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1924

**GREAT DX ON SPEAKER WITH
3-TUBE REFLEX** By ABNER J. GELULA

RADIO WORLD

Title Reg. U. S. Pat. Off.

155-144

VOL. 6. NO. 14.

ILLUSTRATED

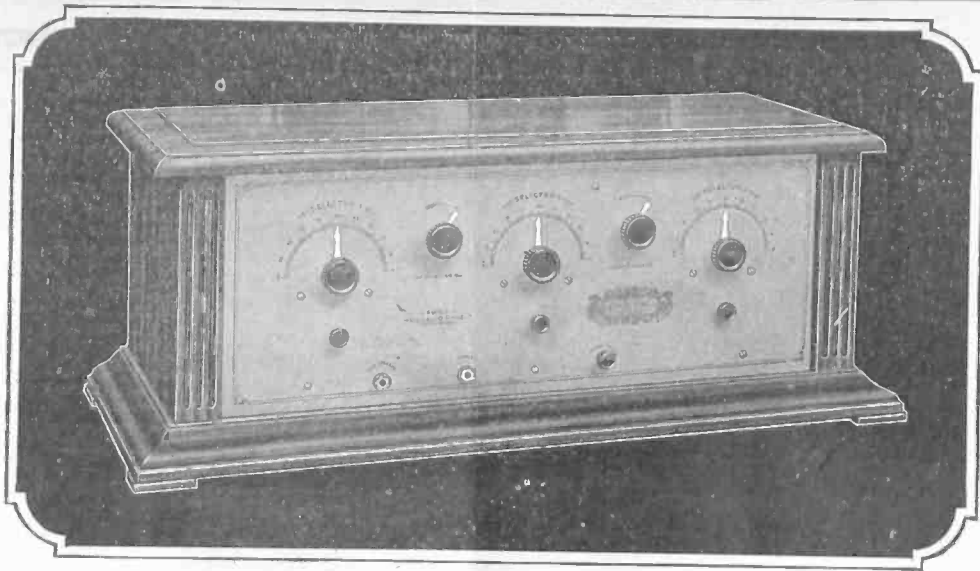
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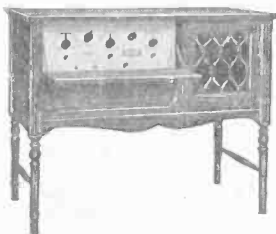
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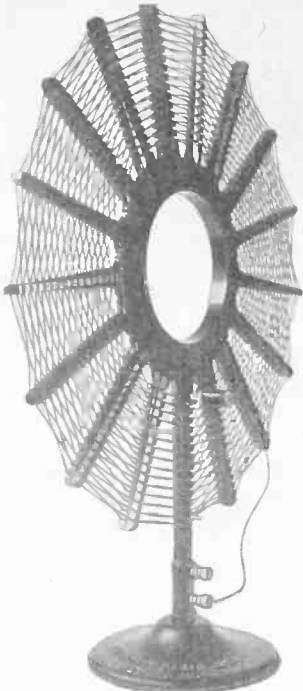
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IN the list of parts for building the 3-Tube Reflex set in this issue of Radio World, note that the panel recommended is the Radion 7x21.

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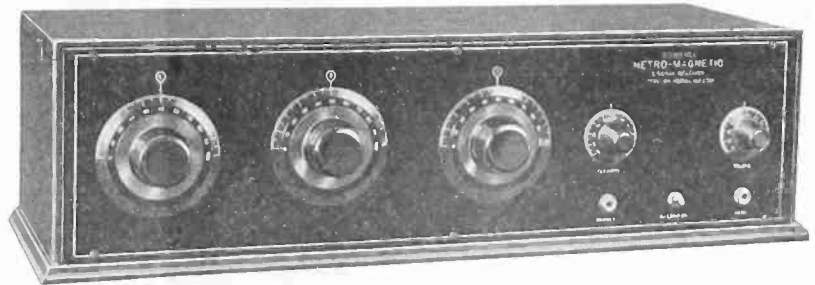
Here you have the most modern 5 tube HETRO MAGNETIC RECEIVER. The most sensitive, most powerful and greatest distance getter of all, employing the standard 3 dial tuning system, enabling one to get the same station at all times on the original dial setting, using three stages of Hetro Magnetic frequency, detector-used twice, and two audio, makes it possible for you to get the most distant station on the loud speaker exceptionally loud and clear.

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Tube arrangements: Magnetic coil, equalizer, amplifier, detector, two stages audio.

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PANEL: Beautifully engraved Rubberite or Bakelite, highly polished.

DIALS: 3 4-in.

RHEOSTATS: Standard Sidbenel.

CONDENSERS: Low loss.

SOCKETS: Bakelite.

CABINET: Beautiful finished solid mahogany.

GUARANTEE—One year against defective workmanship, providing none of the factory seals have been broken and set has been purchased from an authorized dealer.

Set comes with tuning chart and complete simplified directions for installing and operating. Once installed the instrument will give good service for practically a life time.

Demand a demonstration from your dealers before paying twice as much for an ordinary Receiver.

PRICE, for immediate delivery, \$75.00.

Price, complete, in Christmas package, including all batteries, antenna, tubes, etc., \$135.00. Immediate delivery.

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Manufactured under license granted August, 1924

RADIO WORLD

[Entered as second-class matter, March 20, 1922, at the Post Office at New York, N. Y., under the Act of March 3, 1879]

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

Vol. VI. No. 14. Whole No. 144.

December 27, 1924

15c. per copy, \$6.00 a year

Gelula's

3-Tube Superflex

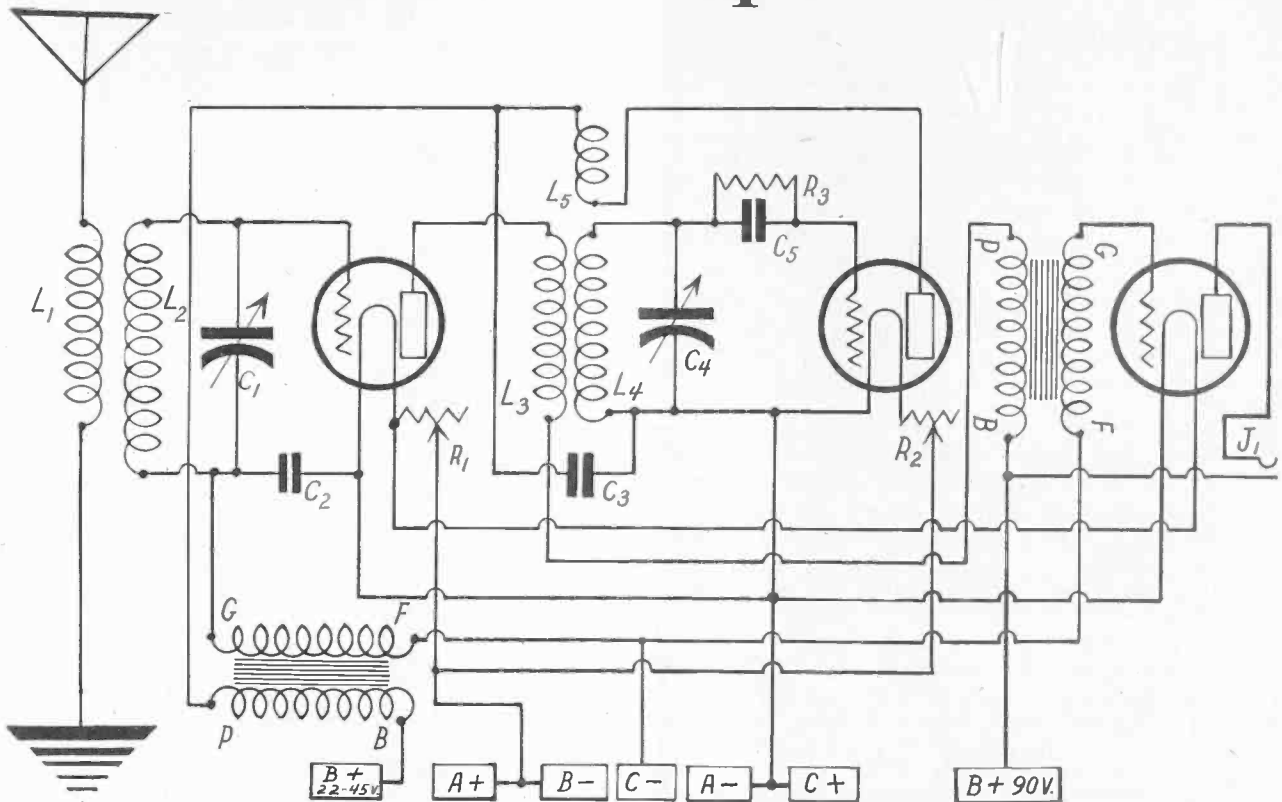


FIG. 1, the circuit network of Gelula's Superflex, which piled up an amazing record of DX reception in a ten-day test, using an outdoor aerial. The circuit will bring in locals on a loudspeaker with a loop. The advantages of a 5-tube set are obtained from the Superflex, because the first audio stage is reflexed in the radio-frequency tube, and regeneration, equivalent to at least an extra stage of RF, is used in the detector tube. L1L2 are two separate coils, but inductively related. L3L4L5 constitute a 3-circuit tuning coil. The two variable condensers, (one C1, the other regarded as C4) are .0005 mfd. low-loss, normally 23 plates. Both must have vernier. A C battery is included to cut the B battery drain and eliminate any distortion. For extreme DX the earphones should be used, otherwise plug in the speaker. The set brought in Chicago, 700 miles away, on the speaker time and time again with considerable volume. Only one jack is provided because the set is designed for loudspeaker use whenever that is obtainable, earphones being used only as an alternate compelled by conditions. Many will find it possible to bring in 1,000 to 1,500 miles on the speaker, as the tests made were from a New York City apartment house. The three tubes used were the 201A type.

By Abner J. Gelula

THE public appetite for receiving distant stations is growing all the time, hence it was decided to design a receiver that would be a "bearcat" for DX and still would cover the prospective new wave-band, 200 to 545 meters, without tapswitches. For satisfying the demand for DX performance the receiver was so designed as to be super-selective and extremely

sensitive. The wide wave band was covered by employing compensated tuning. In this way the inductances and capacities of coils and variable condensers may be combined to reach the highest wavelength station.

The circuit (Fig. 1) embodies a stage of radio-frequency amplification regenerative detector and two stages of audio, the first audio stage reflexed in the RF tube. As regeneration supplies radio-frequency amplification equal to at least one stage, this circuit has

RADIO WORLD STARTS 1925 WITH OVER 100,000 CIRCULATION

The Coils for Gelula's Set

DX Tests Successful

Without doubt selectivity is one of the greatest advantages any radio set can possess, with sensitivity a close second. Of course volume is an asset, but since stages of audio frequency amplification can be added comparatively easily, the two other assets take precedence. The set developed by Abner J. Gelula was designed to meet these requirements in the order of their importance.

Donald H. J. McArthur, Chief Engineer of RADIO WORLD's laboratories, thoroughly tested the circuit under unfavorable conditions and proclaimed it "one of the finest."

Under actual test, the stations that this comparatively simple little set brought in astounded the entire laboratory staff. To make the test still more severe, the set was taken to a shielded apartment house in New York City, a ten-foot aerial strung across the room, a wire wound around the radiator pipe carelessly and direct current from the house lighting system applied to the filaments without any further straightening out of the current. The first station to come in was WEAO, State College, Columbus, O., on the loud speaker. Switching that station off one dial one degree, WHN, a local, came roaring in. Realize that both stations are on 360 meters. Then turning the dials at random, CNRM, Ottawa, Canada, came in beautifully on the loud speaker.

However, the small congregation soon tired of these chicken-feed distances of 500 and 600 miles and decided to try for some DX. After some careful tuning, KFAF, Denver, Col., came in with comfortable volume on the phones.—EDITOR.

A circuit that brings in extremely distant stations on outdoor aerial and works locals on a loudspeaker with a loop. WEAO, 500 miles away, separated from WHN, local, by turning dial one degree, though both have an assigned wavelength of 360 meters.

(Continued from preceding page)

a 5-tube value. Many a Neutrodyne will not bring in as much DX as this 3-tube set. Although this is a reflex it is not difficult to construct or operate.

The Coils Used

The primary and secondary coils are fixed. All coils are of the spiderweb type. The primary is 15 turns wound on a spiderweb form having a core of 1" in diameter; the secondary, 35 turns, on a spiderweb form having a core diameter of 1½". No. 22 double silk covered wire is used.

When the coils are to be mounted, it would be well to experiment in adjusting the distance between these two coils. Laboratory tests indicated that from ¼ to ⅜" is about right.

If the DX that is possible with this set is to be

obtained, it is imperative that the utmost care be given to winding these coils. It may take several hours to make the complete set of coils, but the results will be well worth the time and energy spent.

