. The set can now be completely finished by the bridging of the condenser wires to their proper terminals. The wires from the rotary plates go to the respective No. 3 posts of the Lemnis Coils and hence also to the filament, while the wires from the stationary plates go to the corresponding No. 4 posts. [*Part II next week.*]



THE AUTHOR "points with pride" to the power tube in the last stage, a Daven Mu-6. The two tubes to the left thereof are hi-mu (20-mu), while —01A tubes are used for the two RF and detector stages. The Lemnis Coils are in the moulded Bakelite containers of peering-glass shape. (Fig. 4).

What's Wrong With My Set?

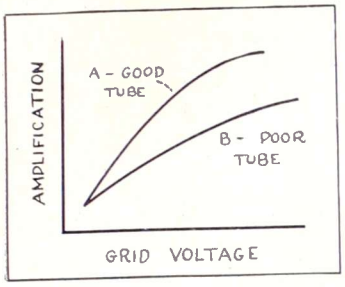


FIG. 1—If the tube is a good one, a slight voltage fluctuation on the grid causes a big change in plate current. The tube then really amplifies. A poor tube is defective in this respect.

By Brainard Foote

THE most popular radio-frequency set on the market today uses five tubes in all. Two of them are radio-frequency amplifiers, for increasing the sensitiveness of the set. The third tube is the detector, whereby the received impulses are converted into audible speech and music. The last two tubes increase the loudness of the signals so that a speaker may be operated.

BRAINARD FOOTE

In the majority of cases there is little wrong with the manufactured receiving set. You buy a 5-tube set, along with five tubes, two 45-volt B batteries, speaker, aerial and ground equipment, go home and install it. It may work beautifully for a while or perhaps trouble is encountered at the outset. At any rate, so long as something can be received, the chances are that the set itself is O. K. and that there is fault to be found with the accessory equipment or connections. Since the receivers are plainly marked as to the positive and negative binding posts, the wiring to these accessories is usually correct.

Tubes and Batteries

Since a 5-tube set will generally receive with a poor antenna on account of its sensitivity, we'll leave the aerial entirely out of this discussion just now. This brings the search down to the tubes and batteries, assuming that the speaker and battery wires are correctly connected. Since dealers are getting fairly thorough in their tests of tubes, it seldom happens that the purchaser gets bad ones at the store.

In most instances the tubes and batteries are all right for a time before any trouble is encountered. Difficulties with sets that have been used for a while may be listed as follows:

1. Decrease in signal volume.
2. Poor sensitivity, especially on DX and long waves.
3. Scratching and scraping noises.
4. Howling or microphonic noises.
5. Excessive oscillations.
6. Necessity for turning up tubes too far.

Let's talk about these troublesome features in relation to the tubes and batteries, for it is in these that the remedy lies. The A type of vacuum tube hasn't an indefinite life. It will not function as long as the filament will light, so that it is impossible to tell by looking at a tube whether it's any good or not. The A tube's filament contains a certain quantity of thorium in the form of an oxide. During the emission of electrons this thorium is slowly boiled off, and when it is entirely boiled away no further electrons can be given off. The tube still lights, but doesn't work.

Fig. 1 shows, graphically, the comparison between a good tube and a bad one. Tube A is the good tube. A slight change in its grid potential causes a considerable change in the plate current, thereby affecting the next tube or the loud speaker. The poor tube, B, is deficient in this respect. A change in its grid voltage doesn't cause much of a change in the plate current, so that it doesn't amplify satisfactorily. All tubes gradually change from the A type to the B in the course of continuous service, although the actual decrease is very slow at first and then, as the end approaches, the plate current falls rapidly. It then becomes necessary to turn the rheostats on so that the tubes are lighted very brightly before results are obtained.

As the tubes used for the radio-frequency are most critical, it follows that the best tubes in the set ought to be in the first two sockets—the RF sockets. Tubes which will fail as RF amplifiers often perform splendidly as audio amplifiers. Hence it's a good stunt to shift the tubes about when they are first installed, and once in a while thereafter to note any changes or possible improvement in their filament and plate voltages.

The B Batteries

The batteries furnishing the plate voltage do not last so very long on a 5-tube outfit, especially where the set is used several hours every day. As the battery deteriorates the moisture in the cells dries up and the electrical resistance becomes greater and greater. In Fig. 2 the batteries are sketched with this point stressed —that B batteries DO have resistance and as such are likely to interfere with the satisfactory operation of the set. It is to be observed that a number of tube circuits is common in the B batteries. In other words, while these circuits are supposed to be entirely separate from each other, they do not have separate B batteries, but use them jointly. If the batteries had zero resistance, this would not have any noticeable effect, but since B batteries do NOT have zero resistance, even when brand new, the resistance must be taken into account.

We have all heard of resistance-coupled amplifiers. Such amplifiers are suitable for the amplification of both radio and audio frequency energy, and use is made of the system extensively. However, the resistances for such a purpose are separate, there being an individual resistance for each plate circuit. When the resistance is the same for a number of plate circuits, howling takes place, if the amplifier is audio, and oscillation, if it be radio. Both are really oscillations, the difference being that the audio oscillation is within hearing range. We must avoid such coupling. To by-pass the radio-frequency current over such a resistance, a very small fixed condenser will serve. Most manufacturers of 5-tube sets include a .006 mfd. condenser in the set for this very purpose, but a larger capacity is perhaps preferable.

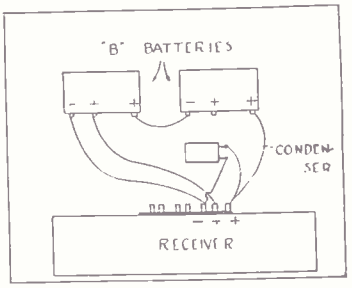


FIG. 3—When the B batteries are only a little bit worn the set is greatly improved by shunting them with a large fixed condenser of 1 or 2 mfd. capacity. This acts ar a by-pass for both AF and RF current.

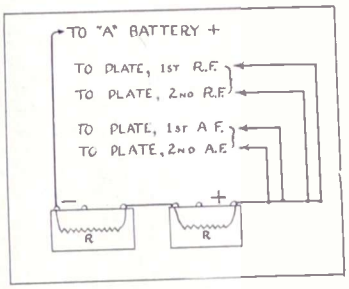


FIG. 2—RF oscillations and audio-howling are often caused by high resistance B batteries—old ones, as a rule. This is because a number of plate circuits are "commoned" in the B battery and are thereby coupled by the resistance method.

When the resistance becomes high the coupling effect becomes more serious, even for the radio-frequency current. And such coupling is almost sure to develop howling and singing in the audio amplifier—its most annoying effect. To by-pass the batteries for audio-frequency is another matter, for the fixed condenser must be very much bigger. There are several 1 or 2 mfd. fixed condensers on the market for the purpose. Such a condenser is almost sure to improve the operation of the set, both from the radio-frequency and audio-frequency angles. The condenser hasn't much effect on new B batteries unless the wires to the batteries are several feet long, but on batteries only partly depreciated the effect is most valuable. The condenser absorbs sudden voltage increases and decreases, exerting a stabilizing effect. Voltage changes occur on account of the current variations due to changes in the volume. The current variations in the B battery cause these voltage changes on account of their internal resistance. These the large condenser helps to smooth out. The condenser goes either inside the cabinet or outside, preferably so that the wires to it are short and direct. It is illustrated in Fig. 3.

Other Troubles

Noises of various sources may be traced to their origins and stopped. No matter what sort of noise is heard, the aerial and ground are to be disconnected at first. If the noises persist, look for trouble in the set. There may be loose contacts on the filament rheostat, on the socket binding posts, loose wires in the filament or B circuit, or eorroded terminals on the storage battery. The A battery terminals should be cleaned often, especiallv the positive pole where the most trouble is.

Magic Music on Five Tubes

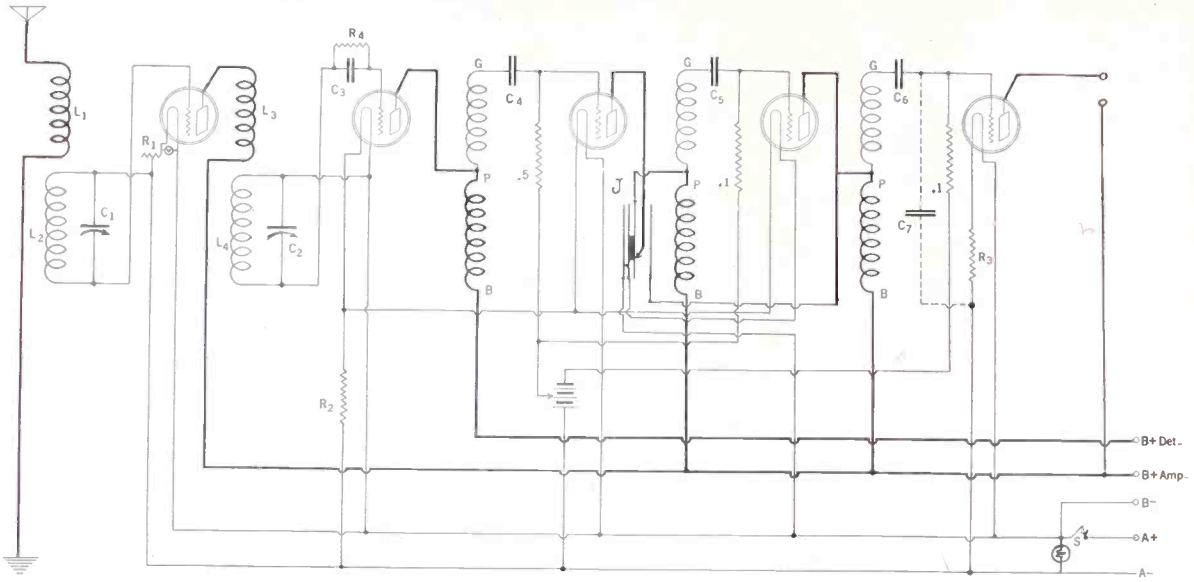


FIG. 1, the schematic diagram of the wiring of the receiver.

By Lewis W. Feldman

KEEPING in mind only the idea of making a set that would be in the front rank as a quality set I built the receiver shown in Fig. 1 and in the photographs. This was not designed for distant reception particularly, yet the first night I tried it at my home in Brooklyn I received several Chicago stations on a short aerial. But it is the tone quality that I desire to stress. This is so wonderful that it is thrilling. It is the product of the radio amplifier and the audio amplifier, because the set is not made so selective as to distort the incoming signal, while the form of audio amplification is my favorite, comprising three steps of auto-transformer coupling.

In keeping with the quality idea I naturally selected things that were pretty to go on the panel. These included a filament control switch with a pilot light. The window of this pilot light is on the order of the ruby—with nothing like jewelry expense atached, however—while the dials were the exceptionally attractive Marco. These have a traction movement, a firm grip, too, and prevent lost motion and backslipping, giving very excellent vernier adjustment. If desired, the station call letters may be written in at one side of the dial for a part of the wavelength band and on the other side of the dial for the rest, windows being present for this purpose.

Now, I built the set on a 7½x21" panel because that odd size was adaptable to a console cabinet I had purchased. But for the run of sets the 7x21" panel, which is stock size, may be used. While all my friends do not agree with me, I nevertheless like the combination of a mahoganite panel and black dials and knobs. Let personal taste prevail in such matters, however.

The circuit diagram is conventional as to the radio-frequency stages. There are one stage of tuned RF amplification and a non-regenerative detector. This circuit therefore does not break into uncontrolable oscillations, yet is selective enough to make it serviceable in New York City, and therefore may be regarded as safe for any other part of the United States and Canada.

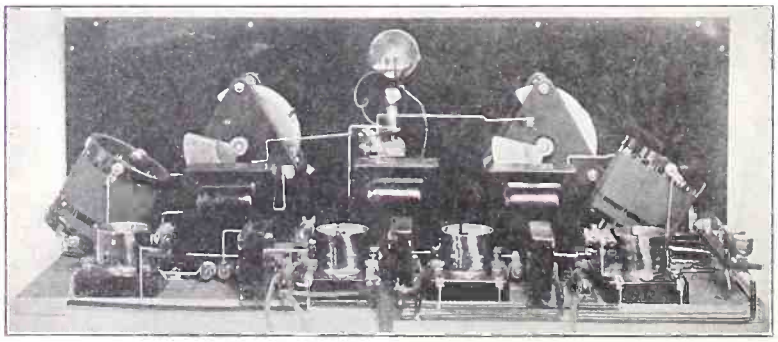
After consideration I selected the General Radio .0005 variable condensers for C1 and C2, as these represent without doubt one of the finest examples of condenser manufacture in radio history. The coils were the Bruno No. 55 RF, because of their comparable efficiency. Then for the audio hookup the auto-transformer method was selected because to my ears the quality is as good as with resistance coupling and because the required B battery voltage is less. The Thordarson Autoformers were used in conjunction with rather large capacity isolating or coupling condensers (.25 mfd.) and mu tubes. For the first and second audio steps the tubes were hi-mu (Veby 20-mu), while the last one was lo-mu (Veby 6-mu).

The novelty of the audio hookup is that a jack is used whereby the filament of the second from the last tube is turned out and that tube's plate connection skipped, if one desires only two AF stages, while the power tube in the last stage is always the final tube. It is advisable, if one uses a power tube, to keep that as the last tube, and it is better practice than to cut in on the previous tube, for then adjustment of the grid bias would be almost a requisite.

Let us look at the Jack J. It is a Yaxley A battery switch jack with a filament control. When the switch is turned to the "off" position the second audio tube is automatically unlighted and the plate of the first audio tube is connected to the P post of the final Autoformer. When the switch jack switch is at the "on" position the filament circuit of the second audio tube is closed, that tube lights up, and the whole circuit is in operation.

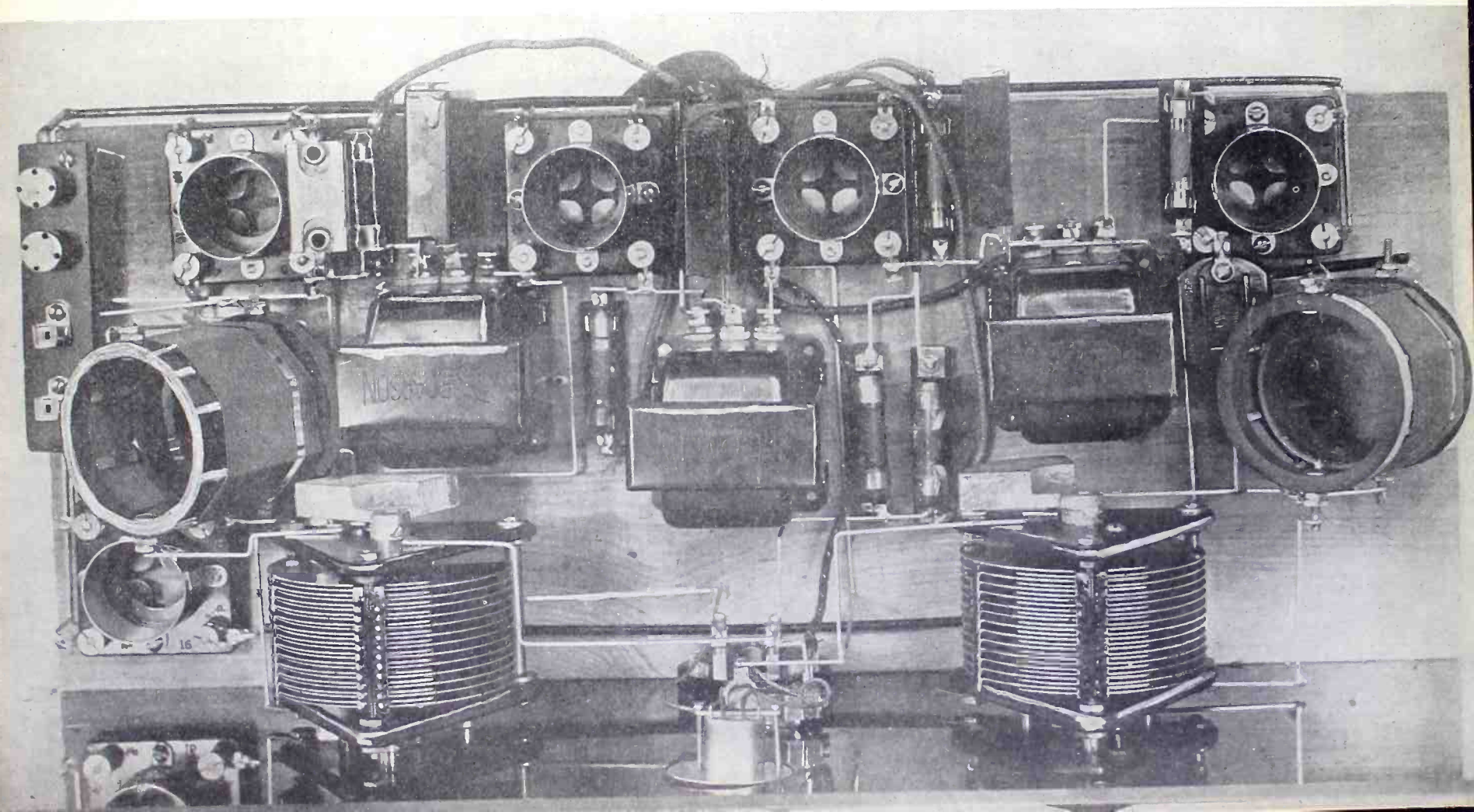
The object of all this is, of course, to have volume control. On strong locals two stages of AF will be sufficient. In other cases three steps will be used. The shift from one to the other is therefore accomplished in the simplest fashion, by turning the knob attached to the eccentric cam that makes and unmakes the contacts.

The pilot light causes a red glow to be present on the front panel all the while the set is in operation. Although this light, shown at lower right of Fig. 1, uses some juice, it is such a small drain, compared with the attraction, that I am glad I incorporated it. Another feature of the panel is a small voltmeter, to show the voltage at the filament of the RF tube. This is the only tube provided with a rheostat, and the only object of that rheostat is to keep the tube burning at a temperature lower than that which will produce over-oscillation on the lowest receivable wavelength. Only once or twice a night, while tuning in 25 stations, was it necessary to touch this rheostat, and normally for local reception one will leave it alone. But when it is necessary it is indeed a

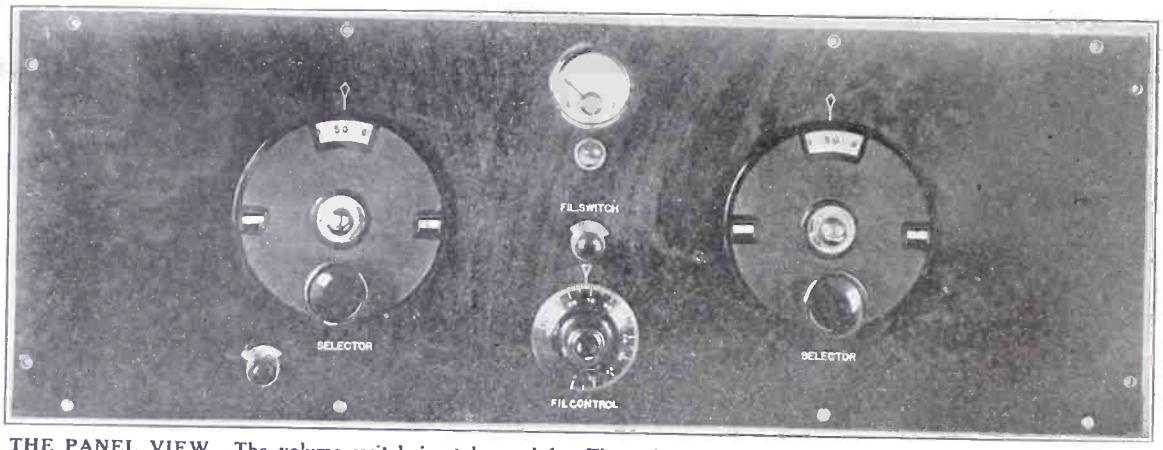


LOOKING at the rear of the receiver. The RF tube is at right, hidden by the coil. At left is the detector. The first, second and third audio sockets are in that order, left to right. Note that the battery cable is connected directly to points in the set.

The Top View of the Feldman 5-Tube Set



Panel of 'Magic Music' Set



THE PANEL VIEW. The volume switch is at lower left. The voltmeter is at top center, beneath it the ruby window of the pilot light. The switch below turns the light on when the set is on. The lower center knob is for the rheostat. Note the visible grain of the panel

handy thing, hence a variable filament control was a prerequisite.

The coils are wound of No. 24 silk over cotton wire on two quartzite forms, each 3½" diameter, 3½" high. The primary consists of 12 turns, the secondary of 45 turns, the same kind of wire being used on both. The space between primary and secondary is ¼". As one coil is exactly like the other, you have the winding directions for both.

The by-pass condenser C7 is optional. With the volume switch that I have introduced I hardly feel it is necessary, but include it in the diagram because some may want all five tubes going even for the strongest local, and in such a case that condenser helps. It should be about .002 mfd.

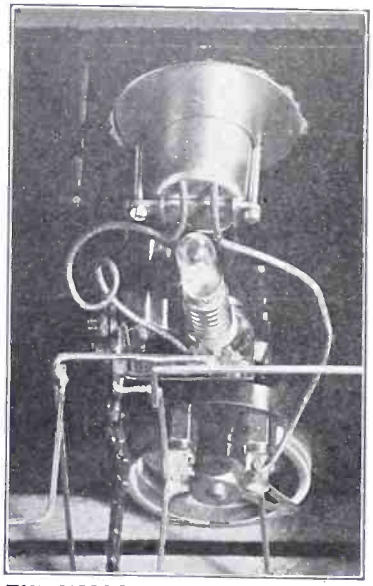
The lower ends of the first and second audio stage grid leaks connect to the same post of the grid biasing battery, 4½ to 6, for 135 volts on the plates, while the final tube is negatively biased from 6 to 12 volts for the same plate voltage.

The power tube was operated at 5 volts instead of the rated 6, as that worked well, although one may omit R3 and simply connect A minus direct to the F minus post of the last socket when using the lo-mu tube that takes 6 volts at the filament terminals.

Nameplates

[*The following is a new list of names and addresses of persons who requested and received name plates for the 1926 Model Diamond of the Air,* RADIO WORLD'S *prize circuit. Send your request to Diamond Editor,* RADIO WORLD, 145 *West 45th Street, New York City.*]

Ed. Tillery, Lexington, Neb.
E. L. Downey, 307 Glencoe St., Toledo, O.
George R. Shackleford, General Delivery, San Jose, Cal.
R. B. Prince, 4466 Asbury Drive, Toledo, O.
L. A. Tucker, Box 52, Azle, Tex.
James F. Collins, R. D. 2, Newburgh, N. Y.
J. Litvak, 407 New Jersey Ave., Brooklyn, N. Y.
Earl A. Smith, 3228 N. Marshall St., Philadelphia, Pa.
Edward Reisenberger, 210-7th St., Wellsville, O.
Ernest D. Warden, R. D. 4, Frankfort, N. Y.
Luen M. Johnson, Mattapoisett, Mass.
E. A. Van Lear, 111 N. 8th St., Richmond, Va.
John E. Kilfer, Letterman, General Hospital, Ward 5, San Francisco, Cal.
Samuel O'Toole, 75 Baldwin St., Pawtucket, R. I.
Claud Gudach, 410 Heath St., Logansport, Ind.
W. Raymat, Principe 16, Barno Atave, Havana, Cuba.
Harry T. Goldthom, 6144 Pine St., Plula, Pa.
H. R. Wiggins, 1931 Lijon St., Des Moines, Ia.
J. J. Manning, 45-4th St., Troy, N. Y.
Frank Gino, 172 Chrystie St., N. Y. City
Irving R. Fisher, 100 Springfield Ave., Buffalo, N. Y.
L. F. Delbridge, 806 Press Bldg., Binghamton, N. Y.



THE VOLTMETER, at top, measures the voltage at the filament of the RF tube. The small bulb is a pilot light, attached to an A battery switch. The only rheostat in the set is at bottom.

How to Use Lastite

The sketches show two views of the Lastite, a radio terminal which gives the set builder a positive means for preventing imperfect connections. When a bus wire is soldered to this little terminal it becomes locked permanently, unless you wish to unsolder it.

Arrow 4 points to the base, which is a ¼" hexagon nut and threaded as indicated by arrow 5 so that it can be screwed onto the terminals of all instruments.

This nut terminates with the very small tube, (1) which holds the bus wires while you arrange them, preparatory to soldering them to little circular rim or flange (2) on the end of the tube.

By this means you have both hands free to help you solder. This is the time, as every fan knows, when he needs all his hands.

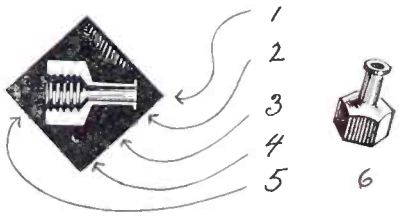
Arrow 3 points to the wall of the Lastite tube, very thin. This is to prevent injury by heat to the insulation while soldering. A "portrait" of the Lastite shows its external appearance over the number 6.

To replace a terminal with a standard Lastite, remove all but one nut from the terminal screw, cut it off with a pair of pincers and then take off the nut. When you take off this nut it removes the bur caused by cutting. The screw should be no more than ⅛" long after the nut is removed. Now screw on the Lastite with any quarter inch wrench.

Use a little flux on the ends of your bus wires.

LIST OF PARTS

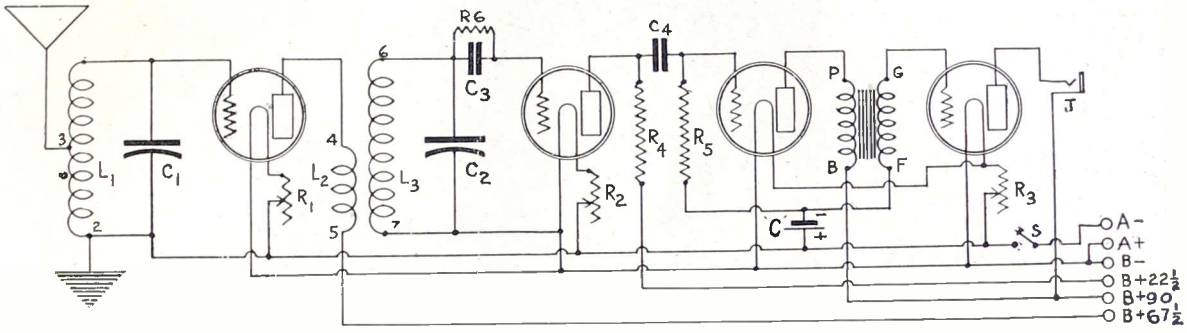
Two Bruno 55 RF transformers, L1L2, L3L4.
Two General Radio 247-F .0005 mfd. condensers, C1, C2.
Two Marco Hairline Vernier dials.
One 0-to-6 voltmeter, panel mount.
One 10-ohm rheostat, R1.
One rheostat dial, 2".
One ¾ amp. ballast, R2.
One .5 amp. ballast, R3.
One 2 meg. grid leak, R4.
One .00025 mfd. grid condenser, C3.
One Yaxley A battery switch with pilot light, S.
One 5-point cutout Yaxley switch with filament control (J).
One .5 meg. leak.
Two .1 meg. leaks.
Three .025 mfd. fixed (by-pass) condensers.
Three Thordarson Autoformers.
One 7x21" panel.
One 8x20" baseboard.
Five Sockets.



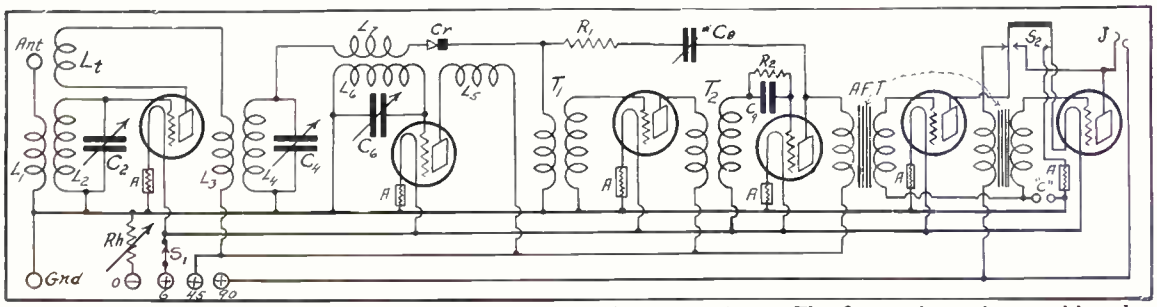
A SPECIAL 4-TUBE DX SET appeared in RADIO WORLD dated Nov. 14. 15c per copy, or RADIO WORLD, 145 W. 45th St., New York City.

HOW TO BECOME AN AMATEUR OPERATOR—A comprehensive, illustrated article appeared in issue of June 27, 1925. 15c per copy, or start your subscription with this number. RADIO WORLD, 145 West 45th St., N. Y. C.

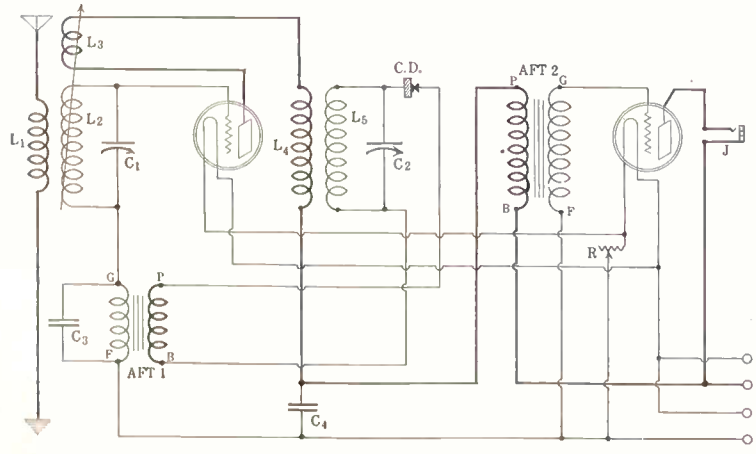
Five Substantial Circuits



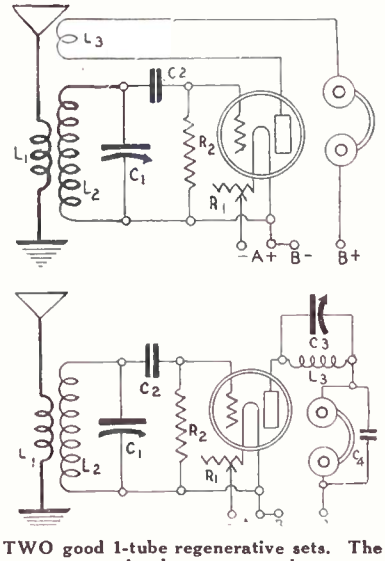
THE electrical diagram of the RX-1 are of the pickle-bottle type, 2¼" diameter. The antenna coil L1, has 58 turns. The tap is taken at the 15th turn. Use No. 28 DSC wire. The RF coil consists of 70 turns of No. 22 double silk covered wire. The primary L2, consists of 20 turns of this 70 turn winding, wound as close as is possible, inside the secondary winding L3. This means that there are 50 turns wound for L3 and 20 turns wound for L2. The primary winding is of the No. 40 double silk covered wire. C1 and C2 are both .0005 mfd. variable condensers. R4 is a .1 megohm resistor. R5 is a 1 megohm grid leak. The condenser C4 is .001 mfd. The transformer used is of the low ratio type. C3 has a capacity of .00025 mfd. The grid leak has a resistance of 2 megohms. The set was described in the Oct. 17 issue.



THE electrical diagram of the 6-Tube Baby Super, described in the July 18 issue. The first tuning unit comprising tbe primary winding L1, the secondary L2, and the tickler Lt, may be any 3-circuit tuner, which has its secondary tuned by a .0005 mfd. variable condenser. C2C4 is a double condenser, each section having a capacity of .0005 mfd. C8 is a midget condenser. C6 is a .0005 mfd. variable condenser. The transformer L3L4 is wound on a wooden spool 1" in diameter and 1" long. The primary L3 consists of 20 turns. This is wound right next to the core. Place two layers of heavy wrapping paper over this winding. The secondary consists of 93 turns. No. 36 DCC wire is used. L6 consists of 43 turns of No. 24 DSC wire wound on a bakelite tubing 3" in diameter. L5 is wound on the same form, and consists of 35 turns. Use the same wire. L7 is wound on a tubing 1½" in diameter with 50 turns. Use No. 36 DCC wire. Other information regarding the constants of the inter-frequency transformers, condensers, etc., will be found in the mentioned issue.



THE electrical diagram of a loud and selective reflex receiver. The radio frequency tube is regenerative. L1L2L3 is a standard 3-circuit tuner, which has its secondary tuned by a .0005 mfd. variable condenser. L4L5 is a standard radio frequency transformer, whose secondary is also tuned by a .0005 mfd. variable condenser. The first AFT is of the high ratio type, while the second AFT is of the low ratio type. Use a 10 ohm rheostat to control the two 201A tubes. C3 is a .001 mfd. fixed condenser, used for by-passing action. The crystal detector may be either of the fixed or of the variable type. C4 is also a .001 mfd. fixed condenser.



TWO good 1-tube regenerative sets. The one on top is the very popular rotary tickler 3-circuit tuner. The bottom hook-up employs a different method, which is adaptable also to low wave work. The variable condensers in both cases are .0005 mfd. for broadcast reception. The plate coil in the bottom circuit consists of 35 turns wound on a 3" diameter tubing

Some Pointers on Dials

By Sidney E. Finkelstein

Associate, Institute of Radio Engineers

DIALS have come in for more attention this year than ever before. In design they are neater, in performance they are smoother, while in action they are, for the first time, somewhat diversified. Getting the right kind of dial is important, for unless this matter is properly settled there will result considerable awkwardness of tuning.