Fig. 5 shows in detail how to build the 3-circuit tuning unit. Follow the directions given in the illustration implicitly. The results are largely dependent upon the proper construction of this instrument. The variable tickler coil is fairly critical, and every fraction of an inch that this coil is turned counts tremendously in the correct tuning in of the station. A distant station is tuned in and out within one degree. Therefore, unless this unit is built according to specifications, tuning will be so critical as to become actually annoying.

All three coils are spiderweb wound. Wind L3, consisting of 8 turns of No. 22 DSC, on a form having a core diameter of 1½". On this same form, and over L3, wind L4, 50 turns.

L5 is the variable tickler coil. Wind 35 turns on a form with a core diameter of 1". These coils are known commercially as Phanstiehl.

Fig. 3 is the assembly plan. Keep L1L2 at as great a distance from L3L4 and L5 as possible. If L1L2 is anywhere in the inductive field of the other coils results will be greatly impaired. Note that coupler L3L4L5 is mounted at right angles to the tuning unit.

As to the condensers, C1 and C4 are low-loss .0005 mfd. variable condensers (normally 23 plates) with vernier attachments, C2 is .00025 mfd. and C3 .001 mfd.

Binding posts are at the rear of the set for the sake of neatness in wiring. They may be mounted on the panel front if so desired.

Fig. 2 shows the panel layout. At the left is the RF tuning condenser. The center dial controls regeneration. At right is the detector tuning control.

Two rheostats control the filament heating of the three tubes. One rheostat controls both the reflex and the last audio stage, the other the detector tube. Only one jack is used. If the signal is not loud enough on the second stage on the loudspeaker, when extreme DX is heard, use the phones.

Will Work on a Loop

A loop gives very good local loudspeaker reception on this set and is very directional. A plug and jack system enables the operator to plug in the loop if he desires directional reception, or for portable use. Leave the aerial and ground attached to the binding posts always, unless, of course, the set is on a moving object. The plugging in of the loop automatically disconnects the aerial and ground, as well as the primary and secondary coils. Tune the set the same with the loop as with the aerial, with the exception that the loop must point in the direction of the transmission.

Tuning this set is slightly difficult until the operator becomes used to tuning in a station by the elimination of the carrier wave. This set cannot be logged exactly, i. e., should you find that a certain station is heard at

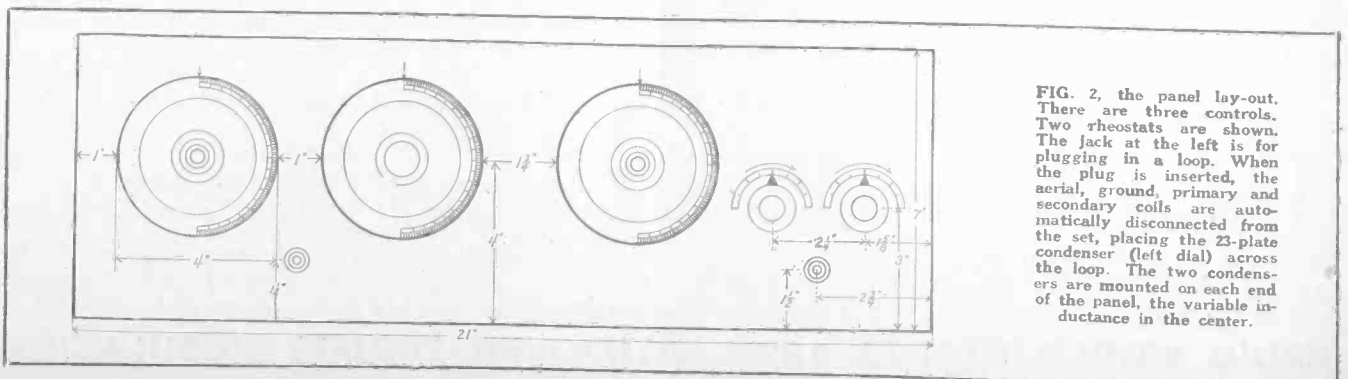


FIG. 2, the panel lay-out. There are three controls. Two rheostats are shown. The Jack at the left is for plugging in a loop. When the plug is inserted, the aerial, ground, primary and secondary coils are automatically disconnected from the set, placing the 23-plate condenser (left dial) across the loop. The two condensers are mounted on each end of the panel, the variable inductance in the center.

Assembly Plan for Reflex

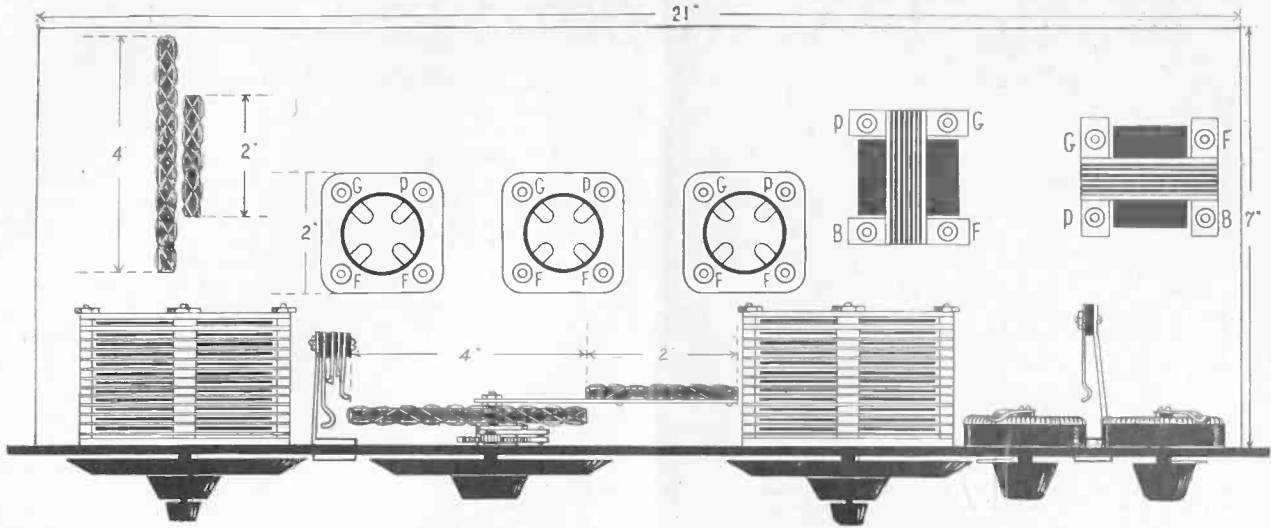


FIG. 3, the assembly plan for the Gelula 3-tube Superflex. The two spider-web coils, representing primary and secondary, are shown at the left, directly behind the condenser. The smaller coil is the primary. The variable inductance is mounted between the two transformers. The loop jack is placed between the coil and the variable condenser. The layout provides shortest leads between instruments.

40-50-30, reading the dials from left to right, one evening, the same station may come in next evening at 42-48-28. However, the reading, while only approximate, enables the most inexperienced person to get the station after getting the settings from the log-book.

I can personally assure the prospective builder of the Superflex, that, if he takes time and care in the construction of the outfit and follows instruction implicitly, the results will far exceed the fondest hopes.

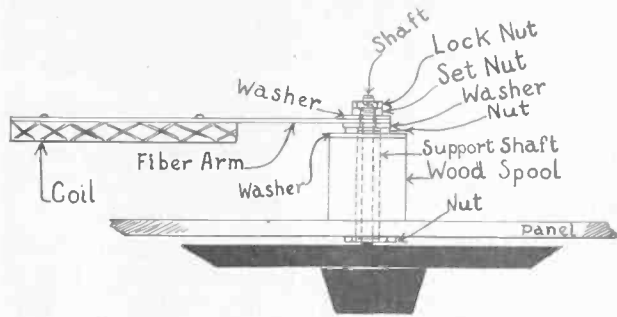


FIG. 5, how to make the variable tuning inductance. The shaft may be a standard 3/4" bolt, the head sawed off. The stabilizing shaft is a cotton spool with one flange removed. The remaining flange is placed against the panel. This instrument is made of parts readily obtainable, although the commercial model is mechanically different.

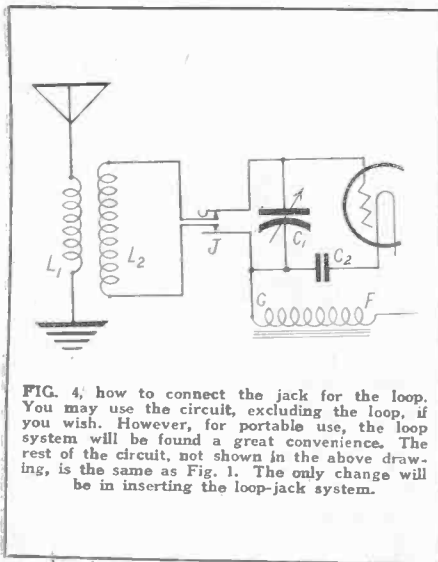


FIG. 4, how to connect the jack for the loop. You may use the circuit, excluding the loop, if you wish. However, for portable use, the loop system will be found a great convenience. The rest of the circuit, not shown in the above drawing, is the same as Fig. 1. The only change will be in inserting the loop-jack system.

The Wiring

In wiring the set connect the beginning of L1 to the aerial, the ground to the end. The beginning of L2 goes to the stator plates of C1 and to the grid of the first tube, the end of L2 to the G side of the first AFT, the rotor plates of C1 and one side of C2. The other side of C2 connects to the negative A battery.

Connect the negative side of all the filaments together. A lead is then taken connecting these negative filaments to the negative A battery. The other side of the filament of the first and last tubes go to one side of the rheostat, the other side of the rheostat to the positive A battery. The other side of the filament of the second tube goes to one side the rheostat, R2, the other side of that rheostat to the positive A battery. The plate of the first tube goes to one side of the aperiodic L3, the other side to the P terminal on the last AF transformer. The beginning of L4 goes to the stator plates of C4, to one side of the grid-leak and to one side of C5. The other side of C5 goes to the other end of R3, thence to the

grid of the second tube. The end of L4 goes to one side of C3, to the rotor plates of C4 and to the negative filament terminal of the tube. The beginning of L5 goes to the other side of C3 and to the P terminal on the first AFT. The end of L5 connects to the plate of the second tube. F on the first AFT goes to the F on the second AFT, thence to the negative C battery. Positive C battery joins to negative A battery. B on the first AFT goes to plus 22½-to-45 volt B battery. Negative B goes to positive A battery. B on the second AFT connects to plus 90-volt B battery, G of this AFT to the grid of the third tube. The plate of the third tube goes to one leaf of the jack, the other leaf to the plus 90-volt B battery.

LIST OF PARTS

- One 3-circuit tuner, as described, or Pfanstiehl 3-circuit coupler.
- One 50-turn coil; one, 10-turn coil.
- Two Erla AF transformers, 6-to-1 and 3½-to-1 ratios.
- Two General Radio .0005 mfd. vernier condensers.
- Three Cardwell sockets.
- Two Carter rheostats, 6 ohms each.
- One 7x21" American Hard Rubber panel (Radion).
- One cabinet and one base-board (7x20") to match.
- One Bradleyleak.
- One Bradley filament switch, push-pull.
- One Pair Towers phones.
- Two 45-volt Bright Star B batteries.
- One World 6-volt storage battery.
- One roll talking tape.
- One Federal single-circuit jack.
- One Federal plug.
- One Tungar 5-ampere charger.
- Twenty-five solderless lugs.
- One Eby terminal block.
- One Western Electric loud speaker.
- Three 201A tubes.
- Lead-in wire, connecting wire, screws, insulators, aerial masts.

Radio World's 3-Tube DX Superdyne

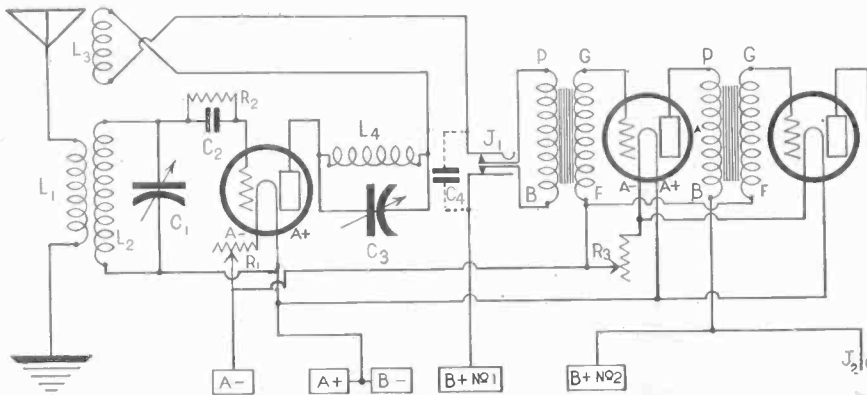


FIG. 1, the circuit network of RADIO WORLD'S 3-Tube Superdyne, consisting of a detector tube and two stages of transformer-coupled audio-frequency amplification. This circuit is a phenomenal DX-getter and produces tone of entrancing quality. The radiation is stifled by using the reverse feedback method, whereby a counter-electromotive force is set up, the return current from plate to grid opposing that flowing in the grid circuit of the detector. L1L2L3 constitute a Superdyne coupler, of which any one of the popular makes may be used. L4 is the plate coil, consisting of a single winding, or impedance, tuned by a variable condenser. Both of the variable tuning condensers, C1 and C3, are .0005 mfd., normally 23 plates. The rotor or movable plates are designated by a curved line. C2 is a .00025 mfd. grid condenser, R2 being a grid leak, preferably variable. C4 is an optional by-pass condenser of .001 mfd. A rheostat, R1, controls the detector tube filament heating, while the other rheostat, R3, governs both audio stages. This is one of the best 3-tube sets it is possible to construct, says Herman Bernard, the author of the accompanying article. He gives painstaking instructions on just how to build this efficient outfit.