SIDNEY E. FINKELSTEIN

The first question to present itself is whether to get a clockwise or a counter-clockwise dial. Now, suppose you have a set that has three tuning condensers. If all are of the same manufacture, that is, all are alike, the only necessary precaution is that all three dials that are to be attached to the shafts of the condensers should be of the same kind either clockwise or counter-clockwise.

The Consequences

The choice may be made either way, but with the following consequences:

(1) If the condensers turn a complete circle either type of dial will enable you to mount the dial so that the higher numbers represent the higher wavelengths.

(2) If the condensers have end-stops, that is, turn only 180 degrees, or half a circle, and that motion of the condenser, from lowest to highest capacity, is clockwise, then a matched dial, that is a clockwise one, would be necessary, if the higher numbers are to represent the higher wavelengths. If a counter-clockwise dial were used on a clockwise end-stop condenser, the higher numbers would represent not the higher wavelengths but the higher frequencies, that is, the lower wavelengths.

(3) If the condenser motion is counter-clockwise in an endstop instrument, then a counter-clockwise dial would make the higher wavelengths come in at the higher readings, while a clockwise dial would make the lower wavelengths come in at the higher readings and the higher wavelengths at the lower readings.

The Difference

The photograph shows a dial that has a counter-clockwise motion, because it has to be turned from right to left to make the readings progress upwards numerically. The arrow or dial pointer represents the place at which the reading is to be taken. Hence, to make the higher wavelengths come in at the higher numbers, just before mounting the dial see that the condenser rotor plates are completely enmeshed with the stator plates. Then mount the dial so that that position of the condenser plates occasions a reading of 100 on the dial. If the dial were so placed that, with the condenser plates completely "in," and the condenser a clockwise one and having an end-stop, the dial would be useless, unless the dial pointer were placed at the bottom of the dial, because, starting at zero, the dial would have to be turned through the 180 degrees, where there is a blank on the dial. Hence the underneath placement of the pointer gives us an option that offers quick solution.

THIS is a counter-clockwise dial because to turn it so as to make the numbers advance necessitates motion to the left, which is the opposite direction to the one in which the hands of a clock turn in the upper semi-circle. Notice particularly that the numbers read from left to right, but the turning motion is from right to left. Hence the dial direction is rated in terms of the motion, which is opposite to the direction in which the numbers read without turning.

The first precaution is to determine if your condenser has an end-stop, and, if it has, to find out in which direction it is necessary to turn the shaft so that the rotor plates will engage more and more, until maximum. The end-stop is always present in a straight-line frequency condenser.

Fan Must Decide

Now, with the SLF type of condenser one must decide whether he wants the tuning to be represented on the dial on a frequency or on a wavelength basis. Engineers prefer to have the frequency style prevail with straight-line frequency condensers, that is, with the higher numbers representing the lower wavelengths. The higher the frequency, the lower the wavelength, because the higher frequency means greater rapidity of alternation in the wave emission, and the greater the rapidity, the shorter the distance between the crest of one wave and the crest of its successor (wavelength).

The straight-line capacity, that is, semi-circular plate, condenser has been in use so long that radio set users have become accustomed to having the higher wavelengths represented by the higher dial readings. Therefore, many fans, even while using SLF condensers, stick to this plan, and buy dials that will enable them to maintain their preference. That means if the SLF condenser motion from lowest to highest capacity is clockwise that they will buy a clockwise dial for it, whereas for tuning on the frequency basis it would be necessary to procure a counter-clockwise dial for a clockwise condenser.

Distinction Without Difference

It really makes very little difference, in the case of an SLF condenser, what type of dial you use, in fact, the reception is not affected in any manner, only the readings. Under one system (matching the motion of the dial with that of the SLF condenser) 492 meters might come in at 85, whereas by getting the opposite kind of dial the same station would come in, just as well, at 15.

The semi-circular plate condensers usually turn completely around a circle, hence are adaptable to either type of dial, and it is for use on this type of condenser particularly that the straight-line frequency dial is made. This type of dial, however, is procurable usually in either clockwise or counter-clockwise form, the fan still retaining the same freedom of choice that has prevailed on ordinary dials right along.

What An SLF Dial Does

The straight-line frequency dial makes any condenser that is not straight-line frequency tune nevertheless on a straight-line frequency basis. This is a mechanical feat. Whereas the SLF condenser accomplishes worth-while spreadout of stations when tuning in on the lower wavelengths, by resorting to electrical means, the slower variation of capacity by shaping the plates, the dial accomplishes the same thing mechanically. The SLF dial introduces a changing ratio of vernier all along the line, whereby the motion is ever so slow on the lower wavelengths, thus accomplishing the spreadout, and rapid on the higher wavelengths.

It is assumed that plain dials of only 180 degree variation have been considered, in comparison to SLF dials. It is, therefore, apparent that a straight-line frequency condenser, spreading out stations on the lower wavelengths, has to introduce motion at the other end of the dial of such rapidity that the whole wave band is tuned in over one-half the circumference of the dial, that is, the semi-circle on which the numerals are calibrated. If a straight-line frequency dial spreads out the stations on the lower wavelengths and is so constructed that it may rotate more than 180 degrees, even while the condenser shaft is confined by endstop or otherwise to only 180 degrees, the SLF dial need not introduce such rapid motion at the higher wavelength end. Expressed different, on an SLF condenser the higher wavelength stations must be brought much closer together on an ordinary plain or vernier dial than if a semi-circular plate condenser were used with an SLF dial of more than 180 degree rotation.

An advantage of the SLF dial is that it may be attached to the shaft of a tickler coil in a regenerative set to relieve the condition of critical tuning.

Some Stations Nearly Ready But Will Get No Wavelength

WASHINGTON.

Almost frantic efforts are being made by the owners of new stations already constructed or almost near completion to get wavelengths before the door is finally closed to new broadcasters.

In some cases, these newly constructed stations will be given wavelengths, according to officials of the Department of Commerce. It will depend entirely on the circumstances connected with each individual case.

Three stations are known by the Department of Commerce to be near completion and about ready to go on the air. One is in New York, another in Chicago, and the other in St. Louis. In the cases of the New York and Chicago stations, it is doubtful if they have much chance of getting a wavelength at present. It is believed that new St. Louis station may be given a wavelength as soon as it is possible.

In individual cases, according to commerce officials, much will depend on whether the station was warned in advance that it could not get a wavelength. If the station was constructed in the face of such a warning, it may not receive very sympathetic consideration.

Diamond Control Is Perfect

Regeneration Smooth at All Wavelengths—Amplification at Radio-Frequencies 25 Per Cent. Higher Than That in Conventional TRF Circuits

By John F. Rider

Member, Institute of Radio Engineers

WE discussed last week several factors pertaining to the design of the various circuits, so far as the wavelength tuning range and amplification on the various wavelengths were concerned. In this text we shall consider two items of paramount importance, in fact, the two most significant details in the 1926 Model Diamond of the Air. These are the voltage amplification factor of the stage of radio frequency amplification and of the regenerative detector. If these values are high and the associated circuits possess low values of effective resistance a high degree of amplification will be obtained in each tuning unit carrying radio frequency currents, resulting in good sensitivity and volume.

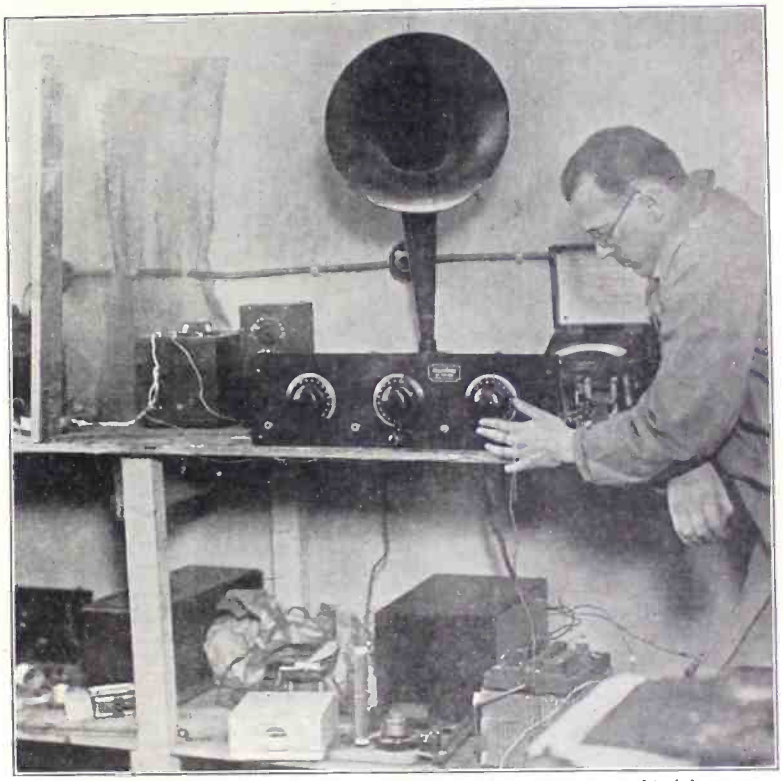
What the Amplification Factor Is

No doubt many fans are wondering about the voltage amplification factor of the tuned radio frequency stage and also of the detector. Just what is this voltage amplification factor? In simple language it is the amplifying power of the tube and coil combination. If a transformer is used in conjunction with the tube, it is the amplifying power of the tube and transformer combination. In other words it is the ratio between the voltage applied to the grid of the tube under test, and that applied to the grid of the subsequent tube. In a regenerative detector it is the increase in amplification, due to the regenerative effect, and is determined by measurement of the output of the detector tube alone, no other tube entering into this consideration, unless it be that of a vacuum tube voltmeter, utilized as the output indicating device.

Now, as the stage of tuned radio frequency amplification is for all measurement purposes entirely remote from the regenerative detector, each will be considered separately. Accordingly we will forget for a short while the regenerative detector and delve into the facts pertaining to the stage of tuned radio frequency amplification.

An Analysis of TRF

Tuned radio frequency amplification has during the past two years received so much exploitation and publicity that it is without a doubt the most widely known topic of the entire radio art among the vast host of radio fans. And correspondingly the majority of the fans, if not all, are thoroughly familiar with its function it being to amplify the radio frequency currents before they reach the detector tube and are rectified and passed into the audio amplifiers. Now, as the stage of tuned radio frequency is intended as an amplifier of radio frequency currents, thereby augmenting the degree of sensitivity of the receiver, it is best to obtain the highest power of amplification, thereby obtaining the maximum efficiency. In technical language this would be the highest voltage amplification factor. Unfortunately, however, there are decided limits to this value, due to the amplifying characteristics of the tube itself, the tendency towards over-oscillations, which action would render the receiver unstable in operation, and the design of the various circuits comprising the tuned radio frequency stage.



THE 1926 Model Diamond of the Air under test by John F. Rider in his laboratory. Mr. Rider is shown determining the voltage amplification of this stage of radio-frequency. The condenser and resistance of the phantom aerial are to the right of the screen. The output indicating meter and associated equipment at right rear of the receiver. (Foto Topics).

This design factor includes the primaries, secondaries, the inductances values of the two and also the capacity value between the two sets of inductances. Therefore when designing the radio frequency circuits to have a certain amplification factor it is necessary to strike a value consistent with the desired stability of operation and the general design of the receiver, that is, whether or not neutralization is to be employed, an independent oscillation control included, etc. These precautions are necessary because of the increased tendency toward over-oscillation as the voltage amplification factor is increased, although it is true that there is a gain in signal intensity with each gain in the amplifying factor.

Varies For Number of Stages

The number of stages of tuned radio frequency amplification also governs the voltage amplification ratio factor of each stage. That is, each stage is designed to afford a certain value. This is unfortunate, but nevertheless true, it being necessary to reduce the amplifying power of each additional stage of radio frequency, or to use a uniform but decreased value throughout, when more than one stage are utilized. Hence the amplifying power of a well-designed single stage of radio frequency in a receiver employing only one, is invariably greater than that of any single stage in a multi-stage radio frequency amplifying unit. And the design of the Diamond of the Air has been well carried out, since the stage of tuned radio frequency amplification has an average voltage amplification factor of slightly more than 6 on wavelengths within the broadcast band, from 200 to 560 meters. To some this value may appear small, in that the amplification constant of the tube is greater than that figure, but 6 is a very satisfactory value of voltage amplification for a stage of radio frequency, bearing in mind that the stage is perfectly stable.

The Regenerative Effect

Delving deeper we arrive at the other important item, the amplifying power of the regenerative detector. It is unnecessary to discuss the advantages accruing through the use of regeneration in every receiver, in so far as increased distance and receptivity are concerned, but the design of a unit that will provide a high value of amplification with perfect control warrants careful consideration. In the first place, the attainment of regeneration is by no means difficult, but so that it be satisfactory it must be under perfect control from the minimum to the maximum wavelength covered by the tuning circuit. Furthermore it must be a stable control with low loss circuits in the primary and secondary. This last mentioned factor has been neglected by many, but it is of importance, and many will be surprised to hear that regeneration control with a tickler or plate variometer is more difficult with a low loss secondary circuit than with a high loss system. This should not be construed to mean that it is more difficult to obtain, but more difficult to control. This is so because there is less positive resistance to be removed from the grid circuit. And when there is a smaller value of resistance in the grid

(*Concluded on page* 23)

Coils for Eliminator

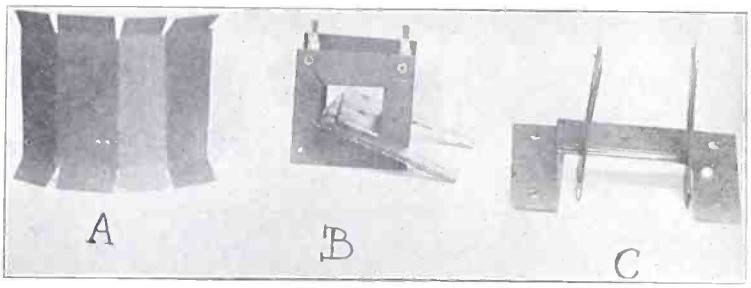


FIG. 1-A shows how the form upon which the wire is wound looks after it is cut out from the piece of fibre. B shows the choke coil head, with a couple of laminations. C shows the side view of how the heads should be mounted when placing the laminations.

PART II

By Lewis Winner

Associate, Institute of Radio Engineers

THE transformer and choke coils employed in the Rex B Battery Eliminator were made at home. In this article their construction will be described in detail. When making these, follow directions carefully. Also consult the photographs frequently.

Before making any of the parts, all the tools required for the job should be at hand. The following is a list of the necessary tools: (1)—A rip saw, 15" long, with a 2" wide edge. A small edge like this is used due to the small space at hand in the form. (2)—A screw driver, total length of metal body, 4¾"; length of wedged body 1½"; flattened edge, 1/32" wide. (3)—Pair of common pliers, 5" long, with a flat mouthed opening. (4)—Small breast drill, which will hold all size drills up to ¼". (5)—Electric or plain soldering iron. The tip should be composed of pure copper. It should be large so as to withstand heat. (6)—Solder and paste. (7)—Small sized hammer, with a 1½" steel head. (8)—Coil winding machine, with automatic turn counter. (9)—Vise with a ¼" screw, and a strong grip adjuster.

Making the Forms

Procure two pieces of fibre, 1/16" thick, and 6" square. Lay one piece aside. Cut the other piece in half. It will be 6" long and 3" wide. Lay it so that the 6" portion faces you. That is, there is a 6" portion on the top and a 6" portion on the bottom. The 3" portions are on the sides (left and right). Three inches from the right and the left hand side make a dot, on the top and on the bottom of the 6" edges. Draw a line connecting these two points. Cut here. Take the other piece of fibre, and do the same thing. Take the 6" square piece and follow the same procedure. This will give you eight pieces of fibre 3" square. Now consult Figs. 5 and 6. Here you see how to cut and drill these portions so that you will obtain what is shown in Fig. 1B and C. There should be two large heads and six small heads. Fig. 5 is for the large heads and Fig. 6 is for the small heads.

Now procure two pieces of fibre, 1/64" in width, and 6" square. Cut and saw as per Fig. 7. The dotted lines represent portions to be bent, while the heavy lines represent portions to be cut. Fig. IA shows what this looks like when completed. This is the form upon which the wire is wound. There are three of these required.