By Herman Bernard

FOR loudspeaker operation on three tubes it is hard to beat the Superdyne that employs that principle in the detector stage. Indeed, it is merely impossible to make a better regenerative set at home. The oscillation of the detection tube is kept under excellent control and a strong radio-frequency amplification (due to stabilized regeneration) thus obtained. This makes itself felt when one is desirous of reaching out for DX. Besides, the quality of the received signal is one that satisfies beyond measure. This Superdyne was tested in RADIO WORLD's laboratories and found to be a receiver par excellence.

Selectivity of the Set

As for selectivity, it is sufficient to separate stations fifteen meters apart when both are three miles or less from the reception point. Distant stations closer together as to wavelength are separable. This is all the selectivity that any one should reasonably ask, because if greater selectivity is used there will be a sharp decline in the tonal quality, due to the choking off of side bands that carry the harmonics of voice and music.

It is in these harmonics that the richness of tone lies and to stifle them or cut them off altogether is to bring about distortion. This is often wrongly blamed on the audio-frequency transformers, although they naturally contribute their little share to this choking off process. Usually it is necessary to pass, besides the carrier wave, a 4,000-cycle band. These are audible frequencies, although choked off when they ride the air as the radio-frequency envelope in which the carrier wave is wrapped.

Extent of Logging

The set may be so constructed that you can virtually log it. The tickler dial setting will not be constant, but this will not prove a stumbling block, because it often happens that the tickler variation will be only a few degrees for the entire waveband, and for a great part of that range perhaps the tickler position may remain unchanged. But the tickler is not inherently a tuning control, rather a volume

control, hence the real tuning end of the circuit, the two variable condensers, may be dialled in step. This simplifies the tuning considerably for the folks at home when the radio expert of the family is not around and they want to do a little autonomous dial twisting.

For DX work, however, experience at tuning a Superdyne is necessary. This was discussed in an article published in RADIO WORLD last week, issue of December 20, when the construction of the present circuit, but without the two audio-frequency stages, was explained.

The Coil for the Set

The Superdyne coil used in the present circuit, as well as in its companion of last week, may be any good one, several of which are widely advertised. Some are wound on bakelite tubing, some are "wound on air" and are of the basket-weave type, while others have a bakelite shell cut down to an almost irreducible minimum. The constructor may make his own choice, but should be sure, merely from the viewpoint of economy, of getting a coil that is mechanically strong.

The Condensers

The variable condensers should be of the low-loss type, or, if those with bakelite or other insulation end-plates are to be used, only those of excellent manufacture should be employed. That does not mean that all so-called low-loss condensers are better than any insulated end-plate condenser, but that some unquestionably high-loss variables are knocking about at low prices because the manufacturer has since changed over to the low-loss kind as a sort of admission. A good, strong variable even with insulated end plates, that has a firm contact, preferably to phosphor-bronze, will do very nicely, as tests showed. Therefore the latitude in choice of both coils and condensers is wide, so long as good products are used, and the results will not materially differ.

Some manufactured coils are made evidently with the intention that a given hookup be used, the coupler being to the right of the condenser tuning it, instead of to the left, as used in the present circuit. To gain the advantage of short leads all that is necessary to make such a coupler

conform to the needs of this circuit is to mount it on the panel upside down, so to speak, whereby the beginning of the windings will be on bottom.

It is sometimes difficult for the novice to distinguish the beginning of the tickler. Often this lead has some identifying mark, like a rubber collar. If in doubt, connect in either fashion, then reverse connections to the tickler later for best results.

Covering the Entire Band

The coupler windings depend somewhat on the properties of the .0005 variable condenser used, capacities built up by the circuit wiring itself and resistance in the connecting leads. The minimum and maximum capacities of the condenser affect the range of wavelengths, too. The result is that with one kind of condenser you get dial readings slightly lower than with the other, but there is never anything annoying about these difficulties. They simply concern the highest and lowest waves you will reach. If 526 meters, for instance, comes in at 95, you need a little more inductance on the secondary of the coupler. Usually all that is necessary is to include the excess wire of the secondary as part of the inductance. Instead of using that as connecting wire, remove one wire terminal from the anchorage (usually two parallel holes) and wind it as part of the coupler secondary. If still more inductance is needed, then do the same also with other terminal of the secondary, and you will have added a turn or a turn and a quarter or a little more, thus giving you about all the inductance you need to tune from a little above 200 meters to 546 meters, which covers the entire broadcast waveband, present and contemplated, since Secretary Hoover has decided not to attempt to put into effect the 200-to-545 meter band recommended by the Third National Radio Conference.

The best way to try out the coupler is to hook it up to the variable condenser as shown in Fig. 1, and put one of the phone tips at the beginning of L3 and the other phone tip at B+ 22½ volts. You now have an ordinary regenerative set. See where your stations come in. You should get 546 meters at around 95, 526 at around 85 and 492 at around 76. In nine times out of ten you will come close enough to these to be serviceably right and will not have to trouble yourself with adjusting the coil.

Making Two Condensers "Keep Time"

Now to make the plate coil tune in step with the other. This also will be the case in many instances, requiring no inductance adjustment. However, re-establish the set as shown in the circuit (by removing the phone tips and connecting leads as in Fig. 1) and now tune in a station at the detector jack, noting what the dial readings are. If they are higher than those on the secondary of the coupler, winding should be increased on the plate coil, because the greater inductance, the less capacity for a given wavelength equation. If the readings are lower than those on the other condenser, some more winding is needed on the plate coil. Here, too, the difference is bound to be small. Indeed, it may be necessary to add only a fraction of a turn, which may be done by utilizing the excess as described before. If any wire is to be removed, that is still simpler.

In adding to or detracting from the inductance, be sure to hold the winding secure, so that it will not spring off when the terminal is freed from the anchorage. To re-establish an anchorage, especially if

Tuning Two Dials in Step

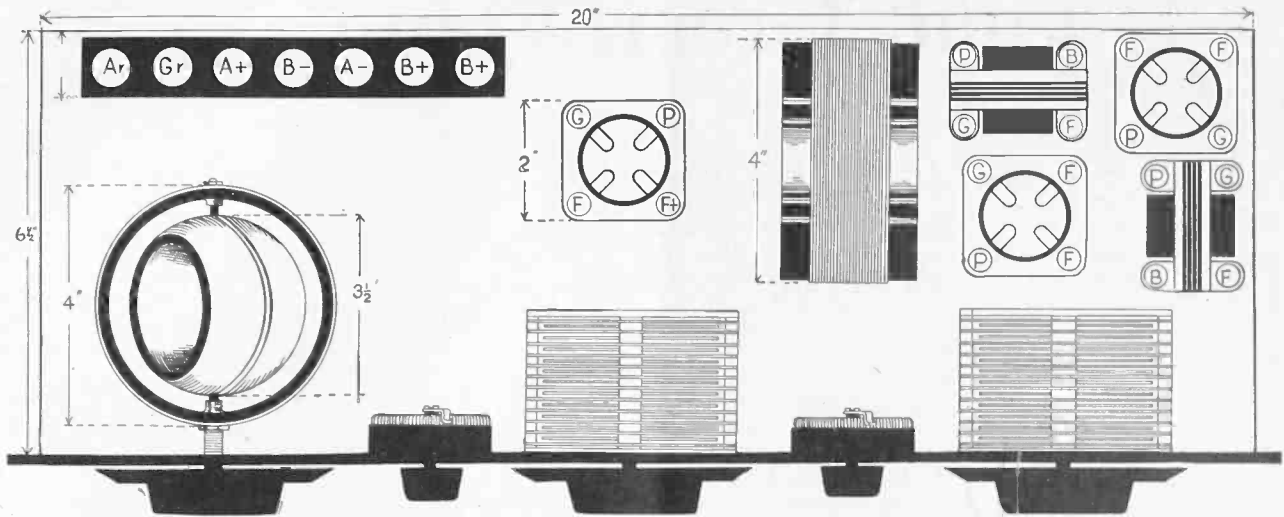


FIG. 3, the assembly plan for RADIO WORLD'S 3-tube Superdyne. The baseboard is 6½x20", as the panel is 21" long and the cabinet will be about 7" deep, or a little more. The Superdyne coupler is at left, with its dial shown. This dial controls regeneration by rotating the tickler or movable form within the coupler. Behind the coupler is the terminal block. On this block the A+ and B- may be joined underneath, by soldering a strip of bare wire. The variable condenser that tunes the secondary is shown in center, and behind it the detector tube socket. The plate coil is to the right of the detector socket and is mounted at right angles to the coupler stator, as shown. Unless this is done a most harmful interplay of currents induced between the coupler and the plate coil may result. The condenser that tunes the plate coil is at extreme right. The audio-frequency transformers are so arranged that the grid leads will be only about 1½" long, and one plate lead will be about the same length. The two rheostats are shown, the one between the coupler at the detector secondary is the detector rheostat and the other, between the two condensers, controls both audio tubes. The jacks are not shown because they are under the variable condensers. Also the grid leak and condenser are omitted, as they may be placed where most convenient.

the coil is wound on a bakelite or similar tubing, two tiny parallel holes may be drilled. Now that you have your two dials in step you may tune in any two stations either at precisely the same settings all the time or at precisely the same settings for most stations, with some very slight variations between the two dial readings on the other stations.

Operation

As to the Superdyne effect, which was discussed last week from the viewpoint of underlying principles, it is not the complete suppression of the beat-note from audibility, but constitutes an effective check on oscillations. The object always is to have the tube functioning just a trifle under the oscillation point, which is that point where it starts on a career of uncontrollable misbehavior, sometimes even preventing the reception of signals. No trouble should be experienced in keeping the set just below the point where the detector tube runs riot. On the low waves it may be necessary to exercise great care in manipulating the tickler dial so that the station comes in with fine quality. If too much regeneration is used there will be distortion, but a slight re-adjustment will bring in the signals with wonderful quality. If too little regeneration is used the signals will be very faint or entirely inaudible. In either case it's merely a matter of correct adjustment. That is where the criticalness of Superdyne tuning comes in. For best DX results there should be vernier on all three dials. They may make an improvement you would not want to miss. At a sacrifice of some DX reception, though not all by any means, all vernier may be omitted.

When the set is functioning properly over-regeneration results in distortion or, on the low waves, it simply tunes out the station without causing the awful squawks sometimes present in circuits where there is no meeting of regeneration and wavelength on the lower waves.

Coil Dimensions

With the considerations broached heretofore regarding the unknown elements that cause some very slight differences, the coupler, if it be on bakelite may consist of 31 turns of No. 22 double silk covered wire on a 4" diameter tubing 2"

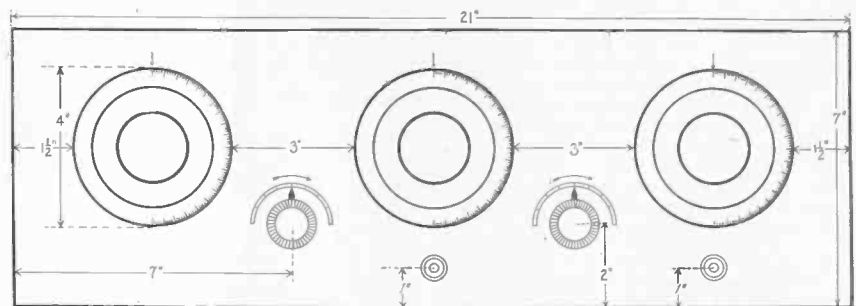


FIG. 2, panel layout for RADIO WORLD'S 3-tube Superdyne. The dials, left to right, are, coupler rotor, coupler tuning condenser and plate coil condenser. The panel is 7x21". Two rheostats are used and two jacks, one jack being for the detector output, the other for the second audio output. The author suggests 4" dials. Vernier on all three improves DX possibilities.

high. The primary, wound over it, and for the entire length of the secondary winding, that is, wound with turns about ¼" apart, or a little more, consists of four turns, for which the same kind of wire may be used. The tickler, wound on a 3½" diameter tubing, or on a 3½" formed rotor, which has sides like the bilge of a boat, has 18 turns of the same wire on one side of where the shaft will penetrate the rotor, and the same number on the other side, making a 36-turn tickler. These were the coil dimensions used with a Flewelling variable condenser, .0005 mfd., 23 plates. For a basket-weave type coupler the same number of turns and the same diameters may be used, except that the rotor will be wound as an unseparated coil. All windings are in the same direction.