Take the small heads, which are for the choke coil winding. Where the ⅛" holes are drilled, insert lugs as shown in Fig. 2. These lugs are ⅝" long, 3/16" at the widest portion, ⅛" at the narrowest por-

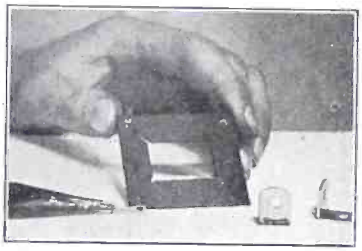


FIG. 2, putting the lug into the transformer head. The notches for the carrying of the wire have not yet been cut, as you will note.

heads in the vise, lay a block of wood underneath portion where lugs are to be inserted, and hit the lug with the hammer. These lugs of course have a tip which is

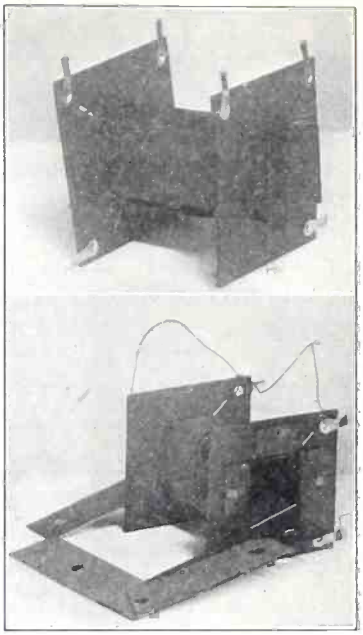


FIG. 3 (top)—placing the form upon which the wire is to be wound into the transformer head. Note the opposite placement of the lugs. The lug on the extreme right hand side should be opposite the lug in the front to the left. These lugs are for the filament winding terminals. Don't make this mistake as is shown in the photograph. (Bottom)—placing the first three laminations into the form.

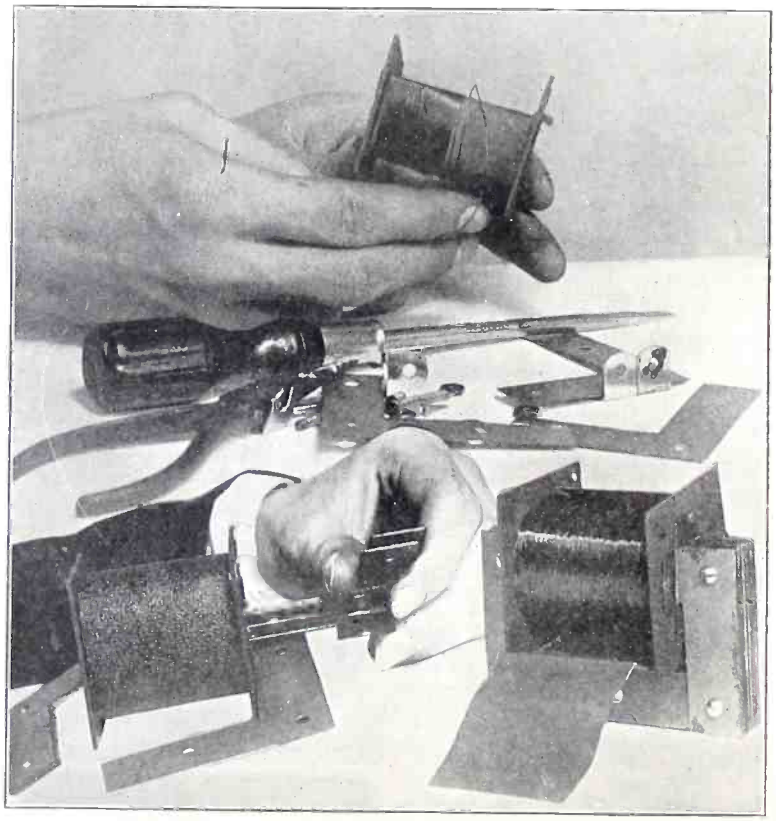


FIG. 4 (top) winding the coil. (Left hand side) putting four laminations at a time into the form upon which the wire is to be wound. (Right hand side) showing how the complete choke coil looks. Note the lapping over of the sides of the

Transformer and Chokes

inserted into the holes. This tip is 3/16" high and ⅛" in diameter. When it is hit by the hammer, a small portion of the tip is flattened out on the opposite side giving it a hold in this form. There will be only two lugs to insert into choke coil head. Each transformer head will have 3 terminals. This, of course, is the larger head.

Take the form which is to have the wire wound upon it. Insert into small head, as per Fig. 3 (top). Now insert other form into large size heads. Insert other form into other small head. Note that in the photographs, the three terminals are not opposite each other. Place these terminals so that there will be 4 in the front and 2 in the back on the top. The bottom portion of the back of the transformer head has no lugs attached.

Now take the drill, with a 1/16" drill. Insert one of the heads with the form into the vise. Drill small holes into the bent portions of the form. These holes should not be deep. Just enough to catch the tack. Drill one on each leaf. This means that there will be 8 on each. Now take the tacks which are ¼" long and have a 1" head. Hammer a tack through each small hole. They will not pass through the head. It will form a sort of a rivet and therefore hold the form. In all cases put the head into the vise with a block of wood or a metal object underneath so that there will be a solid base.

After you have completely put together all the forms with the heads, the winding is the next thing to be attended to. Lay the two choke coil forms aside. Place a ¾" square block of wood in the transformer head. This, of course, is 2" long. Place two strips of adhesive tape over the form. This is to make a good grip on the first turn of wire. The insulation is also improved. Obtain 4 pounds of No. 26 enameled wire. Place it on the coil winding machine. Place the first turn through the inner small notch to the right. Wind 807 turns. Bring the end of this winding through the small notch on the other edge. This constitutes the primary. Get two sheets of heavy manila paper 1/64" thick. Place over primary winding. See that the edges of this paper laps up against the sides of the head. Fig. 4, right, shows the complete transformer, with the paper lapping up against the sides. Bring the beginning of the secondary winding through the upper long notch. Wind 1614 turns. Bring the end through the upper long notch on the other head. The beginning of the secondary is connected to the terminal which is on the same side as the terminal which holds the beginning of the primary winding. Place two sheets of heavy manila paper over this winding, taking care that the paper overlaps the sides of the head. Take the spool of wire, which was inserted into the catches on the coil winding machine off. Place a spool with ¼ pound of No. 18 double cotton covered wire in these catches. Bring the beginning of the filament coil to the long notch on the same side that the beginnings were connected to and thence to the terminal. Wind 44 turns. Bring the end directly to the terminal. The filament winding terminal is directly in back of the secondary winding terminal. Solder all the leads, which go to the terminals securely. Place three sheets of manila paper over the filament winding. In order to hold this paper, you will have to place some gummed paper over the edges of the paper. This is done wherever this paper is wrapped over a winding. When the winding has been completed, there will be 4 terminals, carrying the beginning and end of the primary winding on the bottom, and the beginning and the ending

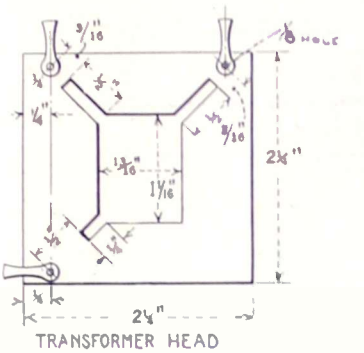


FIG. 5, showing the constructional data for large head for the transformer.

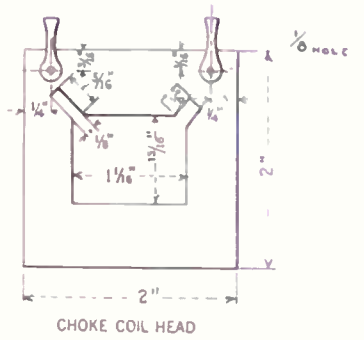


FIG. 6, showing constructional data for small head for the chokes.

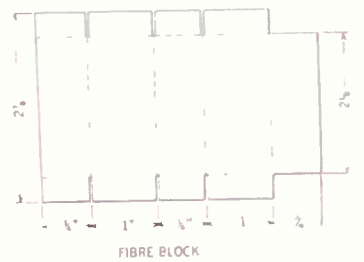


FIG. 7, shows the constructional data of the form upon which the coil is to be wound.

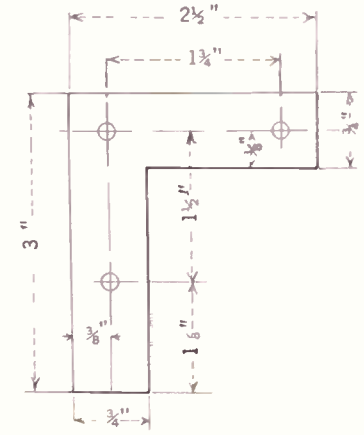


FIG. 8, shows the constructional data of a lamination.

LIST OF PARTS

One AC 220-volt step-up transformer L1L2L3 (Shore).
Two 60 henry choke coils L4L5 (Shore).
Three 8 mfd. fixed condensers C1, C2, C3. Conn. Tel. & Elec. Co., or Western Elec.
One rectifier tube (Rex Magnatron).
One rheostat, 0 to 5 megohms, R2, (Clarostat).
One rheostat, 0 to 6 ohms, R1.
One terminal strip (G-K).
One 25 ampere, 110 volt AC fuse.
Ten feet of lamp cord.
One plug.
One socket to hold the fuse.
One pair of angle brackets.
One baseboard.
One socket to hold the rectifier tube.
Accessories: Bus bar or lead-in to wiring, solder, screws, nuts, etc.

[Next week Part III the conclusion will deal with the making of the eliminator to fit in a cabinet]

of the secondary winding. The terminals in back of the secondary winding carries the filament winding.

Making the Core

The next thing to do is to place the laminations into the core. The dimensions of the laminations to be placed into the form are shown in Fig. 8. There are 128 laminations required here. Fig. 3, bottom, shows how the laminations are first placed into the form. Do not, however, place the laminations into the form before all the wire is placed on the form, as is shown in the photo. Place a small block to hold the form up underneath the windings. Take a lamination. Place the long edge into the left hand side of the form. Place another lamination with the long edge into the right hand side. Place another lamination with the short edge over the short edge of the lamination first placed into the form. This will then give you a perfect oblong. Now take four laminations. Place the long legs of the laminations to the right hand side of the form over the lamination in the right hand side. The short leg of this lamination will fall over the short leg of lamination 3. The next four laminations are then taken. The short legs are placed over the short legs of the lamination first put onto the left hand side. Four more laminations are then taken. The short legs are placed over the short legs of the second lamination placed into the right hand side. There are 32 sections of four laminations placed in this fashion, making 125 laminations. A single lamination is placed over the last one placed into the core e.g., three laminations first placed into core, 32 sections of four then placed into the core, and then finally one lamination, making a total of 128 laminations placed into the core.

Now get five screws 1¼" long. The thread is 1" in length. The screw is ⅛" in diameter. The diameter of the head is ¼". The height of the head at its highest point is 3/16". The depth of the nick (where the wedge of the screwdriver is placed into) is 1/16". It is ⅛" in width.

Place the screws in the various holes. When placing those at the bottom extreme ends, place angle brackets, which have the following dimensions in with the screws: 1⅛" in total length; when bent 9/16" in length; the holes are ¼" from each edge and 3/16" in diameter.

When you have concluded all the above, place a coat of black paint over the laminations. You can also place a sheet of imitation leather covering over the

(*Concluded on page* 19)

Radio University

A Question and Answer Department conducted by RADIO WORLD for its Readers by its staff of Experts. Address Radio University, RADIO WORLD, 145 West 45th St., N. Y. C.

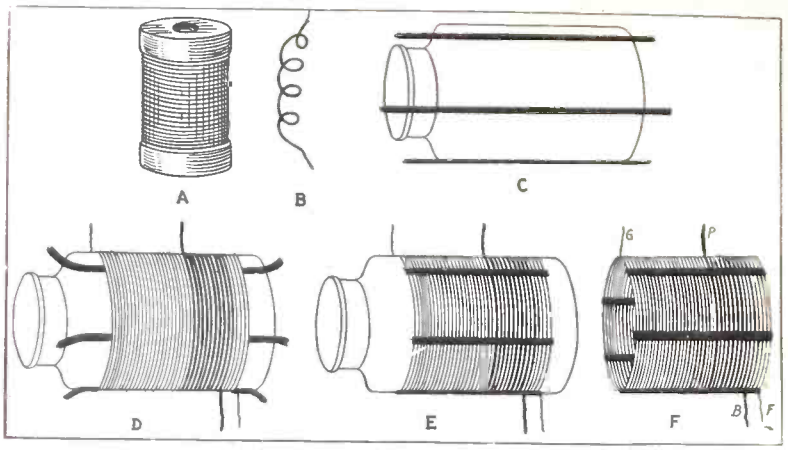


FIG. 242, showing how to wind a low-loss coil.

WILL YOU please tell me how to make a low-loss coil, with the aid of picture diagrams?—H. T. Tullins, Oakley, Cal.

Fig. 242, shows the winding of the low-loss coil. A is a spool of No. 20 enamelled double silk covered wire. B is 13 feet of the wire measured off and cut. C is an ordinary glass preserving jar with five strips of ¼" adhesive tape gummed side up, laid upon the jar. D shows the completed coil wound over the tape, the dark wire, the aperiodic primary is wound alternately with the secondary. E is the completed coil, the tape turned back to hold the winding in place. F is the coil removed from the jar winding form. P and B in Fig. F are the beginning and the end of the primary, G and F, the beginning and end of the secondary. Do not place any holding substance in the coils as this makes the coil very inefficient, due to the small eddy currents that will flow through coil. The distributed capacity of the coil will be materially increased.

* * *

I HAVE a 5-tube Atwater-Kent set which is built in a large cabinet. The tubes are not of the RCA type. Now coming to the drawbacks, which I think are very slight. (1) The tuning is broad. (2) The A battery never lasts more than 6 days, with a total of 40 hours. The B battery is only four weeks old and is already exhausted. Now could you tell what is the trouble?—Louis B. Lepp, 129 Quitman St., Newark, N. J.

(1) Decrease the length of your antenna. Use a water pipe as a ground. See that the antenna and the ground are connected to their proper places and not reversed. (2) You must be using a small sized A battery, with a capacity of only 80 amperes. If you will get a larger size battery it will last you much longer. If you get one with a capacity of 120 ampere hours you will be able to use it nearly twice as long. (3) Make sure that the B batteries are connected up in correct fashion. One of the B batteries might have been low. When connected with live ones, it gradually draws from the good ones. One battery cell may have been dead. This would cause the other batteries to go dead more quickly.

* * *

WHERE CAN I obtain the ¾ ampere resistor, used in the Diamond of the Air?—G. N. Boyton, 33 Bowden Ave., Toronto 6, Ontario, Canada.

See the advertising columns of this issue.

* * *

KINDLY INFORM me as to the owners, location and the wavelengths of stations WLIB and WPPC. I received these stations and am quite anxious to know where they are.—F. E. Woodward, 191 Tremont St., Malden, Mass.

Station WLIB is located in Elgin, Ill., and is owned by Liberty Weekly, Inc., wavelength, 303 meters. Station WPPC is not listed.

* * *

WILL YOU please help me with my troubles with the 1926 Diamond? (1) What makes the reception sound so tinny and rattly. It sounds as if the diaphragm is shaking. (2) How can I stop the set from plopping?—Harold Chute, 16 Boyton St., Eastport, Me.

A poor speaker causes this. The signals are so strong they overload your speaker. It is not actually due to the set. (2) Take five turns off the tickler coil. Reduce the voltage on the plate of the detector tube. Take out the condenser, which goes from the tickler coil to the beginning of the secondary of the 3-circuit tuner (grid return).

* * *

I HAVE just completed the Diamond and have trouble making it work with the loop. Will you please offer some suggestions? (2) Is it a bad policy to run the grid leads right up against the panel? (3) I live ½ mile from station WKAR, which has an output of 1,000 watts. Should I be able to tune it out easily with the loop or with the antenna?—Harold A. Childs, 343 M. A. C. Ave., East Lansing, Mich.

(1) See if the prongs of the double circuit jack open up, when the plug from the loop is inserted. See that the plug is not shorted internally. (2) No. This causes body capacity and difficult tuning. (3) By following construction directions exactly, you will be able to tune out the station on a loop or short outdoor antenna.

* * *

I HAVE two Thordarson audio-frequency transformers, but am confused on how to use them in a set, as they are not marked Plate, B plus, etc. They have the P1P2, S1S2 markings. Will you please help me?—H. D. Ticker, 605 N. Michigan Ave., Marshall, Ill.

P1 is the plate post. P2 is the B plus post. S1 is the grid post. S2 is the F minus post.

* * *

I HAVE just completed the "Reflexed 3-Tube 3-Circuit Tuner That You Can Log" described in the March 14 issue of RADIO WORLD. I can only get a loud whistle. This is stopped by touching the P post on the last AFT.—Ben Coates, Elizabeth, Ill.

First put a new AFT in the last stage. Place the grid leak R3 across the condenser C4. Test the condenser C5 for a short circuit. Reverse the leads of the A battery. Place five turns on the plate coil L5.

* * *

I HAVE three .0003 mfd. variable condensers, which I would like to use in the standard Neutrodyne receiver. Can you tell me how many turns to wind on a tubing 3" in diameter? (2) At what turn do you tap the secondary for connecting the neutralizing condenser? I wash to use No. 22 double cotton covered wire.—William J. Simon, 309 East 70th St., N. Y. City.