The plate coil will consist of 30 turns of the same wire on a 4" diameter tubing 2" high. A duolateral or honeycomb coil may be adjusted along the lines explained and will serve nicely, although if commercial products are to be used, get the plate coil sold with the coupler.

Usually the commercial plate coil is wound in a direction reverse to the windings on the coupler. The direction of winding is of no importance, since the manner of making the connections determines the polarities. Usually the plate coil has a hole or other identifying mark at the beginning of the reverse winding. In this circuit the plate coil is used in

positive fashion, hence the beginning of a reverse-wound plate coil for the present purpose, would be the terminal OTHER THAN the one with the designating mark. The tickler leads are reversed, instead of the plate coil, and that's how the Superdyne principle is invoked.

Wiring Directions

1. Connect the A- on battery to one side of the rheostat R1, the other side of the rheostat to the F- post on the detector tube socket, at left in Fig. 1. The F- post is always on a line with the grid post and is at left when both F posts face you. Do not connect the A- to the F+ post. Also connect the A battery minus to one side of the other rheostat, R3, the remaining unconnected side of R3 going to both F- posts on the two audio sockets, shown at right in Fig. 1. Connect the A- to the F- posts of both audio transformers. Be sure this connection is from the minus post of the battery and NOT from the socket side of either rheostat. It is made from the BATTERY side of the rheostats. Connect the A+ direct from battery to all three F+ posts on the sockets. This completes the A battery wiring.

2. Connect the beginning of L1 to the aerial, the end to the ground. The beginning will be the top terminal of the aperiodic primary wound over the secondary L2, unless the coupler has been purchased.

(Continued on page 30)

White's

Supertone Audio Amplifier

One stage of transformer coupled and two steps of resistance-coupled A F produce superior tonal quality and make the extra tube well worth while.

By Charles H. M. White
Consulting Engineer

THERE are three leading types of audio-frequency amplification — (1) choke coil coupling, (2) transformer coupling and (3) resistance coupling. The choke coil type practically has fallen out of modern broadcast practice and has given way to transformer coupling and resistance coupling because of their virtues which include all that choke coil type has to offer and more besides. For instance, choke coil coupling cannot step up the volume such as does the transformer type and it lacks the tonal purity of the resistor type. Transformer coupling on the other hand is capable of

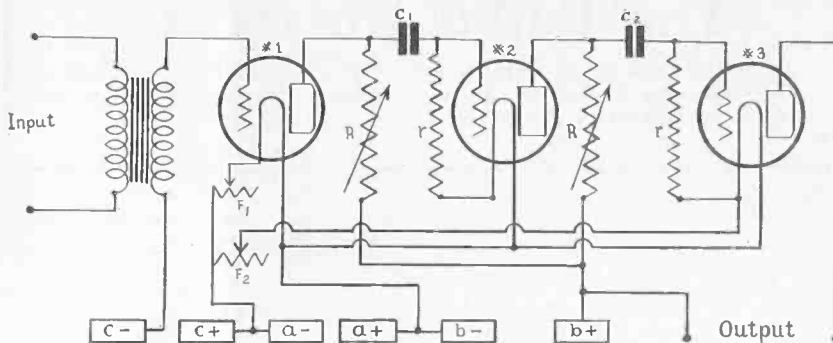


CHARLES H. M. WHITE

producing the maximum volume per tube, but it introduces noises and distortion that become very apparent when more than two stages are employed. With resistance coupling, however, any number of stages can be used, but the volume per tube is very low compared with the transformer type, as the ratio of transformer in resistance coupling cannot be more than unity; whereas the ratio with transformers can be anywhere from 3-1 to 6-1.

The ideal amplifier would be one which combines the transformer type with the resistance type. For the first stage of such an amplifier a 5-1 or 6-1 ratio transformer is used, but for the last two stages resistance coupling is employed. Although the volume received from this amplifier is no more than the volume received from two well-designed stages of transformer audio-frequency amplification, still the tonal reproduction is superior. The use of the extra tube is completely justified. In any resistance coupled amplifier a high plate voltage must be used. It is recommended that at least 90 volts of B battery be used and if possible a little more, yet, with the average receiver 90 volts will be found sufficient.

To obtain the maximum benefit it is necessary to use the specified parts. For the transformer T, any good standard make of audio-frequency amplifying transformer will suffice. The resistance amplifying units R must be Fil-Ko-Resistors, which are variable between 5,000 and 250,000 ohms. The high end is marked H and the low end L, while in the middle is a point marked C and corresponds to 100,000 ohms. As a preliminary adjustment place both units R at C, but it will be found that the most efficient adjustment lies between C and L. In varying the units R try to keep them at the same approximate relative positions, although no serious harm is done if they are off just a little. The units R are not critical in



CIRCUIT DIAGRAM (Fig. 1) of White's Supertone Audio Amplifier, consisting of one transformer-coupled stage and two steps of variable resistance-coupled audio. Wonderful tone quality is obtained.

value and as an average $\frac{1}{2}$ or 1 megohm leaks can be used. The condensers C are .006 mfd. mica insulated fixed condensers. The rheostats F1 and F2 are new model Fil-Ko-Stats with battery switch attached. It will be found that the volume of the amplifier can be controlled by the rheostat F2. Resistance coupling alone permits volume variation without distortion by

varying the brilliance of the tube filaments. In assembling it is not essential to mount the controls to R on the panel because after the first preliminary adjustment these controls are not used.

It is recommended that shock-proof sockets be incorporated in the layout because much microphonic noise is caused by mechanical jars and vibrations.

By D. Alfred N. Goldsmith

Super-Power Won't Interfere with Receivers 10 to 20 Miles from the Station—Static Will Be Overcome.

THE radio audience is divided into two classes. There are the distance hounds and those who desire quality of reception. There is no connection between the two.

The DX hound in the East will sit up all night fiddling away at the dials in an effort to bring in Frisco, Oakland, or some other distant station. Finally, about 3 A. M., he will hear WXYZ on the other side of the world signing off. Then will come a crash of static. But he will die happy! He has heard WXYZ.

On the other hand are those who like to listen in on good programs, regardless of whether they are local or distant, and who obtain their greatest pleasure from the quality of reception. Obviously, it is this class of people for whom we must strive to make improvements.

A radio expert once told me that he thought we never would be able to eliminate static because it was God's signature. I think he did not have the right force of control and that static is somebody else's signature.

At any rate I believe we are going to be able to overcome static and fading to a great extent. I believe in the next few years it will be done.

Sources of Interference

Interference comes from two different sources—natural and man-made. The man-made interference we are trying to eliminate. It will take time, but we will succeed. Perfection of apparatus and higher power, I think, may overcome natural interference.

If you are in a crowded room and desire to be heard by all, the natural thing to do is to raise your voice. I think the same thing applies to radio. In a certain sense, the air is crowded with static and inter-

ference. If the power of the broadcasting station is increased, the signal will have a chance of being heard.

If a receiving set is really selective, practically no difficulty will be experienced in tuning out a super-power station, that is if you are 10 or 20 miles away from it. Of course if you are close to it, a 3-circuit set and perhaps a wave trap may be necessary to tune it out, if it can be accomplished then.

Super-power is simply a matter of increasing the strength of the signal over the strength of static. It stands to reason that if the static and the signal have the same strength you are going to hear nothing but a lot of weird noises. If the signal strength is increased you can shorten your antenna, thus reducing the static, while at the same time the signal will come in with equal or greater force and you will have a chance to find out what the program is about.

Effects of Super-Power

Super-power will also eliminate "birdie" or the regenerative whistles. Nobody is going to tune his set to the oscillating point to bring in the super-power station. This is only done by the DX hounds who spend hours trying to tune in ABCD on the other side of the world. Of course if two DX hounds using regenerative sets both try to tune in the same distant station at the same time they are going to interfere with each other. But let them go to it and may the best man win. These sets will not interfere with others.

The range of real service of a broadcasting station of 500 watts does not exceed 25 miles and may be much less. By real service I mean service similar to a good wire to telephone conversation at all times. To increase the range of real service we must increase the power.

"WHITE'S D-EXCELLENT 2-TUBE SET," by Charles H. White, noted radio authority. Send 15 cents for December 6 issue of RADIO WORLD.

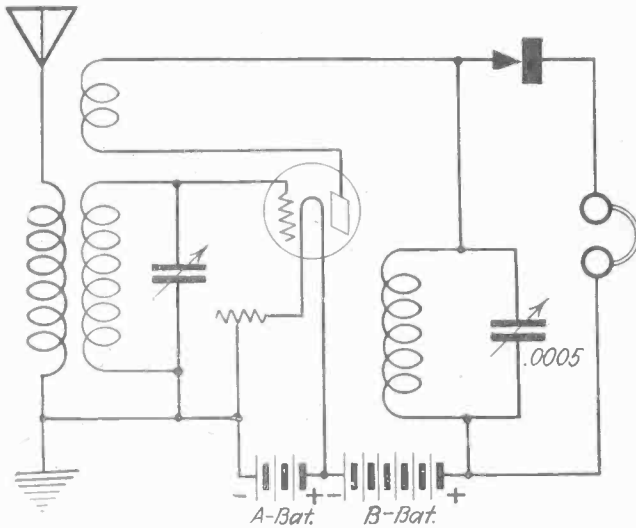
"HOW TO MAKE A \$1 COIL WINDER," by Herbert E. Hayden. Send 15 cents for December 6 issue, RADIO WORLD.

RADIO WORLD STARTS 1925 WITH OVER 100,000 CIRCULATION

A Simple Crystal Superdyne

The Radio University

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



Two 23-plate variable condensers and the tickler comprise the any type amplifying tube may be used. However, type 201A maximum results. From 45 to 90 volts of B battery should

FIG 60—A 1-tube Superdyne utilizing a crystal as detector. The tone is marvelously clear. The set is very simple to build and requires very little previous knowledge of radio. The primary is aperiodic, having but 15 turns wound directly over the secondary wire. The secondary has 50 turns, the tickler 39 turns, the plate coil 35 turns. The wire is No. 22 D. C. C. However, any 3-circuit variocoupler may be used for the primary, secondary and tickler, but the plate coil must be kept out of inductive relationship to the coupler. The tickler leads are reversed, that is, the beginning of the coil goes to the plate and the end to the crystal detector and to the end of the plate coil, three tuning controls, or 199 is advised for use.

CAN a crystal be used in the Superdyne circuit? I desire to use the crystal as detector and tube as the radio frequency amplifier.—Jos. Mulvaney, 636 11th St., Brooklyn, N. Y.
Fig. 60 is the circuit you request.

WHEN working my little one-tuber I experience trouble with my plate variometer. It is even noticed when adding amplification. When going on the higher wave lengths the set refuses to regenerate, and I am at a loss as to what to do and how to overcome this. Can you assist me?—J. Robertson, Ventnor City, N. J.

When adding amplification to any type of regenerative set it is advisable to connect a fixed condenser of .001 mfd. capacity across the primary terminals of the first transformer. This by-pass condenser assists the regenerative action for the radio frequency currents flowing in the plate circuit of the detector tube, pass through the condenser instead of the primary windings of the transformer. With non-regenerative receivers this condenser is not required.

I AM under the impression that radio was invented during the recent World War and that little was known about the subject until that time. Can you enlighten me on the subject?—H. K. Falk, Summit, N. J.

Radio sprang from the discovery that electrical oscillations give rise to electric waves in the ether. This marvelous discovery was made by Rudolf Hertz in 1887, and the waves are known as Hertzian waves in his honor. These waves appear to be the same as light waves, except they are of a much lower frequency. They are capable of being reflected the same as light. This was the basis of Marconi's experiments which later developed to radio in 1895. At about this time Marconi succeeded in transmitting complete messages across the English Channel. Radio advanced rapidly from the coherer to the crystal and then to the audion. In the early nineteen hundreds Dr. Lee De Forest invented the third element of the vacuum tube known as the grid. All this took place before the war, at which time radio made rapid strides. During the World War tube transmission was perfected, which makes present day broadcasting possible.

I AM building a new 4-tube set, one radio frequency amplifier, detector and two audio-frequency amplifiers. I want to make it as elaborate and complete as possible, and, with that in mind, please tell me what voltmeters and ammeters I should incorporate in the set.—W. J. Simpson, 490 8th St., Chicago.

"Simplicity" is a good motto to follow when building a radio set. Nothing should be included

that is not necessary. A filament voltmeter is useful, as it results in economy in tubes. Instructions that come with each tube state the correct filament voltage, and if that voltage is maintained the tube will last longer. Other meters are not necessary.