(1) The primaries consist of 10 turns. The secondaries consist of 65 turns. (2) Tap the secondaries at the 12th turn from the filament end of the winding.

* * *

I HAVE all the parts for the Uncle Sam 4-Tube Set. Are these parts useful for the Diamond?—R. L. Kierstead, 35 Princeton St., East Boston, Mass.

Yes.

* * *

I WOULD like to build a good receiving set and therefore desire to ask a few questions. (1) In the Dec. 5 issue of RADIO WORLD a diagram and description of a 70 to 1208 meter receiver appeared. Is this set as good as the Diamond? (2) Will this set have enough volume on all the wavelengths to work a speaker?—C. Shingler, 608 7th St., Juniata, Pa.

(1) Yes. (2) Yes, provided these stations are within reasonable range.

* * *

I HAVE built a 1-tube set using a WD11 tube. Would you please tell me if I could use UV199 tubes in the audio-frequency stages of amplification, still using the WD11 as a detector?—E. C. R. Albany, N. Y.

Yes. You will have to use a separate batch of batteries to light the filament of the 199 tubes. That is, the filament leads of the WD11 tube will be individual to the filament leads of the 199 tubes.

* * *

IN THE Dec. 5 issue on page 20 there appeared a diagram of a 4-tube regenerative receiver. Will you please advise me if this set will work successfully with WD11 tubes? (2) Will you please give me all the data about the coils, condensers, transformers, etc.?—H. N. Brock, 68 Traymore Ave., Buffalo, N. Y.

(1) Yes. (2) L1L2 consists of 53 turns of No. 20 single cotton covered wire, tapped at the 10th turn. The tubing is 3½" in diameter and 4" high. L3L4L5, the 3-circuit tuner, is wound with the same kind of wire. L3 consists of 7 turns wound on a tubing 3½" in diameter. Leave ½" space. Wind 43 turns. This constitutes the secondary L4. The rotary coil or tickler L5, consists of 26 turns of No. 26 single silk covered wire. It is wound on a tubing 2¼" in diameter and 2½" high. C1 is a double condenser with two .0005 mfd. variable sections. M is a midget condenser with a capacity of approximately .00004 mfd. C2 is a .00025 mfd. grid condenser. R4 is a variable grid leak. R1 is a ballast resistance. R2 is a 10 ohm rheostat. C4 is a .002 mfd. fixed condenser. C3 is a .001 mfd. fixed condenser. R3 is a 6 ohm rheostat. The both AFT are of the low ratio type. The 201A tubes may be used throughout.

* * *

PLEASE GIVE coil winding data, and any other necessary changes, for the 3-Tube Dry Cell Circuit described by Capt. P. V. O'Rourke, in the Nov. 7 issue of RADIO WORLD, so that .0005 mfd. variable condensers can be employed.—D. H. Binkley, Oklahoma City, Okla.

The primary L1 consists of 10 turns of No. 24 silk over cotton wire wound on a 3¼" outside diameter skeleton form. 4 or 4½" high. A space of ⅜" is left. The secondary is then wound, which consists of 45 turns. The secondary is tapped as

per: first at the 11th turn and then at the 28th turn. There are no other changes necessary.

* * *

WILL YOU please give me the electrical diagram of the Bernard 1-Tube DX Set? Also state the data on the various constants.—L. Trasuns, Wood, Pa.

Fig. 243 shows the electrical diagram of the Bernard 1-Tube DX set. The primary L1, is wound on a tubing 3½" in diameter. It consists of 10 turns. The secondary is wound on the same tubing and consists of 60 turns. Use No. 22 double cotton covered wire. There is a ¼" spacing between the two windings. The tap is made at the 8th turn. Use No. 20 single cotton covered wire. C1 is a .00035 mfd. variable condenser. C2 is a .00025 mfd. variable condenser. R1 is a 30 ohm rheostat. R2 is a 2 megohm grid leak. C3 is a .0002 mfd. fixed condenser. J is a single circuit jack.

* * *

WOULD A 5-wire cage antenna be better than the common 1-wire straight wire antenna to be used for the coming International Tests?—H. D. McChesney, Princess Theatre, Crandon, Wis.

No.

* * *

HOW CAN the polarity of a magnet be determined?—Herbert L. Casey, 24 E. Main St., Geneva, O.

Two magnetic poles are alike when they both attract or both repel the same pole. If one of these poles attracts and the other repels the same pole, they are unlike. By taking the north pole of the compass needle you can find out which is the north and the south pole of a magnet.

* * *

IS PUSH-PULL amplification advisable with a 3-tube set, using a detector and 2-step transformer coupled amplifier? (2) Please tell me how many turns to place on these tubings so as to make a 3-circuit tuner; the outside diameter of tubing is 3⅛". The outside diameter of the tubing on which the tickler winding is to be placed is 2½". I wish to use No. 26 double cotton covered wire. (3) Can push-pull transformers be used as ordinary transformers?—Dr. Robert C. Johnson, Elwood, Ind.

(1) No. (2) The primary consists of 10 turns. The secondary consists of 60 turns. The tickler consists of 50 turns. (3) No, not very successfully. The secondary has two many turns.

* * *

I HAVE read the description of the Pathfinder in the Oct. 31 and Nov. 7 issues of RADIO WORLD and would like the following questions answered before building the same. (1) Is it a good distance set? (2) Has it good volume? (3) Does it howl or squeal? (4) Where can I obtain the parts for this receiver?—George A. Meister, Route 11, Chambersburg, Pa.

(1) Yes. (2) Yes. (3) No. (4) Write to Sanford M. Bookee, 223 Fulton St., New York City, for the answer to this.

* * *

WILL YOU please tell me if it is advisable to add another stage of tuned radio-frequency amplification to the Ambassador 4-Tube receiver? (2) What are the best tubes to use in the impedance-coupled amplification unit?—George V. Gallagher, 208 Union Ave., Brooklyn, N.Y.

(1) No. (2) The high-mu tubes for the first and second AF stages, and a lo-mu tube for the last stage.

* * *

I AM thinking of reconstructing my 1925 Superdyne for the 1926 Diamond. (1) Do you think it better to get two .0005 mfd. variable condensers or could I use my double condensers with the same satisfaction. (2) Can I use the same coils as I use for the Superdyne in the Diamond? (3) I am at sea as to what the high and low potentials on a coil mean. Do the recent issues of RADIO WORLD make this clear?—Gustav Soult, 2816 Church Ave., Brooklyn, N. Y.

(1) You will get good results with your present double condenser. (2) Yes. (3) See the Nov. 21, 28 and Dec. 5 issues of RADIO WORLD.

* * *

WILL YOU please print an electrical diagram of a 4-tube set, using a step of tuned regenerative radio-frequency amplification, a crystal as a detector, and 3 steps of autoformer coupled audio-frequency amplification?—L. Thomas, Utica, N. Y.

Fig. 244 shows the diagram that you request. L1 is the antenna coil and consists of 53 turns wound on a 3¼" diameter tubing. The tap is taken at the 8th turn from the beginning. L2 is wound on a tubing 2" in diameter and consists of 8 turns. L3 is wound on a tubing 3¼" in diameter and consists of 45 turns. Use No. 22 SCC wire. C1 and C2 are both .0005 mfd. variable condensers. C3 and C4 are both .001 mfd. fixed condensers. C5, C6 and C7 are 1 mfd. fixed condensers.

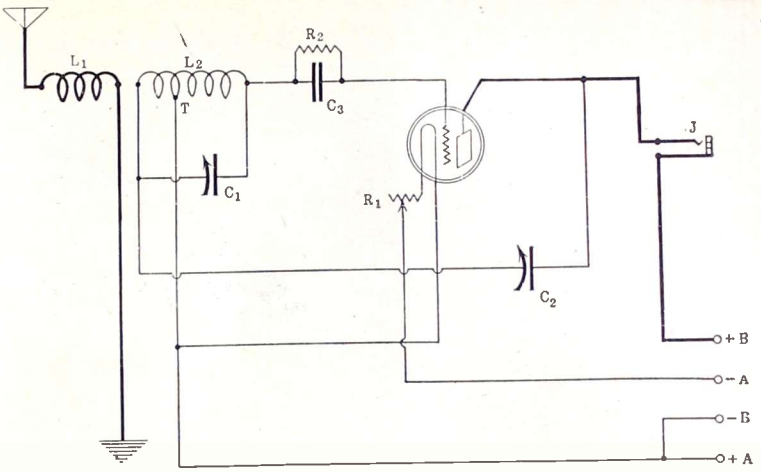


FIG. 243, showing the electrical diagram of the Bernard 1-Tube DX Set.

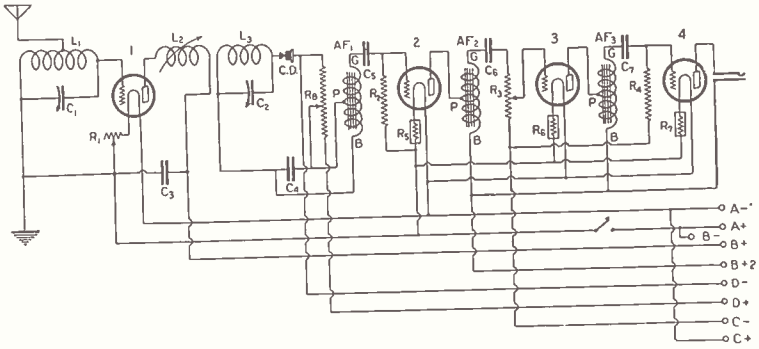


FIG. 244 showing the electrical diagram Mr. Thomas requested.

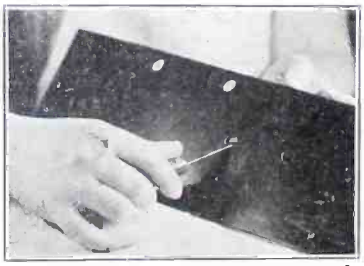
Obeys "Hands Up!" to Be a Phantom Aerial

RANDALL CATHCART, 14, of Oakland, Calif., trying to tune in recently, made the discovery that aerials may be dispensed with. The boy says that the human body will answer the purpose. His aerial was broken by chance, and his hand accidentally touched the binding post. Instantly he heard the program he had been trying to tune in. Then he went that one better, using his toe for contact, and raising his arms for better pickup. (International.)

A Firm Ground

A GROUND spring clamp finds a good gripping surface on the radiator regulator.

Scrape Where Drill Fails



IF you haven't a drill large enough for a desired hole, use a knife.

Major Bowes and His C

THE FIRST photograph of the popular Ca through WEAF and chain of stations every left to right: Chester Hale, Dr. Billy Axt, M Henry Heil, Rudy Wiedoeft, Max Herzberg ski, William R

Buying Is Heav

A SCENE in a store in New York City and a clerk are shown, displaying pa

Sealing the B Battery t

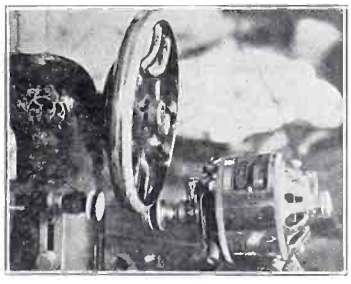
itol Theatre Family Who Are Weekly Broadcasters

Theatre "Family," directed by Major Edward Bowes (Middle Center), which broadcasts day evening. Bottom row: Tommy Dowd and Capitol Ballet Corps. Second row, sitting Edward Bowes, David Mendoza, Gene Smith. Top row, standing left to right: Julia Glass, jorie Harcum, Sigurd Nilssen, Doris Niles, Josef Fuchs, Celia Turrill, Martha L. Wilchin- Pietro Capodiferro, Yasha Bunchuk and Caroline Andrews.

As Holiday Nears

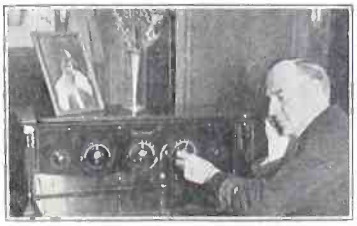
s proprietor, "Blan, the Radio Man," o purchasers. (Kadel & Herbert.)

Source of Interference



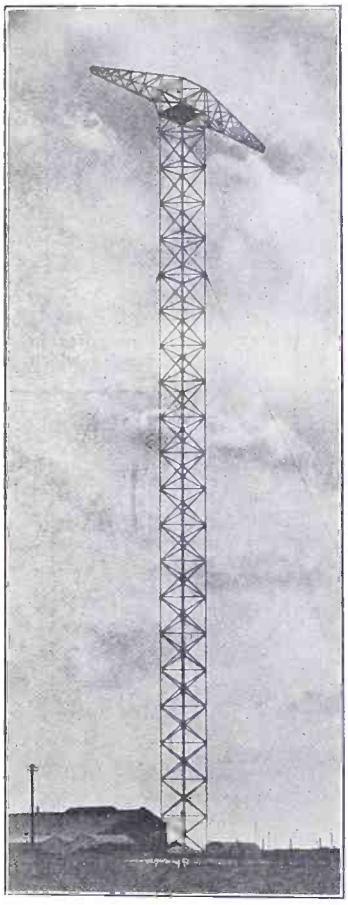
OFTEN the electric light company is blamed for a hum, but a neighbor's motorized sewing machine may be the cause.

Hears Stork Broadcast



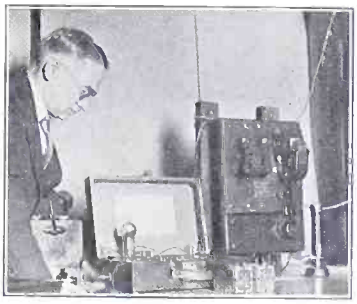
CAPT. HERBERT HARTLEY, of S. S. Leviathan, listening-in to his radio set on board the vessel. With this set he obtained news of the recent visit of the stork to his wife in N. Y. (K. & H.)

Ready for the Tests



THE huge proportions of one of the aerial masts of the Marconi Beam Radio Broadcasting and Receiving Station at Dorchester, England. This is 400 feet high. The first test of this station will be held during the international broadcast week in January. (Kadel & Herbert.)

Shadows Audible



VIK. ZWORYKIN, physicist of the Westinghouse Electric Co., experimenting with his photoelectric tube in a radio set. The tube is a development of the radio tube. It is so sensitive that it is energized with a shower of electrons by the slightest shadow that crosses its light. In a recent demonstration in the Wanamaker store in New York, Mr. Zworykin started a washing machine with his device and demonstrated how the housewife's work could be made much lighter by the use of the tube. (Kadel & Herbert.)

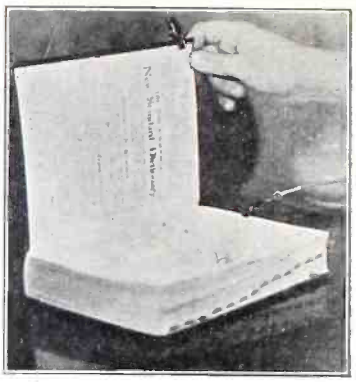
lake It Surely Airtight

Sometimes you may buy a B battery where the sealing wax at one of the binding posts clips does not afford full coverage, in which case melt a little of a stick of sealing wax to make the whole B battery envelope airtight.

An Emergency Aerial That Uses a Pie Plate

The old pie plate serves purposes in addition to containing the dough which heat converts into delicious crust. Should your aerial blow down, dig up a pie plate and fill in the gap that might exist otherwise in your reception. Put the telephone on the pie plate and attach the bare end of a wire to the pie plate. See that actual metallic contact takes place. The pie plate serves as the literal plate of a fixed condenser, the other plate being the telephone wiring system. Other than this you should leave your telephone and electric light wiring alone for aerial purposes, with the exception of a socket aerial or equivalent. The reception from a telephone aerial such as the one pictured is quite good on sensitive receivers, but some sets will not produce enough volume, due to the radio-frequency amplification not being high enough. This is on account of the receiver itself. Any set that will work on a loop should give good results by the telephone aerial system.

Next to Reading Matter

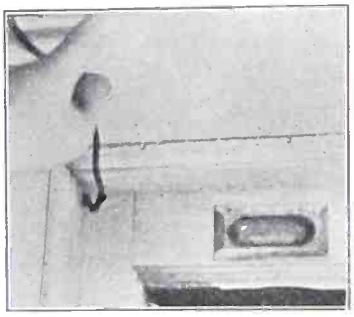


After considerations of mere reading, or consulting text, are swept aside, the dictionary or other book still may be put to the useful service of an experimental variable condenser, properly called book type. The hand in the photograph is shown lifting one of the covers of the book. Inside this cover has been pasted a thin sheet of tinfoil. That is one plate of the condenser. The other plate is placed between the second and third pages of the book. Hence both sheets of tin foil are hidden from view by the book paper. Note that a wired connection is made by metallic contact between one sheet of tin foil and a wire lead and between the other sheet of tin foil and the other lead. When these leads are brought to the terminals of a coil, such as the secondary of a tuned radio-frequency transformer, the wavelength is varied by moving the sheets of tin foil nearer or closer together. The closer they are, the higher the capacity between plates, the higher the wavelength. The book cover alone is varied and thus is the rotor. It may be kept in any given position by placing the top or bottom against the wall, which would bring the thickness of the pages against the wall, too.