I HAVE a 3-tube set, detector and two audio amplifiers. I notice that quite a few of the European broadcasting stations use wave lengths over 1,000 meters. Can I use honeycomb coils larger than I use to get American stations to cover the high wave lengths? (2) If so, what size coils should I substitute for primary, secondary and feed-back coil?—Lazar Duvid, 25 S. Richmond Ave., Atlantic City, N. J.

Yes. (2) Primary, No. 400, with an .001 mfd. variable condenser in series with the antenna; secondary, No. 250, with an .001 mfd. variable condenser shunted around it; tickler coil, No. 100.

I RECEIVE a terrible crackling noise in my reflex set. It stops as soon as I take off either the A or B battery leads.—Harlow M. Holmes, 907 Patterson St., Ogdensburg, N. Y.

Indications point to your having poor filament connections. Look over the fixed condensers for leaks and shorts. If possible, try your tube in another set.

IS IT possible to use the same A and B battery for a Neutrodyne?—Andrew Hoffman, Box 656, Livingston, Ill.

You may use the same A battery for all tubes. If you are using a "soft" detector it is necessary to have a separate B battery for that tube. The same B battery may be used on all amplifying tubes—RF and AF.

I HAVE a 4-tube Acme reflex set and operate it on a loop and also have tried an outside antenna which is 90 feet long. Have three stages of radio frequency and the same of audio. I receive all the local stations, but cannot get any distance. On the loop the set tunes O. K., but on the antenna the tuning is very broad, with greater volume but still no distance. Can you recommend a good type of tuning circuit to this set?—Jack Robinson, 18th St., Madison, Wis.

The set you have is designed to operate from a loop and although you can use a small outdoor antenna with greater volume, it has been noticed that it will not tune as sharply when used in this way. A small 18-inch loop will give ample volume on the local stations for ordinary work and will deliver a pleasing amount of distance. Your inability to receive distant stations is due to the use of a high rather than low loss condenser;

possibly a crystal that is insensitive, or poor tubes.

IN MAKING low-loss coils for the Neutrodyne (1) must they be mounted at the 57.3 degree angle? (2) Will I need neutrodons?

(1) Yes. (2) Try the set without neutralizing condensers. Insert them only if necessary. A test on waves under 300 meters will give you the answer. Usually the neutrodons are necessary.

CAN YOU tell me how to add a 1 or 2-stage amplifier to the \$20 DX set of great volume?—John Stroller, 1239 N. 27th St., Philadelphia, Pa.

See the issue of Dec. 6 for complete directions for building a 2-stage audio frequency amplifier to operate a speaker on any set.

AS TO the Superdyne circuit: I am using low-loss coils and condensers and built the set according to directions. My only fault is the fact that I can't get sharp tuning. Would it help me to take off turns from the aperiodic primary?—John A. Perry, 378 N. Columbus Ave., Tuckahoe, N. Y.
Yes, that should help. Keep coils at least 1 1/2" from condensers and at right angles to other coils.

PLEASE answer this in reference to Caldwell's circuit in the issue of Nov. 15, Radio World: What ratio for the AF transformers? (2) How is the outside winding of the RF coil fastened? (3) Approximately what is the range of the set for loudspeaker use, under ideal conditions?—James Bright, Winston, Conn.

First stage, 6-to-1; second stage, 3 1/2-to-1. (2) Loop the two ends of the wires through a hole bored in the form. (3) Approximately 300 to 500 miles.

I SHOULD like to know if I could expect satisfactory results on the Superdyne using standard parts, not necessarily stated low-loss, but of good quality?—R. J. Hilton, 2 Lawrence St., Waterville, Me.

Yes. CAN you tell me how to build a portable set?—W. H. Ainsworth, 421 Broad St., Utica, N. Y.

Next week's issue will contain complete data for the construction of a portable outfit.

I AM going to build a 1-step audio amplifier. Is it the positive or negative side of the filament that connects to the rheostat? (2) How is the amplifier connected to the detector? (3) I use 199 tubes. Since I use 6 1/2 volts of B battery for it, can I hook the amplifier to the same batteries?—Howard List, LeRoy, Ill.

Either side to rheostat. (2) P on the amplifying transformer connects to the plate of the detector tube; B on the AFT goes to the positive B battery 2 1/2 volts. (3) Yes.

I MADE the set described in the issue of Oct. 18 by Wainwright Astor and get wonderful results on wavelengths below 400 meters. Is there anything I can do to raise the wave? I should like to get up to 600 meters.—Robert E. Beck, RD 1, Chatham, N. J.

You may take C1 out of the aerial lead and place it across (or in shunt with) the 75-turn coil. But it would be better to leave things as they are and buy a new 23-plate condenser and place it in shunt with L1, leaving C1 as is. Shunting a condenser across any primary coil will raise the wavelength.

I WANT to build a receiver that will receive spark as well as CW signals covering the wavebands of 175 to 200 meters and from 450 to 750 meters. What, in your opinion, is the best method?—Jno. C. Clayton, 2411 Ave. K., Galveston, Tex.

The use of interchangeable coils of either the honeycomb or spider-web type would be best.

IN REFERENCE to the 1-Tube Dandy by Herbert E. Hayden in the issue of Oct. 4: Will the set, using the coils specified, cover the band between 200 and 600 meters? (2) Would the efficiency be higher if a larger wire were used? (3) Please explain the action of the link switch in the circuit. (4) Can I use a 23-plate condenser in place of the link switch?—N. B. Winter, 614 Oakwood Ave., Columbus, Ohio.

Yes, with an aerial of 100 feet in length. (2) Not in this circuit. (3) The link switch controls the wavelength range of the set. (4) Yes; one side of the condenser is connected to the post designated by No. 1 condenser, the other side connects to the ground. Remove all condensers except the .00025 mfd. and grid-leak.

In reference to the DX crystal circuit by G. N. Barkett, what size wire is used on the coils?—Arthur Sansonio, 83 9th St., Fall River, Mass.
No. 22 DCC.

CAN a tuned radio-frequency amplifier utilize a crystal as a detector? Will tone, volume and

Air University from WGBS

distance equal the Neutrodyne?—M. W. Dennis, 556 Broadway, So. Haven, Mich.

You may use a crystal as detector in a tuned radio-frequency circuit. Tone quality will be equal to—probably much better than in the Neutrodyne, but volume and distance will not even nearly equal it. If you desire to use only four tubes, why not the Superdyne? The tone is wonderful, and you also have distance and volume. See issue of Nov. 29.

Yes.
WILL you please give me a good 1-tube hook-up that uses a coupler and condensers?—Albert W. Meyers, 529 Broadway, Youngstown, Ohio. See Fig. 61.

I BUILT the Reflex Magnadyne as described in the issue of Sept. 13 issue of RADIO WORLD, but get nothing but local stations. I get a constant hum of frying noise in the set. Can you help me?—Erwin White, Saginaw, Mich.

The frying noises and no DX are caused by (1) bad connections, (2) corroded joints, (3) worn-out B batteries, (4) bad tube or too high a plate voltage on the detector, or (5) leaky insulation in electric lighting main. See that the condensers are not leaky or shorted.

KINDLY give me a list of parts for the Hayden 1-Tube Dandy?—R. R. E. Wright, Greensboro, N. C. See issue of October 4.

I WANT to build a set as described on page 7 in the issue of Nov. 22 RADIO WORLD. Will this set receive distances up to 500 miles? The nearest broadcast station is 100 miles away.—J. J. Hayes, 8 Cumberland St., Boston, Mass.

Yes this circuit will receive 500 miles, but not on a speaker.

MUST I necessarily add more turns for the loss of capacity in the coil wound on a jar, then removed from the form?—John W. Dring, 619 W. 136th St., New York City.

No.
WHERE can I obtain a multiple-condenser for use in the Super-Phiodyne?—E. A. Johnstone, Billings, Mont. The Bruno Radio Corp., 300 Water St., New York City.

IN REFERENCE to the set described by Herman Bernard in the issue of Nov. 15 RADIO WORLD: Can audio amplification be added to this set? (2) Can stations be calibrated? (3) Will the set work efficiently on an indoor aerial?—R. W. Hehnstetter, 2158 Prospect Ave., Bronx, N. Y.

Yes. (2) Yes. (3) Yes, but much better on an outdoor aerial.
DO YOU think that, with a 42-foot aerial, Bernard's "3-Circuit Tuner That You Can Log" would give me as good reception as the standard regenerative 3-circuit tuner under the same conditions? W. E. Westlake, 649 King Edward Ave., Ottawa, Can.

HOW may an A battery be charged from the AC line?—S. H. Dumas, Elsmere, N. Y. It is necessary to use a rectifier, changing the alternating current to direct, after stepping it down.

I AM building a 2-tube reflex. What ratio should the audio-frequency transformers be? Will this set operate on No. 12 tubes?—M. C. McKenney, Box 115, Waldo, Ark. 4/2 or 5-to-1 ratio transformers may be used. The 12 type tubes will work this set.

IN REFERENCE to Hirsch's Quality Reflex, as described in the issue of October 25, it works very well, both as to volume and distance, but it squeals. Can you tell me how I can possibly eliminate this?—Chas. H. Leggett, 212 Drexel Ave., Detroit, Mich.

All indication points to an interaction of currents between the AF transformers, or the AF transformers and the RF transformers. It would be well to shield the AF transformers individually by completely surrounding them with aluminum or copper plate, grounding this metal.

I WANT to build a set that will cover a wave-band of 150 to 23,000 meters. Can you tell me the type of set I should use?—D. N. Miller, Western Union Tel. Co., Des Moines, Ia. The set for your use should be of the honeycomb type, with a complete set of coils from 25 turns to 1,500 turns. A complete diagram appeared in this department Dec. 20.

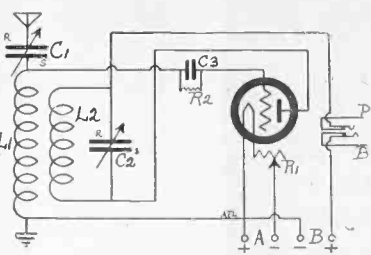


FIG. 61, a simple 1-tube 2-circuit regenerative receiver. A soft tube is advised for this circuit, although almost any of the tubes rated for detector-amplifier used is all right.

**RADIO WORLD'S
Broadcast University**

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

THE TUNING of the 1-Tube DX Superdyne, referred to by Abner J. Gelula at WGBS and described by Herman Bernard in the December 20 issue, is very sharp and the set is as selective as can be desired, but I do not get as much DX as I would like. The best I have been able to get is Hastings, Neb., about 1,200 miles away, which I can hear almost any time. Can this set be made to reach from coast to coast, or possibly tune in stations in London or Berlin once in a while?—Gottlieb Zismer, 2571 Madison St., Ridgewood, Queens.

You are doing pretty well as it is. Once in a while, more by accident than by design, on an ideal night, you may get a peep out of KGO or some other West coast station, but a 1,200-mile range is even more than Mr. Bernard claimed for the set.

I DO NOT understand where the reverse feedback that is embodied in the Superdyne principle comes in. I refer to the talk on Bernard's DX Superdyne given from WGBS, Gimbel Bros., N. Y. C., Dec. 10 at 6:35 P. M.—Irving Reinitz, 364 Sumpter St., Brooklyn, N. Y.

In the Superdyne the plate current is fed back to the grid circuit in a negative manner; that is, some coil between the plate or P post of the socket must be wound or connected in a reverse fashion. The reversal consists of using one coil to change the polarities. This may be done either by reversing the direction of winding, and connecting in standard fashion, or in winding all coils in the same direction and reversing the connections of one of them. As there are only two coils in which this may be done, that is, the tickler or the plate coil, the solution must lie there. Mr. Bernard uses the method of reversing the polarities in the tickler, connecting the plate coil in standard fashion. As the plate coil is a solenoid, i. e., a single-layer coil on a cylinder, the direction in which it is wound means nothing, since that coil is not in inductive relationship to any other coil. The only thing that counts in that case is the manner of connecting. If the plate coil is placed as a test on top of the stator of

the coupler, and the terminals of the windings of the coupler stator (secondary) and of the plate coil are studied, it will be found that either both run in the same direction, the terminals pointing identically, or they run in the opposite direction. Consider the terminals connected. Now, if you will turn the plate coil upside down, so to speak, and make the connections to the plate coil as before, the plate coil will oppose the stator. In that way you may determine which is the beginning and which the end of the plate coil and you may select either terminal, provided you make connections accordingly. Remember that the tickler is the rotary coil inside the coupler stator, while the plate coil (tuned by a variable condenser) is to be all by itself. Now, to reverse the connections as Mr. Bernard advises, place the plate coil on the top of the coupler stator so that the two windings are in the same directions. The top terminal of the panel-mounted coupler's stator is the beginning, hence the top of the plate coil is the beginning of that coil. Mark the plate coil's beginning "B." The plate of the tube is connected to B, while the end on the plate coil goes to one of the tickler terminals. Which one? Look at the tickler. You will note that on the coupler all windings are in the same direction. Turn the tickler so that its windings are parallel with those of the coupler stator and ascertain where the connection emerges from the tickler that corresponds to the beginning of the stator and of the aperiodic primary. On the Wallace coupler this beginning has a small white rubber collar on the inside of the rotor to identify the beginning. Considering the tickler wire terminal itself as an arrow, the beginning would be the terminal that points in the same direction as does the beginning of the stator (secondary). Now, if the end of the plate coil were connected here there would be no reverse feedback. Therefore consider that terminal of the tickler that would ordinarily be the beginning of the tickler, and the other tickler terminal as the beginning. Hence, the end of the plate coil is connected to the end of the tickler and the beginning of the tickler goes to B+. The set works either way, but it is better to use the reverse feedback. You will find that reversing the connections, as described, reverses the dial setting of the tickler, i. e., full coupling would be at theoretical 0, instead of at 100 dial setting.