Electrolyte Antidote

An antidote when the storage battery acid accidentally spills on the carpet is plain household ammonia. Although the husband spilled the acid, the wife in this case hurried for the rag and ammonia, because she was fearful of the fate of the carpet, while the husband's worries were over, the battery having been completely charged before the acid accident occurred.

Leadin Precaution



Scratching noises in radio receivers are attributed to almost every conceivable thing. But before you go any farther determine whether your aerial leadin is not causing the trouble. Often the leadin is of stranded wire and the strands break under pressure, resulting in high resistance, poor contact, weak signals and general lack of pep in the receiver. Also, if the leadin is carelessly brought through the space between the window jamb and the sill it is likely the frequent closing down of the jamb upon the wire has injured it. Use a leadin insulator if you want best results.

Chorus to Opera

ALLURING to look upon, no less than to hear, is Mary Lewis, of the Metropolitan Opera Company. Miss Lewis was heard twice recently from WEAF and allied stations, during Atwater Kent Music Hours, a few weeks apart. Her life story, published in the Nov. 21 issue of RADIO WORLD, **reads like the pages of a romance.**

Grange Broadcasts

HAROLD E. (RED) GRANGE, famous hero of the gridiron, broadcast from WEAF and allied stations on the subject "The Golden Rule." He spoke for the Near East Relief, but reverted to a discussion of football. That was the day he got $30,000 for playing in just one game, and he felt mighty happy. (Foto Topics)

Electrolier Antenna

Another makeshift, in case vour aerial blows down, granting that you have no telephone, is to utilize the electrolier. Pick out some point that has bare metal and attach a clip to it. The clip is at the end of the wire leading to the aerial post of your set. This method affords you the aerial pickup possibilities of the lighting system and is on a par with the socket plug aerial plan. The clip is at upper right in the photograph.

A DELINQUENCY

Many stations spend a great deal of money on equipment and plant operation, but are very careless either in the choice of the annonucer or in telling him how he should speak.

The Pressley in a Fine Cabinet

By Herbert E. Hayden

Photographs by the Author

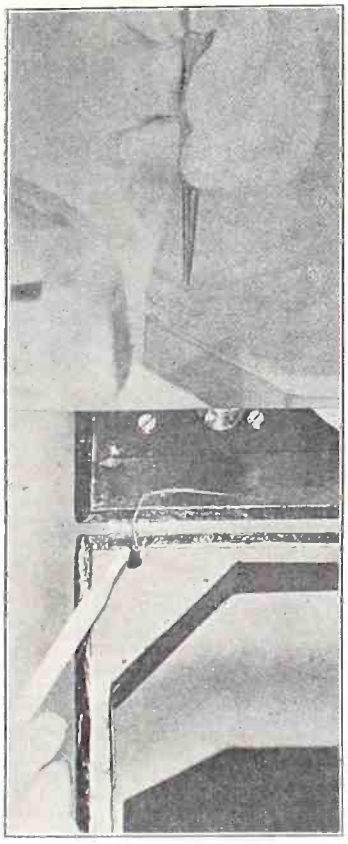


FIG. 10. The cover is nailed down with small brads. These are driven down below the surface of the wood with a "nail set," an instrument that looks like a center punch. Fig. 11 (bottom) shows how in the final assembly the loop wires are brought over the hinges into the case.

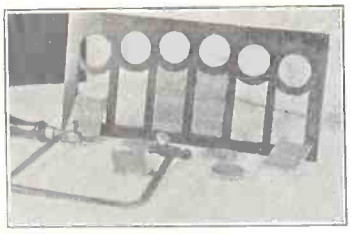


FIG. 12. The grill is cut out by using a scroll saw. Thin silk is pasted on the reverse side of this to cover the loud speaker in the finished machine and to make a neat appearance.

(*Concluded from page* 13)

winding. This completes the step-up transformer.

The Chokes

The chokes are wound on the forms with the small heads. There are only two terminals on these heads, one on each side. Connect the beginning through the long notch, onto the terminal. Solder this terminal. Wind 8000 turns. Use the No 26 enameled wire, which should be snapped into the winder, and the filament coil wire taken off. Connect the end through the small notch, and onto the terminals. Cover with the leather. Place the laminations in the same manner as you did for the transformer. Place screws and angles in. Paint laminations, and you are finished. Make the other choke in exactly the same manner as for the above. There are 8000 turns of the same wire wound.

When you have completed the two chokes and the transformer, test them for a complete circuit or for a short, before putting them into the set.

Those not desiring to make their own transformer and chokes may use commercially made products.

The thickness of each lamentation is .014". When winding the coils, take care that the enameled insulation is not rubbed off the wire.

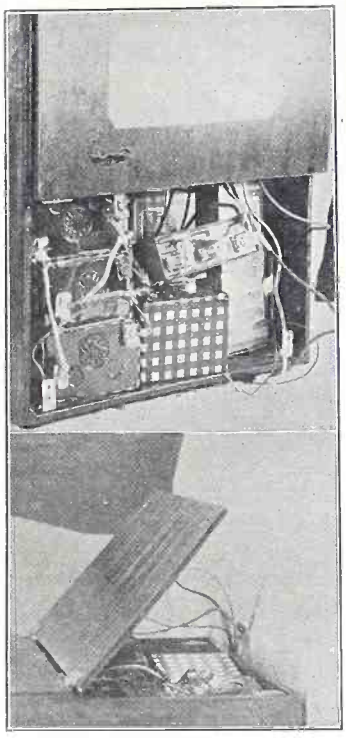


FIG. 13, rear view of the set, showing battery space, holding one C battery, three No. 6 dry cells and four No. 763 B batteries. The paper pasted to the hinged door is the wiring diagram.

Fig. 14, this is the way the rear cover is hinged on. It is held tight to the case by the use of two 6-32 machine screws, which fit into the brass angles which have been tapped for this thread.

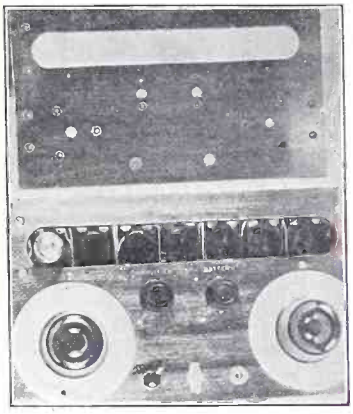


FIG. 15, the 7x12" which has been laid out from the blueprint, which was pasted down on the wood. Notice the panel is wood. Fig. 16 (bottom) is the view of the panel, with all parts in place. The toggle switch is in lower center.

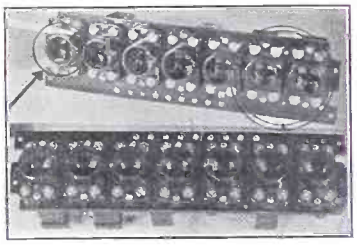


FIG. 17, the completed socket strip. Fig. 18, the same socket panel. Notice how the sockets are mounted. Numbers six and seven are placed differently than the rest (e.g., one at extreme left) (at right, in double-ringed circle)

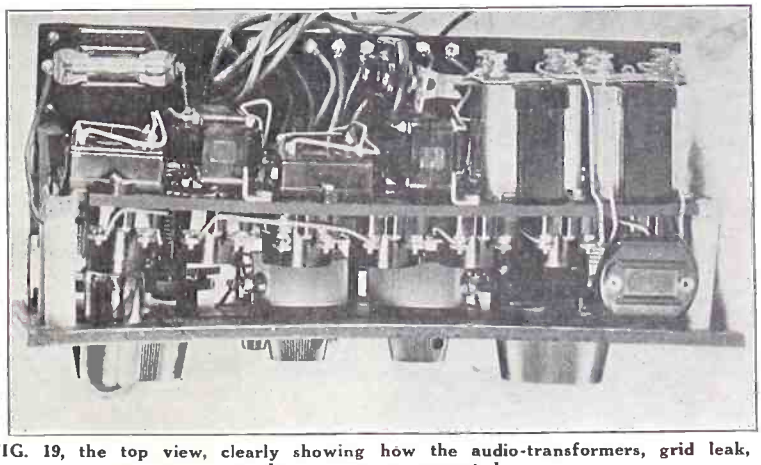


FIG. 19, the top view, clearly showing how the audio-transformers, grid leak, condenser, etc., are mounted.

[*Part I, last week; Part III, conclusion, next week.*]

A THOUGHT FOR THE WEEK

WHY do they label all cut-rate radio dealers as "gyps," and appoint owners of department stores, the start and finish of the greatest cut-rate artists in the world, to trade commissions and other places of civic honor?

RADIO WORLD

Trade Reg. U. S. Pat. Off.

The Link Connecting Radio Fan, Dealer, Jobber, Distributor and Manufacturer

Radio World's Slogan: "A radio set for every home."

TELEPHONES, BRYANT 0558, 0559
PUBLISHED EVERY WEDNESDAY
(Dated Saturday of same week)
FROM PUBLICATION OFFICE
HENNESSY RADIO PUBLICATIONS CORPORATION
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European Representatives: The International News Co., Breams Bldg., Chancery Lane, London, Eng.
Paris, France: Brentano's 38 Avenue de l'Opera
Chicago: A. T. Sears & Son, Peoples Gas Bldg.
Cincinnati Office: Radio World, 304 Provident Bk. Bldg., 7th and Vine Sts. Telephone, Canal 753 and 379.
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EDITOR, Roland Burke Hennessy
MANAGING EDITOR, Herman Bernard

SUBSCRIPTION RATES

Fifteen cents a copy. $6.00 a year. $3.00 for six months. $1.50 for three months. Add $1.00 a year extra for foreign postage. Canada, 50 cents.

Receipt by new subscribers of the first copy of RADIO WORLD mailed to them after sending in their order is automatic acknowledgment of their subscription order. Changes of address should be received at this office two weeks before date of publication. Always give old address also. State whether subscription is new or a renewal.

ADVERTISING RATES

General Advertising

1 Page, 7¼"x11"	462 lines	$300.00
½ Page, 7¼"x5⅛"	231 lines	150.00
½ Page, 3⅛" D. C.	231 lines	150.00
¼ Page, 4⅛" D. C.	115 lines	75.00
1 Column, 2⅛"x11"	154 lines	100.00
1 Inch		10.00
Per Agate Line		.75

Times Discount

52 consecutive issues	20%
26 times consecutively or E. O. W. one year	15%
4 consecutive issues	10%

WEEKLY, dated each Saturday, published Wednesday. Advertising forms close Tuesday, eleven days in advance of date of issue.

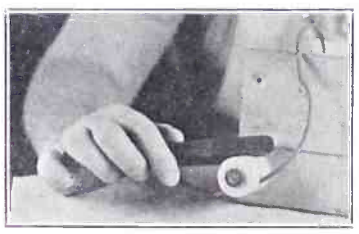
CLASSIFIED ADVERTISEMENTS

Ten cents per word. Minimum, 10 words. Cash with order. Business Opportunities ten cents per word, $1.00 minimum.

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

DECEMBER 19, 1925

Insulator Precaution



The aerial insulator, especially in cities, may become dust-covered, and thus lower the resistance of the insulator, robbing it of much of its insulating qualities. The dust and soot form a path of conductivity whereby the preciously feeble radio current escapes to such an extent that poor volume results. A good plan is to brush the foreign matter off a suspected insulator.

Santa Puts Radio First Among Gifts

By James H. Carroll

OUR old friend Santa Claus is as up-to-date as the next fellow and don't you forget it. He makes his rounds by airplane, while his crack reindeers take it easy; his toy factories are equipped with the most modern machinery, and his candy factories are models of sanitary practice. He is also a "ham" of the highest degree, and the modern children have been sending to him down around 40 meters, telling him what they want for Christmas instead of mailing requests, as was the old-fashioned way. He also loves to listen in and his den is fully equipped with a fine standard outfit on which he and Mrs. Claus listen to programs from all over the world, as reception is very good at the North Pole. His hobby, however, is building his own, and his shop is filled with circuits of all kinds. Therefore, this year he has put radio at the top of his list as being the finest kind of present and his warehouses are now filled with stacks of the finest standard sets, mounds of speakers, cabinet, cone and horn types, thousands of batteries, A, B and C, also B eliminators, millions of tubes of all types and everything you can think of in the way of radio equipment ready for delivery on or before December 25.

The Greatest Boon

Radio is without doubt the greatest boon conferred upon man—it is educative and humanizing, it binds a link of fellowship around the world, it sweetens life, it is a cure for melancholy and a blessing to the bedridden, aside from its commercial uses and its greatest possibilities are as yet to come. Old Scrooge never knew radio. If he did it would not have taken Marley's ghost to bring him to a realization of the beauty of unselfishness, for every radio fan is unselfish—he is always willing to share his joy and give of his technical knowledge to others. The camera, the fishing rod and the golf stick are other great humanizers of the age, but they all run second to radio.

Who would want any better present than a radio Christmas gift? To the person who has never had one a radio set would bring the greatest possible thrill, and extend the Yuletide joy throughout the entire year. To the radio fan, a part, tubes, batteries, phones or a speaker would be of more value than all his other gifts put together. How the set-builder will revel in a new kit! Imagine the ecstacy of a Super-Het fiend over the gift of a new loop or a practical antenna-coupler that will enable him to get the benefit of all the DX qualities of his set. And the price—nowhere is there a more elastic field than radio.

Fits Any Purse

From a dollar up to $2,500, from the little telephone antenna device or the interference eliminator to the de luxe console fully equipped, or for around $500, the set with speaker, the last word in amplification, that works direct on the house current. And as the climax, what could be better than a year's subscription to a real live weekly radio publication? One need not be afraid to give a set this year, if he buys one of a standard make, for the sets are as stable as the modern automobile and work as well.

Don't omit radio from your Christmas list this year, but give it the most important place. Think well and you will find that there are many of your friends and relatives who will appreciate a radio Christmas gift more than anything you can give them. Buy with confidence from a reliable dealer, standard, advertised merchandise and you cannot go wrong. And if you are going to be a Christmas "good fellow" this year and do your bit for the poor and unfortunate, don't forget to include the sunshine of radio as far as you can afford. Even a crystal set or one of the cheaper three tubers will prove an unmixed blessing. Particularly include our wounded and crippled soldier lads, the aged and infirm who are forgotten in the mad rush and the shut-ins who cannot see the world go by, let us bring the world to them; and let us all pull together and make this a radio Christmas as well as a radiant one.

Santa ("Mike") Claus

GOOD little boys and girls anxious to find out what the bag of Santa Claus will contain this Christmas Eve, by tuning in on WGBS, N. Y., may get first-hand information. Here we see Santa at the microphone. The locale is the toy department of the Gimbel Brothers Store in N. Y., the home of WGBS. (Kadel & Herbert.)

"Lopez Speaking"

HERE is how Vincent Lopez, the famous orchestra leader, looks before the microphone. Through WEAF he broadcasts regularly from his own dining club, Casa Lopez, one of the newest night life successes on Broadway. (Foto Topics.)

FACTORY SETS

A weekly guide to prospective purchasers of manufactured receivers — questions answered by expert.

Erla Engineers Discover a New Principle—Thermiodyne Features Master Control to "Bring You Everything That Radio Can Give"—Why Zenith Costs Were Discussed by Manufacturers of the Set —Guides to Prospective Purchasers of Factory-Made Receifers.

By Forrest Watson

Factory Set Editor

MANUFACTURERS of radio receivers specialize on giving the public first consideration. The whole object in manufacturing, of course, is to produce a fine receiver and then sell it. Even at a comparatively low price a receiver may be rated as fine, because one must consider the purchase price in the rating, and if the customer is receiving excellent return for his money, approbation of the manufacturer should not be withheld.

But it would be well for the technicians to avoid boosting some of the cheap noise boxes that pass as radio sets, usually equipped with two very poor audio-transformers to amplify the audio-frequencies. Radio is injured, not helped, by sets that produce signals of poor quality.

The manufacturer of a good set may fall into one of two major classes: (1) he may produce a set with the fixed idea of meeting an existing public demand or (2) he may manufacture a receiver of a type with which the public is not previously familiar and may decide to pioneer in educating the public up to the use of that receiver.

* * *

THE Erla Circloid Five is a set that may be put in the pioneering class, because Erla engineers discovered a new radio principle, that of confining the field of a coil by winding it in toroid style, the shape of wire on a sausage and then bent around, so that there was no measurable external field. The toroid has come to the fore this season by such pioneering and the success that is attending the introduction of this principle in popular sets proves that a wise discretion preceded the merchandising decision. Such advance is fraught with benefits to the public, for the Electrical Research Laboratories, manufacturers of the Erla, make the following claims for their set:

Greater distance, encompassing nation-wide reception in winter and 1,000 miles on reasonably clear summer nights.