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BROADCAST PROGRAMS

Thursday, December 25

KHJ, Los Angeles, 395 (P. S. T.)—6:30 P. M., special children's Christmas program. 7, Hatch Graham, banjo; the Lubovski Trio, Uncle Remus, E. K. Barnes, celeste, the Woodwind Quartet; Rev. Albert Hall; Gladys Blackwell Pickering, soprano; D. McCormick; Edward Murphey, reader; the Sandman and Queen Titania; Richard Headrick, and his baby brother, Edward Earley, David Durand and Jane Hughes, screen juveniles.

WCCO, Minneapolis, Minn., 417 (C. S. T.)—5:30 P. M., children's hour. 6, Biley's Concert Orch. 10, George Osborn's Orch.

WGY, Schenectady, 380 (E. S. T.)—7:45 P. M., Book Review by William F. Jacob. 8, Christmas Cantata in four parts. 11:30, organ recital by Stephen E. Boisclair.

WEAF, New York City, 492 (E. S. T.)—11 A. M., musical program; talk by Cameron Rogers, staff of World's Work; Health Talk by Dr. Iago Galdston; market and weather. 4 P. M., musical program; children's stories. 6, WEAF Instrumental Quartet; Josiah B. Free, haritone; Gordon Soule, concert pianist; children's stories by Blanche Elizabeth Wade, the G. R. Kinney Company story teller; the Happiness Candy Boys; G. Schirmer Musicale by Jackson Kinsey, baritone; "Astor Coffee" Orch.; Schubert Trio; Meyer Davis' Orch.

KDKA, E. Pittsburgh, Pa., 326 (E. S. T.)—10:30 P. M., Christmas Service of East End Christian Church, Rev. John Ray Ewers. 2, special musical feature. 6:15, KDKA Little Symphony Orch. 7:30, Santa Claus and Mrs. Santa Claus. 7:45, Xmas music. 8:30, KDKA Little Symphony Orch. 9:55, time; weather.

WRC, Washington, D. C., 469 (E. S. T.)—7 P. M., special Xmas program.

WMH, Cincinnati, O., 309 (C. S. T.)—8 P. M., Christmas address, J. J. Castleberry, pastor; Mrs. Ruth Lohrum Hahn, soprano and Mrs. Emma Lohrum Grace, contralto; Phoebe Green, accompanist; soprano solos, Mrs. Ruth Lohrum Hahn; contralto solos, Mrs. Emma Lohrum Grace; Christmas reading, Mrs. Ethel Knapp Behrman; mezzo soprano solos, Mrs. Grace Long Shiber; violin solos, Luke Ehrigott, Lucile White, accompanist.

WHN, New York City, 360 (E. S. T.)—6:30 P. M., Vincent Catanese and His Hotel Alamas Orch. 7:10, WHN Employment Broadcasting. 10:25, What Becomes of Old Watches? 10:30, Alja and His Club Madrid Orch. 11, Connie's Inn with Leroy Smith and his orch. 12, Ted Lewis and his Symphonic Clowns. 12:30 A. M., Lou Gold and his orch.

WEBH, Chicago, 370 (C. S. T.)—7 P. M., Edgewater Beach Oriole arch.; Dean Remick, pianist; John Stamford, tenor. 9, golf lesson, Amher Andrews; Belle Forbes Cutter, soprano; John Stamford, tenor; Edgewater Beach Oriole orch. 11, Harry Davis, baritone; Loss Brothers, songs; Banks Kennedy, piano logues; John Stamford, tenor; Edgewater Beach Hotel late revue.

WNYC, New York City, 526 (E. S. T.)—8 P. M., Christmas night program.

WOR, Newark, N. J., 405 (E. S. T.)—4 P. M., "Civic Celebration of Christmas." 6:15, Albert E. Sonn, "Radio for the Layman." 6:30, "Music While You Dine," Jimmie Lent's orch. 7:15, resume of the day's sports by "Jolly Bill" Steinke.

WAAM, Newark, N. J., 261 (E. S. T.)—11 A. M., piano recital. 11:30, of special interest to the farmer. 11:45, Fisher Beer musical program.

Friday, December 26

WHN, New York City, 360 (E. S. T.)—6:30 P. M., Vincent Catanese and Alamas Orch. 7, Harry Richman and His Entertainers with Eddie Elkins and His Orch. 9:30, Dan Gregory and his Crystal Palace Orch. 10, Fashion Chats by Mme. Belle. 10:10, Barnow and Divine, in songs. 10:25, "Storage Batteries," H. B. Shontz. 10:30, Roseland Dance Orch. 11, Vanity Club Revue. 11:30, Sam Wooding and his orch. 12, Ted Lewis and his Symphonic Clowns.

KHJ, Los Angeles, 395 (P. S. T.)—12:30 P. M., news items and music. 2:30, Edward Murphey, reader. 6, Art Hickman's Concert Orch. 6:30, children's program. 8, Mr. H. L. Plath. 9:30, Piggly Wiggly Girls; Hazel McLay, contralto; Adele Wright, soprano; George Hood, reader. 10:30, Earl Burnett's Biltmore Orch.

WCCO, Minneapolis, Minn., 417 (C. S. T.)—2 P. M., "Why Not Be Healthy and Happy." R. H. Coombs. 2:30, matinee musical. 4, "Jimmy Steps on the Scales of Justice," by Myra Sawhill (acture). 5:30, children's hour. 6, sport hour. 7:30, story. 8, to be announced.

WGY, Schenectady, 380 (E. S. T.)—7:45 P. M., health talk. 8, program by Leonard W. Grant, baritone; Wendell Falls, violin; Mrs. John May, soprano. 10:30, dance music by Lou Volin's Music Box.

WOC, Davenport, Ia., 484 (C. S. T.)—10 A. M., market quotations. 10:05, household hints. 10:55, time. 11, weather and river forecast. 11:05, market. 12, chimes. 12:15 P. M., weather. 2, stocks and markets. 6:45, sport news and weather. 7, Sandman's Visit. 7:20, educational lecture: A Christmas Talk by Mrs. Otto Elmegreen. 8, Harry Yeazelle Mercer, tenor; Norine Murray, soprano; Eleanor Mooney, accompanist.

WIP, Philadelphia, 509, (E. S. T.)—1 P. M.,

ROW DO YUH DOODLE DOODLE DOODLE DOODLE DO



CKAC, Montreal, Can., boasts of these two popular entertainers who grace its microphone "ever so often." Ernest LeMessurier, well known cartoonist and Bunny Foster, composer of popular songs try to "see themselves as others see them," according to LeMessurier.

luncheon music. 1:30, weather. 3, concert by artist-students from the Frank Oglesby Studio; Lois Kershaw, soprano; Emma Wright, soprano; Blanche Haegle, soprano; Frank Boehret, tenor; Frank Oglesby at the piano. 6:05, weather. 6:15, Harvey Marburger and his Vaudeville Orch. 6:45, U. S. Department of Agriculture, Livestock and Produce Market Reports. 7, Uncle Wip's Bedtime Story.

KDKA, E. Pittsburgh, Pa., 326 (E. S. T.)—7 A. M., calisthenics conducted by O. Shannon. 8, calisthenics conducted by O. Shannon. 9:45, stockman reports. 11:55, time. 12, weather; stockman reports. 12:20 P. M., Sunday School lesson. 3:30, closing quotations on hay, grain and feed. 6:15, Meyer Davis Orch. 7, Adanac Male Quartet. 7:15, stockman reports. 7:30, Daddy Winkum. 8:15, health talk. 8:30, concert by Westinghouse Choral Club. 9:55, time; weather.

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

WMH, Cincinnati, O., 309 (C. S. T.)—7 P. M., religious service, Rev. H. H. Castleberry, pastor.

WEBH, Chicago, 370 (E. S. T.)—7 P. M., Hazel O'Neil, soprano; Edgewater Beach Oriole orch.; musical bits. 9, Edgewater Beach Oriole orch.; Frederick Agard, tenor; Rita McFawn, soprano. 11, Edgewater Beach Oriole orch.; Three Musketees, songs; Sandy Meek, tenor.

WNYC, New York City, 526 (E. S. T.)—7:35 P. M., meeting of Board of Estimate. 7:50, Tommie Mallie, piano. 8:15, "Timely Topics," by Francis P. Bent. 8:30, violin recital by Leon Goldman. 8:50, Joseph M. White, tenor. 9:05, violin recital. 9:25, Joseph M. White, tenor. 9:45, The Pyramid Entertainers. 10:30, police alarms and weather. 10:35, Ben Bernie's Hotel Roosevelt orch.

WOR, Newark, N. J., 405 (E. S. T.)—7 A. M., gym class under Arthur E. Bagley. 2:30 P. M., Clarence Talisman, violinist 2:45, tenor, Paolo del Pino. 3, Captain Kilroy Harris, "Christmas in Australia." 3:15, violinist. 3:30, Allan R. Cullimore, "Getting Along with the Boss." 3:45, Paolo del Pino. 6:15, Howard Oliver's orch. 6:30, "Man in the Moon" stories. 7, Howard Oliver's orch. 7:15, resume of the day's sports by "Jolly Bill" Steinke.

WAAM, Newark, N. J., 261 (E. S. T.)—11 A. M., Miss Ada Bessie Swann, conducting lesson No. 63, Radio Cooking School course. 11:30, latest reports from the Amateur Radio World, as given in a bulletin from the American Radio Relay League. 11:40, musical program, piano selections. 8 P. M., Home and Heart Problems. 8:10, Ben Friedman, Broadway's Joy Boy. 8:20, Fairlawn dance orch. 8:40, dance orch. 9, Frank Catello's entertainers. 9:15, Irving Porter, tenor. 9:30, Frank Catello's entertainers. 9:50, Ida Wysocki, soprano. 10, Jack Lucy's Jack O'Lantern society orch. 10:15, Johnson & Smithstein, piano and violin. 10:30, society orch.

WFAA, Dallas, Tex., 476 (C. S. T.)—12:30 P. M., address, Dr. Robert Stewart Hyer. 8:30-9:30, Grace Methodist Church orch.

WHAS, Louisville, Ky., 400 (C. S. T.)—4 P. M., selections by the Alamo Theatre orch.; police bulletins; weather forecast; "Just Among Home Folks"; readings; late news. 4:55, local livestock, produce and grain market reports. 5, time. 7:30-9, concert under the auspices of the Kentucky Night Owls; soprano solos, Alice Monroe; four-minute Civil Service talk. O. A. Beckman; news; time.

CKAC, Montreal, Can., 425 (E. S. T.)—1:45 P. M., concert. 4, weather and stock market. 4:30, Ho lessons.

WCAE, Pittsburgh, Pa., 462 (E. S. T.)—12:30 P. M., weather; news. 3:30, news. 4:30, Sunshine Girl. 6:30, dinner concert. 7:30, Uncle Kaybee. 8:30, musical program. 9, concert by the B. Fisher & Co. orch.

KGO, Oakland, Cal., 312 (P. S. T.)—1:30 P. M., N. Y. and S. F. stock reports and weather. 3, studio musical program. 4, concert orch. 5:30, The Girls' Half Hour. 6:45, final reading, stock reports, weather, S. F. produce news, and news items.

WOO, Philadelphia, Pa., 509 (E. S. T.)—11 A. M., organ. 11:30, weather. 11:55, time. 12, Tea Room orch. 5:40 P. M., police reports. 5:45, grand

organ and trumpets. 7:30, sports results and police reports; A. Candelori and his Hotel Adelpia French Room orch. 8:30, Fox Theatre studio. 9:25, special program, Josephine McCulloch, soprano; Nelson Eddy, baritone. 9:55, time. 10:02, weather. 10:03, organ, Harriette G. Ridley. 10:30, Vincent Rizzo orch.

KTHS, Hot Springs, Ark., 375 (C. S. T.)—8:30 P. M., McCafferty sextette.

KOB, State College, 360 (C. S. T.)—7:30 P. M., "Calls of Birds of the Southwest," by Mrs. O. C. Snow; "The Modern Conception of Electricity," by Dean R. W. Goddard.