Better selectivity, enabling one to tune out stations separated in the wavelength assignment by only a few meters, even if those stations are in the low wavelength group.

Increased volume, on account of a higher factor of radio-frequency amplification, due to coil efficiency.

Finer tone, attributed to the prevention of stray magnetic feedback.

From these considerations it is evident that the Erla Five pivots about the coils, since the four outstanding items are directly related to the functioning of the inductances.

As for the controls, they are three in number, showing that Erla does not consider that control elimination is the most important factor in the public mind, and is not to be compared with distance, volume, selectivity and tone. For these four nothing should be sacrificed, is the obvious opinion of the Erla engineers.

"NOBODY has to study out how to run it."

This is the catch phrase for the Thermiodyne Master Control receiver and emphasizes the opinion of the important organization manufacturing and selling that popular set on the subject of control simplification.

The Thermiodyne has a single main tuning control. By means of a rack and pinion arrangement the turning of a knob actuates the three tuning condensers through a gear system.

"A single turn of the master control" and the stations glide in, says an announcement by Thermiodyne Radio Corporation.

The tuning dial is calibrated as to wavelength, thus further simplifying tuning in stations. To avoid any sacrifice at the expense of simplicity, the receiver is so constructed that, while the center knob moves all three condensers, each unit may be tuned independently, whenever atmospheric conditions render that advisable. For the general run of reception the solitary motion amply suffices.

Care has been exercised in coil, condenser and audio hookup construction, as well as in the lesser fine points of making the set.

* * *

FROM a study of the most popular receivers of the day it is obvious that public demand has risen to great heights for sets that afford beautiful furnture effects. Hence the console model is on the crest of the wave. Both Erla and Thermiodyne have such models, as has the Zenith Radio Corporation, manufacturers of the Zenith receiver.

* * *

THE public is willing to pay higher prices this year because it wants better sets than it did previously, and it knows it is getting its money's worth and is well satisfied. That a ratable part of the enjoyment obtained from a receiver is derived from contemplation of its fine appearance is a lesson that is brought home this year with a certaintv.

The Zenith receiver is frankly announced by its manufacturer on a price comparison basis, although some sets of about the same number of tubes sell for less. "Why does Zenith cost more?" the manufacturer asks, then says it is because the set does more, adding:

"It does more because it brings in more distant stations with ease and implicity. It gives reproduction with full, rich tone values faithfully preserved."

The points of perfect balance in the selection of parts and in the construction also are emphasized.

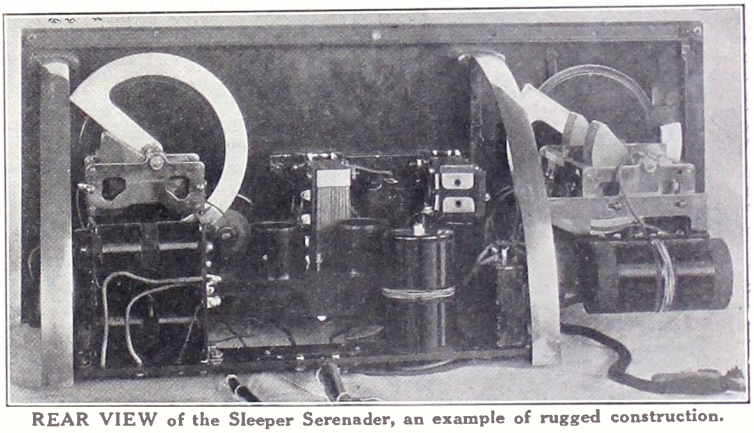
The set has two tuning controls, the panel being prettily calibrated, ornamental pointers being moved to the desired numerical position.

The company stresses the point that Donald McMillan took the Zenith to the Arctic and got wonderful results, also that many enviable distance records, have been established by Zenith set owners.

* * *

IT is therefore obvious that there is a diversity of appeal by set manufacturers and that the public, in selecting a set, should study the various considerations as put forth by the manufacturers, and compare them with his own needs and preferences. In any event, by purchasing a receiver with a recognized name he is assured of a set that is efficient and stable. The better radio receivers are just as standard as automobiles, less expensive and afford more enjoyment per dollar invested than any other invention that has been wrought by the ages.

Rugged construction is the rule with the better class of factory-made sets and the probability of something going wrong inexplicably has been wholly removed. When one purchases a well-made set he buys service of the most dependable sort.



REAR VIEW of the Sleeper Serenader, an example of rugged construction.

[Send in your questions regarding manufactured sets to Factory Set Editor, RADIO WORLD, 145 West 45th Street, New York City.]

FOUR STATIONS INCREASE POWER

WASHINGTON.

Four stations have been authorized by the Department of Commerce to increase their power. They follow:

WEBH, Chicago, from 1,000 to 1,500 watts.

KFKX, Hastings, from 2,000 to 5,000 watts.

WHT, Deerfield, from 2,000 to 2,500 watts.

WLWL, NeNw York, from 1,000 to 1,500 watts.

THE RADIO TRADE

Crosley Buys Out Amrad, With Its Neutrodyne License

ANNOUNCEMENT has just been made of the purchase of the assets of the American Radio and Research Corporation (Amrad), Medford Hillside, Mass., by Powel Crosley, Jr., president and owner of The Crosley Radio Corporation at Cincinnati. Mr. Crosley said that a new company is now being formed to be known as the Amrad Corporation, which will be controlled by him personally, acting as chairman of the board of directors. It is understood that Harold J. Power, former president of the American Radio and Research Corporation, is to be president and general manager of the new company, which will be operated at its present location. The name Amrad has long been well-known in the radio industry. It was truly one of the pioneers, this organization dating back long before the world war. It has always been foremost among radio concerns in fostering radio research, having contributed from its laboratories such developments as the S tube, used extensively for rectification for alternating frequency currents.

Amrad is licensed under the basic patents on Mershon electrolytic condensers, used extensively not only in radio, but for electric power transmission work. It is licensed under the Hazeltine Neutrodyne patent.

During the war Amrad was quite active in the development of submarine detecting devices for the United States Government, in cooperation with the Naval Consulting Board, and built a large quantity of radio equipment for the American Expeditionary Forces and for the United States Navy.

Amrad is said to have operated the first successful broadcasting station in the United States in 1915. Amrad has experienced some financial difficulty during the past few years, due partly to an overproduction during the first few months of the broadcasting craze. Under the reorganization Amrad will be amply financed and will immediately resume the production of radio equipment with the announcement of several new things in the way of receiving equipment, which have been under development for the past few years.

Through the purchase of Amrad, Mr. Crosley, president and owner of The Crosley Radio Corporation, who also controls the Canadian De Forest Radio Corporation, Toronto, Can., becomes a still more prominent figure in the radio industry. Mr. Crosley's rapid attainment of his position of manufacturing more radio sets than any other concern in the world, is one of the romances of the business world.

Detailed plans are expected soon.

Barmac Signs Up As Powertone Agent

The Barmac Radio Corporation, 199 Church Street, Hartford, Conn., has been appointed exclusive New England representative of the Bruno 1-dial Powertone receiver. Ed. McCaull, president; J. J. Barry, treasurer, and H. McCaull, secretary, made a trip to New York with their lawyer, Louis L. Katz, and signed a contract. Louis Lager, vice-president and general manager of the Bruno Radio Corporation, 223 Fulton Street, New York City, signed for his organization. Each party handed the other a $1 bill to seal the bargain and an order for immediate delivery of 500 sets was made out.

Blueprints Available for Powerola Electric Set

Owing to the wide interest shown by the fan in an electric light socket operated radio set, the Powerola Radio Corporation now issue blueprints and list of parts of the famous Powerola set so that the fans may construct one at home, or sets now in use can be equipped to operate direct from the electric light socket. The Powerola Radio Corporation's office is at 1845 Broadway, New York City.

CORPORATIONS

Cushman & Cushman, radio, N. Y. City, $5,000; R. E. and W. R. Cushman, K. Kirk. (Atty., L. Vander Pyle, 1843 Broadway, N. Y. City.)

City Radio Stores Corp., N. Y. City, $50,000; H. M. Stein, M. Cohen. (Atty., I. Sack, 110 West 40th St., N. Y. City.)

Philadelphia Audio Laboratory, Wilmington, Del., $100,000. (Charles G. Guyer, Wilmington, Del.)

Audiphone Manufacturing Corp., electrical equipment, N. Y. City, $10,000; D. A. and E. A. Reynolds, H. S. Naul. (Attys., Audiphone Co. of America, N. Y. City.)

FULL LIST OF BROADCASTING STATIONS appeared in RADIO WORLD dated Dec. 5. Send 15c., or start subscription with that number. RADIO WORLD, 145 West 45th Street, New York City.

Coolidge a Challenger in Business Talk

PRESIDENT COOLIDGE as he flung his challenge to the radicals in his address in Chicago to the American Farm Bureau. Radio carried his voice to millions. (International).

R. E. THOMPSON DECLARES DIVIDENDS FOR TWO QUARTERS

The R. E. Thompson Manufacturing Company, radio manufacturers, has declared a dividend equal to $2.00 per share for the third quarter ending September 30, 1925, and a dividend equal to $2.00 per share for the fourth quarter ending December 31, 1925, or a total dividend of $4.00 per share, upon its First Preferred Stock, payable January 15, 1926, to stock holders of record as of December 31, 1925.

CAPITAL INCREASES

Burndept Wireless Corp. of America, N. Y. City, 1,500 shares, $10 each, and 3,500 common, no par, to 3,500 shares, $10 each, and 1,500 common, no par.

Continental Radio and Electrical Corp., N. Y. City, $100,000 to $150,000.

Literature Wanted

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

Trade Service Editor,
RADIO WORLD,
145 West 45th St., N. Y. City.

I desire to receive radio literature.

Name .....

City or town .....

State .....

Are you a dealer? .....

If not who is your dealer?

His Name .....

His Address .....

Orrick Electric Co., Huntington, Ark. (Dealer).

Frank W. Berger, 1343 E. Ave., East, Cedar Rapids, Ia.

Tilton & Son, Prairie Depot, O. (Dealer).

E. W. Armstrong, Sharpsville, Pa.

Thomas H. Brogan, Ellis Brothers, 14 Park Place, Auburn, N. Y.

William Dudley, Box 155, Route 1, Herrin, Ill.

J. A. Bellemare, 72-b 3rd St., Shawinigan Falls, Quebec, Canada. (Dealer).

E. J. Taylor, 690-37th St., Des Moines, Ia.

Edward W. Work, 63 Third St., Lowell, Mass.

C. A. Roberts, Box 167, Tupelo, Miss.

Joseph J. Kehrer, 39 West Van Vechten St., Albany, N. Y. (Dealer.)

CIVIL SERVICE

The United States Civil Service Commission announces the following open competitive examination:

Chief of Radio Service

Receipt of applications for chief of radio service will close January 5. The examination is to fill vacancies in the office of the Secretary, Department of Agriculture, Washington, D. C., and vacancies in positions requiring similar qualifications.

The entrance salary for this position is $3,800 a year. After the probational period of six months required by the civil service act and rules, advancement in pay may be made without change in assignment up to $5,000 a year. Promotion to higher grades may be made in accordance with the civil service rules.

The duties are to supervise the distribution by radio of educational information from the U. S. Department of Agriculture. The chief of the radio service will be expected to make and execute comprehensive plans for the educational use of radio by all offices and bureaus of the Department, and to arrange for the preparation of addresses and assist in the adaptation of these to the needs of broadcasting.

Competitors will be rated on their education and experience; and a thesis and published manuscripts or lectures to be submitted with the application.

Full information and application blanks may be obtained from the United States Civil Service Commission, Washington, D. C., or the secretary of the board of U. S. civil service examiners at the post office or custom house in any city.

Business Opportunities Radio and Electrical

Rates: 10c per word; Minimum, $1.00; Cash with order.

$100 WEEKLY UP. We want experienced radio men to operate branch assembly plants. Part or whole time. Barfield Radio Co., 13 Tillary St., Dept. W. R., Brooklyn, N. Y.

PERFECT MUSIC from radio is possible with new loud speaker; utilizes principle of acoustics hitherto neglected; cost of manufacture extremely low; capital required for expansion; will bear thorough investigation. Box 3, RADIO WORLD.

REPUTABLE RADIO ENGINEER, 15 years' experience, wishes to make new connection with part ownership of business and reasonable assurance annual income not less than twenty thousand. Box 4, RADIO WORLD.

LET US BE YOUR FACTORY—Do not use your funds to buy machinery and equip plant; we are thoroughly equipped in machines and have broadest experience in building dies and tools for economical production; will make your parts or build your complete device; make use of our facilities and experience. Interstate Mechanical Laboratories, 521 West 57th. Columbus 5321.

A TABLE FOR CONVERSION OF FREQUENCIES AND METERS appeared in RADIO WORLD dated Nov. 28. Other features in that number are: The Zero Potential Loop, by Frank Freer; the 1-Tube Headset Receiver, by J. E. Anderson, etc. 15c per copy, or start your subscription with that number. RADIO WORLD

Use of Variable Grid Leak Is Recommended by Rider

(*Concluded from page* 11)

circuit each movement of the regenerating unit has an augmented effect. Apparently this is a defect, but such is not the case, because a reduction in the necessity of regenerating minimizes distortion caused by excessive regeneration and there is no loss in volume, because the low-loss secondary permits a greater inductive voltage to be built up in the secondary winding and applied to the grid of the detector tube. In the Diamond of the Air the regeneration control is perfect from 0 to 100 on the control dial. Tests to determine the regenerative amplification showed an increase in output with regeneration to be 49 times that without regeneration, affording a voltage amplification ratio of 7. Again a very satisfactory value of amplification.

25% Above Two TRF Stages

Now we have two radio frequency amplifying circuits, one with an amplifying factor of 6 and the other of 7. If we assume for one moment a non-regenerative detector, it will possess a factor of unity (one) and with the single stage of radio frequency the combination will be 6 and 1. However, by virtue of the 7 for the regenerative detector, this is of greater amplifying power than the stage of radio frequency amplification, and in reality we have the equal of two stages of tuned radio frequency amplification and non-regenerative detector, since the average tuned radio frequency receiver utilizing two stages of tuned radio frequency amplification has non-regenerative rectification. And in the Diamond of the Air the regenerative detector is more than equivalent to an extra stage of tuned radio frequency amplification and non-regenerative detector, in amplifying powers, not in the filtering effect. This must not be overlooked. The regenerative action of the detector, while increasing the degree of selectivity to a small extent, cannot increase that factor to equal the filtering effect of another stage of tuned radio frequency amplification. The increased amplification gained by the high voltage amplification factor of the regenerative detector over the non-regenerative detector and two stages of tuned radio frequency amplification approximated fully 25 to 30%, when measured against several popular 5-tube conventional type tuned radio frequency receivers.

Action of the Bretwood Leak

Another item of interest is the variable grid leak, and it is unfortunate in every respect that radio fans do not realize the importance of variable grid leaks in this day of many and various powered stations. Many discussions have been provoked by the grid leak, and many articles written about it, but very few have made mention of the fact that the value of a fixed leak is governed by other factors than the recommendation of one person. In substance, the value of the leak with a fixed condenser is dependent upon the intensity of the impressed signal, the kind of signal and last but not least the tube used. Now, if these three factors are encountered in every receiver at all times, it is quite apparent that the choice of a value of fixed leak recommended by one person is not always the correct one. The same value of leak will not permit the leakage from the grid of charges of various intensities, nor will it permit the complete discharge of the grid condenser within the required time. Hence the necessity of a variable leak. The advantages of a variable grid leak need not be described to one who has had occasion to use it at some certain time, but the fan who has never used a variable leak should by all means incorporate such a unit in his receiver.

[This is the second of a series of articles by John F. Rider, noted radio engineer, reporting results of tests, made in his laboratory, of the 1926 Model Diamond of the Air. This circuit was described by Herman Bernard in the September 12, 19 and 26 and November 21, 28 and December 5 issues of RADIO WORLD.*]*

A $5 HOME-MADE LOUDSPEAKER, by Herbert E. Hayden, in Feb. 7 issue. Send 15c for copy. RADIO WORLD, 1493 Broadway.

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Mail us copies of any of the following 1925 issues of RADIO WORLD, and we will send you a copy of a current issue for every copy sent us: January 10, March 28, April 4, 11, 18, 25; May 2, 9, 16, 23, 30; June 6, 13, 20; July 4, 11, 18, 25; August 1, 8, 15, 29; September 5.

Dill Wants Royalties on Basis of Charge for Time on Air

WASHINGTON.

A new Copyright Bill, designed to settle the present row between broadcasters and musical interests over royalties, will be introduced in the Senate by Senator C. C. Dill, of Washington, early in the session. Senator Dill has spent a lot of time this summer looking into the question and has made up his mind as to the kind of bill he will introduce.

"My bill," says he, "will extend the present copyright law to take in the broadcasting of musical compositions. The subject is very complicated, and I believe the Senate will want to hear a lot on both sides of the argument before final action is taken.