WWJ, Detroit, 517 (C. S. T.)—8 A. M., setting-up exercises. 9:30, "Tonight's Dinner." 9:45, Public Health Service bulletin. 10:25, weather. 11:55, time. 3 P. M., Detroit News orch. 3:50, weather. 3:55, market reports. 7, Detroit News orch.; Mrs. May F. Cowperthwaite, soprano.

KGW, Portland, Ore., 492 (P. S. T.)—11:30 A. M., weather. 12:30 P. M., concert by Original Serenaders. 5, children's program; story by Aunt Nell. 7:10, celebration of Second Hoot Owl Anniversary.

WEEI, Boston, 303 (E. S. T.)—6:30 P. M., Dok-Eisenbourg and his Sinfonians. 7, Big Brother Club. 7:45, concert by choir. 8:15, Capt. Percy Redfern Creed, on "Sportsmanship." 8:30, concert courtesy of Gilchrist Company. 9, program from New York studio, Astor Coffee dance orch.

KFI, Los Angeles, 469 (P. S. T.)—5 P. M., Herald news. 5:30, Examiner news. 6:45, Aeolian organ recital. 8, Evening Herald program. 9, Examiner studio. 10, vocal concert.

WBZ, Springfield, Mass., 337 (E. S. T.)—11:55 A. M., time, weather, market report. 7 P. M., market report. 7:05, bedtime story. 7:15, book review. 7:30, "Musical Appreciation," Professor Stuart Mason. 9:55, time, weather.

WLW, Cincinnati, O., 423 (C. S. T.)—10:45 A. M., weather and business reports. 12:15 P. M., College of Music. 1:30, market reports. 3, stock quotations. 4, piano recital by Adelaide Apfel.

Saturday, December 27

WHN, New York City, 360 (E. S. T.)—5 P. M., Tangleand Ballroom Orch. 6:30, Vincent Catanese and his Hotel Alamas Orch. 7:30, Hotel Carlton Terrace Orch. 8, Arthur Stone, blind jazz pianist. 8:15, Blanche Vincent and Jack Fagan, harmony singers. 8:30, Strand Roof Entertainers. 9, Carlo Denobo, operatic baritone. 9:10, Alfred Dulin, concert pianist. 9:20, Jimmy Flynn, dramatic tenor. 9:30, Clarence Williams and His Radio Trio. 9:45, Lou Gordon and Harry Jenets, songwriters and composers. 9:55, Bert Shoemaker, jazz pianist. 10:05, Jimmy Clarke and his Entertainers. 10:30, "Mardi Gras Period." 11, Connie's Inn with Leroy Smith's Orch. 11:30, Roseland Dance Orch.

KHJ, Los Angeles, 395 (P. S. T.)—12:30 P. M., Hi Moulton and his orch. 2:30, Charlie Wellman's Saturday Afternoon Frolic; Helene Smith, pianist; Dix Street, soprano; Hatch Graham, banjo; E. K. Barnes, celeste; Freeman Lang, ukulele; Jimmie Kessel, tenor. 6, Art Hickman's Concert Orch. from the Biltmore Hotel; Edward Fitzpatrick, director. 6:30, children's program presenting Prof. Hertzog. 7:45, "Care of the Body," Dr. Philip M. Lovell. 8, Y. M. C. A. program. 9, program by J. Howard Johnson. 11, Earl Burnett's Biltmore Orch.

WCCO, Minneapolis, Minn., 417 (C. S. T.)—10:45 A. M., Betty Crocker, talk to girls. 8 P. M., "Fireside Philosophies," Rev. Roy L. Smith. 8:30, musical program. 9:30, St. Paul Athletic Club Orch.

WGY, Schenectady, 380 (E. S. T.)—9:30 P. M., dance music by Phi Romano's Orch.

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

WIP, Philadelphia, 509 (E. S. T.)—1 P. M., organ recital by Karl Bonawitz. 1:30, P. M., concert by Aloha Hawaiian Glee Club. 6:05, weather. 6:07, dinner music. 6:45, livestock and produce market reports. 7, Uncle Wip's Bedtime Story. 8, "The Romance of Chemistry," a talk by Charles H. LaWall. 8:15, H. Ralph Wieder, baritone; Flora Ripka, pianist; book reviews by Robert A. Wachsmann, pianist; book reviews by Art Coogan and his orch. 11:05, organ recital by Karl Bonawitz.

WEAF, New York City, 492 (E. S. T.)—4 P. M., dance program. 6, WEAF Instrumental Quartet; Boys' Stories by Fred J. Turner; Honner Harmony Hour; Christmas Surprise Program; Cantor Aaron Katchko, baritone; Vincent Lopez and Orch.

KDKA, E. Pittsburgh, Pa., 326 (E. S. T.)—9:45 A. M., stockman reports. 11:55, time. 12, weather, stockman reports. 1:30 P. M., Daugherty's Orch. 6, Westinghouse Band. T. J. Vastine, conductor. 7:30, Wimple, the Wanderer. 8:30, Westinghouse Band; Helen Rowe, contralto. 9:55, time, weather.

WRC, Washington, D. C., 469 (E. S. T.)—7 P. M., Children's Hour by Peggy Albion. 7:15, concert by Meyer Davis. 8:15, bible talk. 8:30, to be announced. 9, to be announced. 10:30, Astor Hotel Orch. 11:15, organ recital by Otto Beck.

WMH, Cincinnati, O., 309 (C. S. T.)—10 P. M., mixed musical program. 11, Murray Horton's Hotel Alms Orch.

KGW, Portland, Ore., 492 (P. S. T.)—11:30 A. M., weather. 10 P. M., Multnomah Hotel Strollers.

WWJ, Detroit, 517 (C. S. T.)—8 A. M., setting-up exercises by R. J. Horton, physical director of the Detroit Y. M. C. A. 9:30, "Tonight's Dinner." 9:45, Public Health Service. 10:25, weather. 11:55, time. 3 P. M., News orch. 3:50, weather. 3:55, markets. 7, News orch.

KTHS, Hot Springs, Ark., 375 (C. S. T.)—8:30 P. M., Meyer Davis orch. 10:30, dance concert.

WOO, Philadelphia, 509 (E. S. T.)—11 A. M., organ. 11:30, weather. 11:55, time. 12, orch. 5:40 P. M., police reports. 5:45, organ and trumpets. 9:55, time. 10:02, weather.

KGO, Oakland, Cal., 312, (P. S. T.)—4 P. M., concert orch. 8, program by the Faculty of the Musical Arts Institute of San Francisco. 10, dance music.

WCAE, Pittsburgh, Pa., 462 (E. S. T.)—12:30 P. M., news, weather. 2:30, tea-dansant music. 4:30, orch. program. 6:30, dinner concert. 7:30, Uncle Kaybee. 7:45, special feature. 8:30, concert by artists.

CKAC, Montreal, Can., 425 (E. S. T.)—7 P. M., kiddie stories. 7:30, Rex Battle and his Mount Royal Hotel ensemble. 8:30, Frontenac Breweries' concert. 10:30, Joseph C. Smith and his Mount Royal Hotel orch.

WHAS, Louisville, Ky., 400 (C. S. T.)—4 P. M., selections by the Alamo Theatre orch.; police bulletins; weather; "Just Among Home Folks"; readings; late news. 4:55, local livestock, produce and grain market reports. 5, time. 7:30, concert by the Syncopatin' Six; twenty-minute specialty by Frank Wright and Frank Bessinger; late news; time.

WFAA, Dallas, Tex., 476 (C. S. T.)—12:30 P. M., address, Epps G. Knight, business man. 8:30, Joseph B. Rucker, basso; Mrs. Joseph B. Rucker, pianist. 11, Adolphus Hotel orch.

WLW, Cincinnati, O., 423 (C. S. T.)—10:45 A. M., weather and business reports. 1:30 P. M., market reports. 3, dance program.

WBZ, Springfield, Mass., 337 (E. S. T.)—11:55 A. M., time, weather. 6 P. M., Leo Reisman ensemble. 6:30, Copley-Plaza orch. 7, market report. 7:05, bedtime story. 7:30, Hotel Kimball trio. 9, Leon Weltman, violinist. 9:30, C. F. Hein, trumpeter. 9:55, time, weather.

KFI, Los Angeles, 469 (P. S. T.)—5 P. M., Herald news. 5:30, Examiner news. 6:45, speaker. 7, dance orch. 8, vocal and instrumental recital. 9, Examiner studio. 10, Packard Radio Club.

WOR, Newark, N. J., 405 (E. S. T.)—7 A. M., gym class under Arthur E. Bagley. 2:30 P. M., Emma E. Eenger, lyric soprano. 2:45, Sylvia Abrams, pianist. 3, Emma E. Senger, lyric soprano. 3:15, Sylvia Abrams, pianist. 3:30, Papp's orch. 6:15, Henry Jodel's orch. 7:15, resume of the day's sports by "Jolly Bill" Steink; 8 P. M., Schubert string quartet. 8:30, Mabelanna Corby, composer-pianist; Elizabeth Spencer, dram. soprano; Janel Bush-Hecht, mezzo contralto; William Stamm, tenor. 9, Arthur Wynne, inventor of the cross-word puzzle. 9:15, concert by the Schubert string quartet. 9:45, Charles L. H. Wagner. 10:05, program under Mabelanna Corby. 10:30, "Irving Mills and His Radio Gang."

WNYC, New York City, 526 (E. S. T.)—6:20 P. M., Uncle Robert, "Hazards of Jay Walking." 6:30, Sam Wooding's Club Alabama orch. 7:30, police alarms. 7:35, Sam Lamm and his dance orch. 8:30, police quartet. 9, Professor James M. Lee, director school of journalism. N. Y. U. American Newspapers. 9:15, Willy Helm, concert zither; George Natanson, ukulele. 9:45, Frederick E. Benson's orch. 10:30, police alarms and weather.

WEBH, Chicago, 370 (E. S. T.)—7 P. M., Edgewater Beach Oriole orch. Dr. Herbert W. Virgin; musical bits. 9, Langdon Brothers; Edgewater Beach Oriole orch.; Harie Kelly, readings. 11, Edgewater Beach Oriole orch.; Cambridge Sisters, songs; Langdon Brothers, Hawaiian guitars; Banks Kennedy, piano logues; Wayne Meyers, songs; Loos Brothers, songs.

WBZ, Springfield, Mass., 337 (E. S. T.)—10:55 A. M., church services, Reverend James Gordon Gilkey, pastor. 3:25 P. M., Peoples Symphony orch. 7, Copley-Plaza orch. 8, concert direct from the Estey Organ Studio, Artis de Volt. harpist; Charlotte de Volt, violinist, and Grant Drake, organist.

Sunday, December 28

WIP, Philadelphia, 509 (E. S. T.)—10:45 A. M., morning service, Rev. Floyd W. Tompkins, rector. 4 P. M., "Sunday Talk" Meeting; lecture by Dr. William C. Ellis.

KGO, Oakland, Cal., 312 (P. S. T.)—11 A. M., service, C. S. S. Dutton, minister. 3:30 P. M., KGO Little Symphony Orch. 8, service of the First Unitarian Church.

WEBH, Chicago, 370 (E. S. T.)—5 P. M., twilight musicale. 7, selected artists.

WBZ, Springfield, Mass., 337 (E. S. T.)—11:55 A. M., time, weather, market reports. 6 P. M., Westinghouse Philharmonic trio. 7, market report. 7:05, bedtime story. 7:15, "Bringing the World to America"; news from the National Industrial Conference. 7:30, Hotel Brunswick orch. 8, hockey game.

Monday, December 29

WEEL, Boston, 303 (E. S. T.)—6:30 P. M., Dok-Eisenbourg and his Sinfonians. 7, Big Brother Club. 7:45, musicale. 8:45, "Buddy's Bostonians." 9:30, The Mendelssohn Singers. 10:30, Eisenbourg Sinfonians.

KGO, Oakland, Cal., 312 (P. S. T.)—11:30 A. M., luncheon concert. 1:30 P. M., N. Y. and S. F. stock reports and weather. 3, Studio musical program. 4, Henry Halstead's Dance Orch. 5:30, Aunt Betty stories. 6:45, final reading, stock reports, weather, S. F. produce news, and news items. 8, educational program. 10, Henry Halstead's orch. and soloists.

WFAA, Dallas, Tex., 476 (C. S. T.)—12:30 P. M., address Dr. J. D. Boon, astronomer. 8:30, Alita Club, a brass band, twenty-five ladies.

WWJ, Detroit, 517 (E. S. T.)—8 A. M., setting-up exercises by R. J. Horton. 9:30, "Tonight's Dinner." 9:45, Public Health Service bulletin. 10:25, weather. 11:55, time. 3 P. M., News orch. 3:50, weather. 3:55, market reports. 8:30, The Detroit News orch.; F. Eugene Wilson, baritone; Miss Margaret Foy, soprano.