"In the case of stations which sell time, I think a reasonable royalty should be paid to the holder of the copyright. I do not think that broadcasting stations should be compelled to deal with societies which are supposed to represent the copyright holders, but that they should deal directly with the holder of the copyright.

"I think the royalty paid by a station for broadcasting copyrighted musical compositions should depend to a large extent on the charge made by the station in selling time. When the charge is big, the royalty should be proportionally increased. When the charge is small, the royalty should be smaller.

"I am not sure what we can do about stations that do not sell time. I think in the case of most stations that do not sell time, they derive profit from the station in publicity or good will. This, of course, cannot be reckoned in dollars and cents. It would seem that the royalty paid by these stations should be in proportion to the estimated size of their audiences, although I don't know how we will ever be able to figure that out."

Station in Sydney Target for DX Fans

WASHINGTON.

A new station will soon be on the air in Sydney, Australia, with sufficient power to be picked up by American fans under good weather conditions, according to a report to the Department of Commerce. The new station will be owned and operated by the Sydney Trades Hall.

The station will be licensed for an input power of 1,500 watts, on a wavelength of 280 meters. The maximum power possible for the station is about 4,000 watts.

COMPLETE LIST OF BROADCASTING STATIONS appeared in RADIO WORLD dated Nov. 14. 15c per copy, or start your subscription with that number. RADIO WORLD, 145 W. 45th St., New York City.

The Management of the B-C-L Radio Service Co. wishes to all its patrons and readers of Radio World . . . . . A Merry Christmas and Happy New Year

Make This a Radio Christmas

By Presenting Your Friends With

The Most Practical of Christmas Gifts

A Boxed and Sealed

DIAMOND OF THE AIR KIT $35.00

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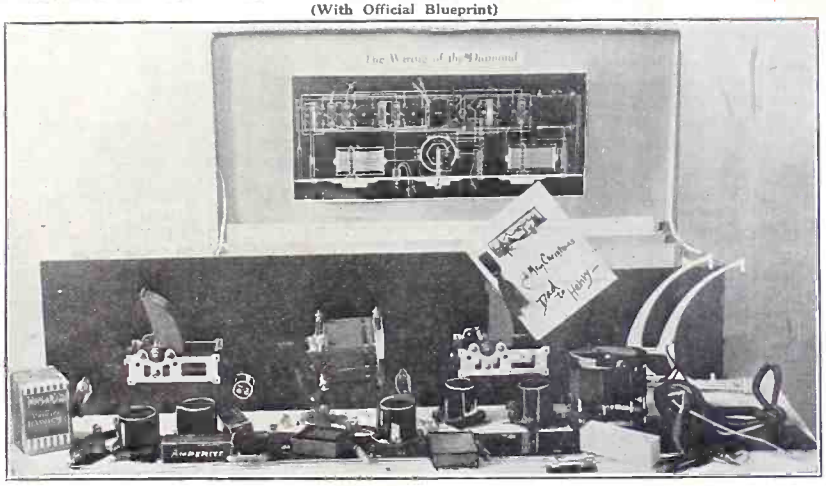

Each kit bears the personal signature of Herman Bernard, the designer of this famous circuit and is your guarantee that all the parts used are matched and will function with precision to obtain the best possible results.

ORDER NOW to AVOID the RUSH and Have Your Set Completed for the CHRISTMAS PROGRAMS

Bruno Engraving will improve the looks of any home-made receiver. Easy to apply, economical, efficient. The finishing touch of any set.

"Bruno 55" matched radio frequency coil for 99 and used in the Diamond of the Air. . $3.00

"Bruno 99" 3-circuit tuner wound on quartzite glass and specified in the Diamond of the Air. $5.50

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Official Blue Prints of 1926 Diamond of the Air 50c each

A Set for Every "Hook-Up"

Easy to apply—Permanent—Neat—Economical

Set No. 1—Complete for detector, tuner and 3 stages of R.F. or A.F. amplification. 40 words and signs.	35c
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Set No. 3—Complete for detector and tuner. 10 words and signs.	15c
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At your Dealers or sent Postpaid on receipt of stamps

Each package complete with special cement and directions

BRUNO BRACKETS

Give your Set that professional appearance

Simplifies wiring and construction of any set. Price per pair $1.00

Write for FREE Catalogue.

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Radio Legislation Introduced; Remedial Enactments Expected

By Thomas Stevenson

WASHINGTON.

Enactment of radio legislation during the present session of Congress will not be accomplished without considerable debate. There is little doubt, however, that legislation of some form, extending the power of the Secretary of Commerce in regulating radio, will be adopted. Whether it will be the kind of legislation desired by Secretary Hoover and the radio industry is another matter.

The chief sponsor of radio legislation in Congress is Representative Wallace White, Jr., of Maine. For three years he has been trying to get through a radio law to supersede the 1912 Act. Each time his efforts have met defeat.

In the Senate C. C. Dill of Washington is an active champion of radio legislation. Mr. Dill is one of the few Senators who have displayed interest in and sympathy for the new art.

Both Senator Dill and Representative White conferred with Acting Secretary Stephen Davis before Congress convened on Dec. 7. They talked over with Judge Davis the recommendations of the conference and announced their intention to introduce bills incorporating most of the conference suggestions.

These bills were introduced in the Senate and House during the early days of the session. Similar in character, these bills include the following important features:

The Secretary of Commerce would have the power to license and classify stations, fix their wavelengths, determine their power, character of emissions, assign call letters and specify hours of operation.

Permits would be necessary for the construction of a station.

The Secretary would have the authority to refuse a construction permit or license to any stations that would not be in the public interest, either through class of service or because they would tend to create interference. This, in effect, would allow the Secretary of Commerce to limit stations.

Stations construction and in operation prior to the passage of the bill would be granted licenses.

The Secretary would have the authority to revoke the license of any station that failed to comply with regulations. Such cancellation of licenses would be subject to review in the Court of Appeals.

Impromptu Explanations Often Are Radio Jokes

Many persons in attempting to make comparisons between receivers, or between the performance of a set with and without some special adjunct, stray far from scientific comparison. For instance, one fan the other day said that he tried to get distance on his set, but could not until he put a by-pass condenser in a certain place. The moment he removed this condenser the DX station was gone and simply would not come in, he reported. A friend visited him the next night, when that by-pass condenser was out, and removed another one that was in the set. Then the friend tuned in stations hundreds of miles farther away than the set owner ever had been able to get.

"You see," said the host, "by-pass condensers are very important."

"Sometimes," remarked the visitor, "but I can assure you that, so far as the receiving range is concerned, neither of these two by-passers probably has anything to do with it. The change in atmospheric conditions from one moment to another may be the secret. Any one of a hundred reasons might be the right one. Don't jump at conclusions. Try a thing a year, in radio, before you attempt to say that it's so."

ROXY HEARD WEDNESDAYS

"Roxy and His Gang" will broadcast a regular program from the studio of WEAF, New York, every Wednesday evening, beginning at 10 p. m. In addition to WEAF the programs will be radiated by WTAG, WJAR, WEEI, WCAP and WWJ.

Get a NAMEPLATE *Free!*

Your 1926 Diamond of the Air will not be complete without the nameplate, which will be furnished free to all who ask. This nameplate is of the transfer type. Immerse it in a tumbler of water for a minute, then place it on the panel, with the nameplate facing you. The paper may be easily pulled away and only the nameplate remain. When the nameplate dries it will be found securedly pasted to the panel.

Send in your request to Diamond Editor, RADIO WORLD, 145 West 45th Street, New York City, or come in and get one at the office, which is just a few steps east of Broadway.

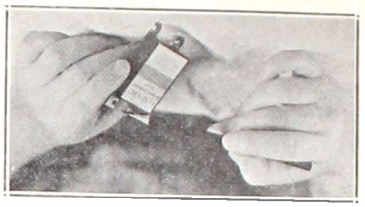
Huber Named Director Of WBAL, Baltimore

The important part played by musical and theatrical managers in the rapidly growing art of radio broadcasting was emphasized in an announcement from station WBAL at Baltimore, Md., telling of the appointment of Frederick R. Huber as director of broadcasting.

Mr. Huber formerly managed the Lyric, one of Baltimore's largest music halls, and was prominent in musical circles as the municipal director of music. It was said by some that this is another confirmation of the increasing trend in selecting the directors and staffs of modern radio stations from the ranks of the theatrical and musical professions.

WBAL broadcasts on a wavelength of 375 meters.

Condenser Terminals



Some fans are confused by the possibilities that by-pass condensers have four terminals but gratified to learn that in fact there are only two. As one pair of terminals may look much like the other pair that serve a different purpose, the point of distinction should be kept in mind. The pencil in the photograph points to a condenser terminal, and it is nearly always true that the other terminal is right beside its companion in service. But the two other hook-like objects are mounting brackets exclusively. The condenser terminals have at least one side not insulated, so that wired connection may be made thereto, but the mounting brackets may be found completely covered with paint. If confusion still persists, due to similarity of appearance, of course a pair of phones and a small dry cell will tell you the answer in a minute. The pair of brackets will disclose their identity by a severe click when one phone tip and one battery terminal are connected to the respective brackets.

Fessenden Seeks $60,000,000 Charges Plot to Ruin Inventions

BOSTON.

Prof. Reginald A. Fessenden has started suit for $60,000,000 against eight manufacturing corporations, charging conspiracy to destroy the value of his radio inventions. The defendants are the Radio Corporation of America, the General Electric Company, Westinghouse Electric and Manufacturing Company, American Telephone and Telegraph Company, the Wireless Specialty Apparatus Company and International Radio Telegraph Company, the Western Electric Company and the United Fruit Company. He charges they are violating the Sherman and Clayton Anti-trust laws, too, by being monopolies in restraint of trade.

How He Figures $60,000,000

Prof. Fessenden computes the $60,000,000 total thus: Actual damage, $30,000,000; treble damages justified under the legal provision for punitive relief in case of wilful injury.

He lists in his bill of particulars scores of inventions patented in his name, covering the entire range of the science of wire and wireless apparatus. He asserts they have restrained and monopolized trade and commerce in the United States in the purchase and sale of inventions, discoveries, processes, apparatus and methods for wire and wireless communication in the acquisition, purchase and sale of United States and foreign letters patent and applications for patents for such inventions.

He declares the defendants have at times refused to negotiate for the purchase of patents and devices and at other times have offered and are now offering for them much less than their fair value.

Professor Fessenden sets forth also that the eight concerns named require their employes to assign to them wire and wireless inventions and also the patents covering the same."

Charges Unlawful Combination

The declaration states that "they have not only refrained from competition in purchasing or otherwise acquiring from other patents and applications for patents covering wire and wireless discoveries, inventions, devices and apparatus and rights under such patents and applications, but also, by mutual agreement, in combination and for the purpose of obtaining the same at much less than their fair values, at times have refused and now refuse to negotiate for the purchase of such patents, applications and patent rights, and at other times have offered, and now offer, therefor much less than their fair value.

Gigli Capitulates to Radio; Will Sing on December 27

Beniamino Gigli, considered by many the greatest tenor, will sing at WEAF on December 27 (Sunday) during the Atwater Kent hour. The voice of the Metropolitan Opera Company's brilliant tenor will be carried also to the chain of interconnected stations.

The tenor came into great prominence in America on the death of Caruso.

Until the other day he refused all offers to broadcast. Recently he was reported to have consented to broadcast a single concert for $50,000. Negotiations were taken up with him a few weeks ago by A. Atwater Kent, Philadelphia, and Signor Gigli signed a contract to give the Christmas week concert of the Atwater Kent series. Mr. Kent said:

"The conversion of Gigli to broadcasting is another indication that the greatest artists of the world who are in America realize the great opportunity to be heard by millions of people instead of by thousands."

RADIO GIFTS NUMBER OF RADIO WORLD dated Dec. 12. 15c per copy, or start subscription with that number. RADIO WORLD, 145 W. 45th St., N.Y.

QUICK ACTION CLASSIFIED ADS

10 CENTS A WORD. 10 WORDS MINIMUM. CASH WITH ORDER

ATWATER KENT 5-TUBE (new). Bargain. Write Simmis, Lake, New York.

GREBE SYNCROPHASE $60. Five tube set $20. Magnavox single control five tube set $50. Magnavox R3 Speaker, $15. Raymond Schlegel, 1118 N. Negley Avenue, Pittsburgh, Pa.

ALL ABOUT APARTMENT HOUSE AERIALS in Aug. 22 issue. 15c per copy. RADIO WORLD, 145 W. 45th St., N. Y. C.

BLUE PRINT FOR 1926 DIAMOND OF THE AIR, sent on receipt of 50c. Radio Division, The Columbia Print, 145 W. 45th Street, N. Y. C.

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BEAUTIFUL REGISTERED BULL PUPS, $15. Bulldogs. 501 Rockwood, Dallas, Texas.

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26 Stations Deleted

WASHINGTON.

Twenty-six class A broadcasting stations were discontinued. At first glance, it would seem that the deletions would create twenty-six vacancies for new stations. This is not the case, however. Most of the stations discontinued were not of sufficient power to make much difference whether they were on the air or not. Here are the stations discontinued, arranged according to power.

500 watts—KOP, Detroit; KFGX, Orange, Texas.

100 watts—WQAC, Amarillo, Texas; KFFV, Lamoni, Iowa; KFQC, Taft, Calif.; KFIO, Spokane, Wash.; WBBG, Mattapoisett, Mass.; KFKQ, Conway, Ark.

50 watts—WCAZ, Carthage, Ill.; KFNV, Santa Rosa, Calif.; WKAP, Cranston, R. I.; KFDH, Tucson, Ariz.; WRHF, Washington, D. C.

20 watts—WNAR, Butler, Mo.; WBBA, Newark, Ohio; WAAC, New Orleans, La.

15 watts—KFRZ, Hartington, Neb.; WEBA, Highland Park, N. J.

10 watts—WBBU, Monmouth, Ill.; KFRX, Pullman, Wash.; WDBQ, Salem, N. J.; KFAW, Santa Ana, Calif.; KFVX, Bentonville, Ark.; KFQT, Denison, Tex.; WGBW, Spring Valley, Ill.

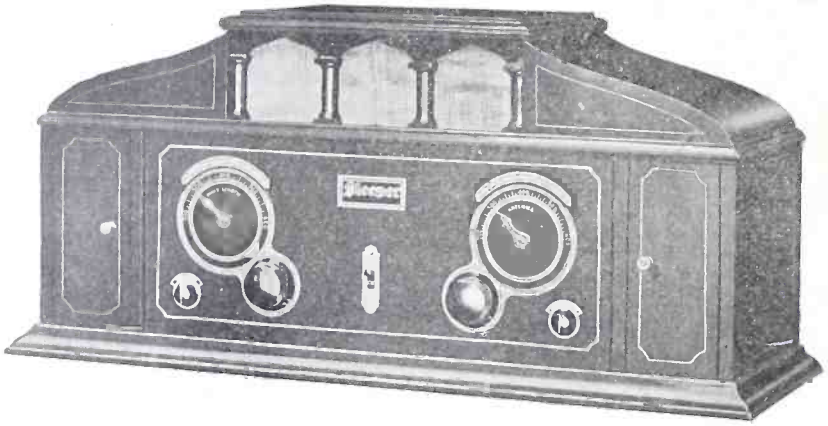
5 watts—WIBQ, Farina, Ill.

TWO JOIN WEAF CHAIN

Two stations, WGN, Chicago, and WLIB, Elgin, Ill., have joined WEAF's network. This makes the total chain of sixteen stations connected to the New York station's microphone by land wires. WLIB and WGN will work alternately in taking the programs from WEAF.

Here is the New SLEEPER SERENADER

$115.00 with built-in loud speaker



Five Tubes, Tuned Radio Frequency

RELY UPON EXPERIENCE TO PRODUCE QUALITY AT LOW COST

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RADIO RECEIVING SETS

—are better built of better materials to the most exacting specifications by an organization that has engaged exclusively in the manufacture of fine radio equipment since 1919.

The New Sleeper Troubadour $65

Five Tube Tuned Radio Frequency

A notable example of the inherent value that characterizes all Sleeper Radio apparatus. In all the new Sleeper models provision has been made for Ux 112 power tube operation.

ONLY experience and "pride of product" could have built such a set as the Serenader at so low a cost. For this is a new kind of radio set. Net until now has a receiver combined such tonal quality with such volume, selectivity and sensitivity. Your first twenty minutes with the Serenader will give you a wholly new conception of radio reception.

TURN the switch and the softened glow of the concealed visored lights illuminate the tuning controls. Move the silver pointers to the designated wave length of your favorite station and you will hear it loud and clear, as distinctly and as naturally as though the artist were at your side—then, and only then, you will realize what Super Radio Reception means.

The New Sleeper Scout $90

Five Tube Tuned Radio Frequency

Deservedly the fastest selling set of the season. By every standard of comparison there are no better radio sets.

If the Authorized Sleeper Dealer in your community has not yet received his quota, write us for descriptive literature and catalog "W"

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