THE RADIO FRANKS, of national radio fame, are Frank Bessinger (left) and Frank Wright (right). Their voices would be known to millions as soon as they spoke, but here they are, folks, in real life. They are touring the country now on the B. F. Keith circuit. Their radio reputes helped to make this possible.

WBZ, Springfield, Mass., 337 (E. S. T.)—11:55 A. M., time, weather, market report. 6 P. M., L. S. Wiggins ensemble. 7, market report. 7:05, bedtime story. 7:15, world market survey. 8:30, program by Harold W. Gar, basso cantate; Lillian Avir Albert, mezzo-soprano; Betty Waitskin and Louis McMannon, accompanists. 8:50, Beethoven tri. 9:20, Triqua ensemble. 9:55, time, weather.

WHO, Des Moines, Ia., 526 (E. S. T.)—7:30 P. M., Hibbard Cleveland, basso; Myrtle Williams, soprano; Helen Birmingham, accompanist. 8, classical program. 12, organ recital, L. Carlos Meier, organist.

WGR, Buffalo, N. Y., 319 (E. S. T.)—6:30 P. M., Vincent Lopez. 8:15, recital, Miss Albedrina Wall. 8:45, address, "The Court Stenographer," by J. J. Healy. 9, Gold Medal entertainment. 11, Addy Britt, Dick Finch, Cameo Record artists.

Tuesday, December 30

WEEL, Boston, 303 (E. S. T.)—6:30 P. M., Dok-Eisenbourg and his Sinfonians. 7, Big Brother Club. 7:30, Somerford mandolin quintet, Myrtle M. Shattuck, leader. 8:15, The Baxter Trio. 9, "Eveready Hour." 10, Goodrich Silvertown Cord orch.

KGO, Oakland, Cal., 312 (P. S. T.)—11:30 A. M., luncheon concert. 1:30 P. M., N. Y. and S. F. stock reports and weather. 4, concert orch. 6:45, final reading, stock reports, weather, S. F. produce news, and news items. 8, program of church music. 10, Henry Halstead's orch.

WWJ, Detroit, 517 (E. S. T.)—8 A. M., setting-up exercises by R. J. Horton. 9:30, "Tonight's Dinner." 9:45, Fred Shaw, pianist and popular songster. 10:25, weather. 11:55, time. 3 P. M., News orch. 3:50, weather. 3:55, market reports. 8:30, News orch.; Miss Barbara Case, soprano.

WBZ, Springfield, Mass., 337 (E. S. T.)—11:55 A. M., time, weather, market report. 6 P. M., Leo Reisman Hotel Lenox ensemble. 7, market report. 7:05, bedtime story. 7:15, Civil Service exam. 7:30, Demetrius S. Zades, tenor. 7:45, Charles Hextor orch. 8:15, Demetrius S. Zades, tenor. 8:30, Mrs. Irene Simpson Rommel, pianist. 8:45, George Leo Patterson, talk on Starlore. 9:15, Lyric quartet. 9:30, Irene Simpson Rommel. 9:45, Night Service. 9:55, time, weather. 11, Watch Year's Eve program.

WGR, Buffalo, N. Y., 319 (E. S. T.)—6 P. M., Hallpryd String Quartet. 9, The Eveready Hour. 10, Goodrich Silvertown Cord Orchestra.

Wednesday, December 31

WEEL, Boston, 303 (E. S. T.)—6:30 P. M., Dok-Eisenbourg and his Sinfonians. 7, Big Brother Club. 7:30, Helen Tracy, pianist. 8, Philharmonic concert by the Philharmonic society orch. 11, midnight organ recital, Lloyd G. Del Castillo.

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

news items. 10, Henry Halstead's orch. soloists. WFAA, Dallas, Tex., 476 (C. S. T.)—12:30 P. M., music by representatives of a Dallas theatre.

WWJ, Detroit, 517 (E. S. T.)—8 A. M., setting-up exercises by R. J. Horton. 9:30, "Tonight's Dinner." 9:45, Public Health Service bulletin. 10:25, weather. 11:55, time. 3 P. M., News orch. 3:50, weather. 3:55, market reports. 8, Jean Goldkette's Victor Recording orch.

WBZ, Springfield, Mass., 337 (E. S. T.)—11:55 A. M., time, weather, market report. 6 P. M., Westinghouse Philharmonic trio. 7, market report. 7:05, bedtime story. 7:15, "At the Theatres" with A. L. S. Wood. 8, Arlington Mills band. 8:15, Goldie Shour, violinist; Dorothy Kraemer, pianist. 8:30, Arlington Mills band. 8:45, Lula Sackett Morgan, contralto. 9, Arlington Mills band. 9:15, Lula Sackett Morgan, contralto. 9:30, program of dance music by McEnelly's singing orch. 9:45, Westinghouse Philharmonic trio. 9:55, time, weather.

WGR, Buffalo, N. Y., 319 (E. S. T.)—6:30 P. M., Vincent Lopez.

WHO, Des Moines, Ia., 526 (E. S. T.)—7:30 P. M., The Bankers Life Radio Orch., Wm. L. Marsh, director. Mrs. Louis F. Bond, soprano.

Thursday, January 1

WEEL, Boston, 303 (E. S. T.)—6:30 P. M., Dok-Eisenbourg and his Sinfonians. 7, Big Brother Club. 7:30, musicale. 9, Gillette Safety Razor dance orch.

KGO, Oakland, Cal., 312 (P. S. T.)—11:30 A. M., luncheon concert. 4 P. M., concert orch. 8, Bernade Solis, pianist; Frank Miller, baritone; Jenette Genter, viola soloist Bacatolone string quartet; Virginia Freadwell, contralto; Fern Backman, violinist; address, "New Year's Resolutions," by C. S. S. Dutton, minister of the First Unitarian Church, San Francisco; Grace Becker, cellist; Selma Mayer, soprano. 10, Henry Halstead's orch. and soloists.

WWJ, Detroit, 517 (E. S. T.)—8:30 P. M., Jean and Theone, song fashions. 10, Jean Goldkette's Victor Recording orch. 11:30, News orch.

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

WFAA, Dallas, Tex., 476 (C. S. T.)—6 P. M., Radio Bible Class, Dr. William M. Anderson. 9, singers from church. 8:30, Lee's Foxtrotters.

WGR, Buffalo, N. Y., 319 (E. S. T.)—6 P. M., Hallpryd String Quartette.

Friday, January 2

KFAE, Pullman, Wash., 330 (P. S. T.)—Piano solos, Mariam Zimmerman; cornet solos, William P. Hanson; piano solos, Ivar Melander, Pullman; essentials of successful farm management, Prof. Geo. Severence; present tendencies in automobile design, Prof. A. C. Abell; success or failure with bees, B. A. Slocum; book reviews, Alice L. Webb.

KGO, Oakland, Cal., 312 (P. S. T.)—11:30 A. M., luncheon concert. 1:30 P. M., N. Y. and S. F. stock reports and weather. 3, studio musical. 5:30, The Girls' Half Hour. 6:45, stock reports, weather, S. F. produce news, and news items.

WFAA, Dallas, Tex., 476 (C. S. T.)—12:30 P. M., address, Dr. Robert Stewart Hyer. 8:30, Mrs. George S. Watson, soprano, and Mrs. Jesse Lee Johnson, contralto; Mrs. Juanita Blair Price, accompanist.

WWJ, Detroit, 517 (E. S. T.)—8 A. M., setting-up exercises. 9:30, "Tonight's Dinner." 9:45, Public Health Service bulletin. 10:25, weather. 11:55, time. 3, News orch. 3:50, weather. 3:55, market reports. 8:30, The Detroit News orch.; Anne Campbell, host; Claudine Secor, soprano; Francis Firth, baritone.

WBZ, Springfield, Mass., 337 (E. S. T.)—11:55 A. M., time, weather. 7 P. M., market report. 7:05, bedtime story. 7:30, Hotel Kimball trio. 8, Albert D. Edwards, baritone. 8:15, Hotel Brunswick orch. 8:30, Hope Wright, violinist. 8:45, Joan Stuart, soprano. 9, baritone. 9:15, Edward Morgan, songs and pianologues; Robert Day, reader. 9:30, Hope Wright, violinist. 9:45, Hotel Brunswick orch. 9:55, time, weather. 10, to be announced.

WHO, Des Moines, Ia., 526 (E. S. T.)—7:30 P. M., Personnel: The Garber quartet and entertainers; Alma Garber Bridges, soprano and pianist; Miss Ruth Garber, contralto. Mr. Paul Garber, tenor and banjo soloist; Mr. Leon Garber, bass; Mr. Leon Garber, accompanist; Mr. Neil Garber, banjo soloist; Mr. M. P. Garber, tenor; M. L. T. Bridges, baritone soloist.

"THE INSIDE STORY OF THE TUBE," by Abner J. Gelula. What happens on a tube. What tubes to use for different circuits. Send 15 cents for copy of November 29 issue to RADIO WORLD.

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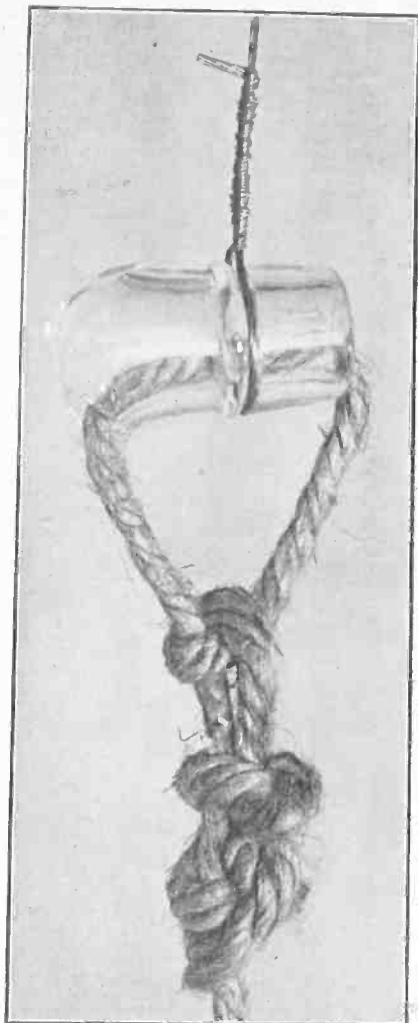
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Broken Bottle An Insulator

Zoo "Artists"



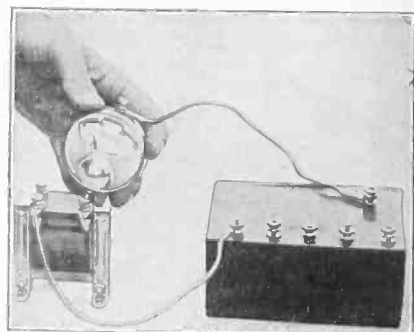
"REJUVENATING" old bottles. Edward Noguera has found that old bottles, purposely broken, make really good aerial insulators. Others may profit by the above illustration. The neck of a broken bottle is very good. The rope leading to the tree goes through the inside of the glass, the aerial proper wound around the outside. The idea is as good as it is novel. (Kadel & Herbert.)



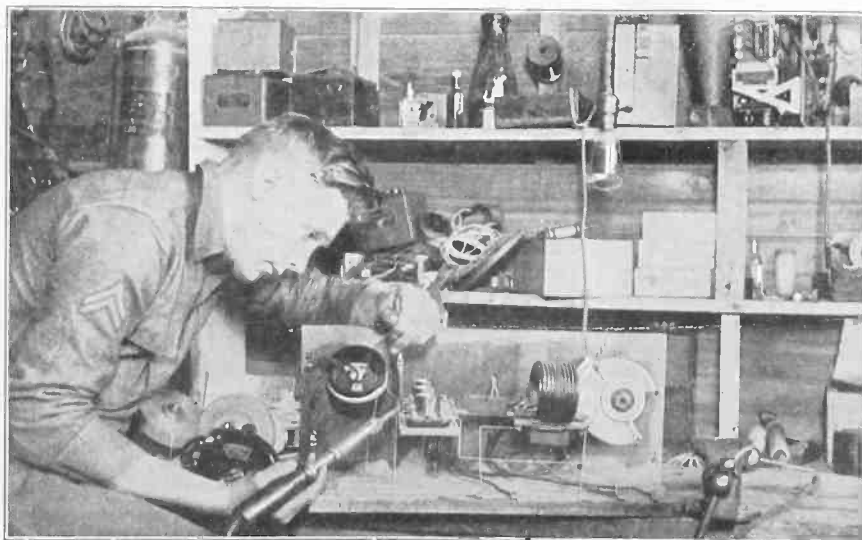
MEET Edward Noguera, discoverer of the "bottle insulator." He admits they're not much for looks, but he claims that they are very effective. No instructions are necessary for taking the neck off the bottle. However, a glass-cutter makes a clean, neat job and presents an insulator that is really efficient. After the neck is taken off, it may be moulded to a desired shape by heating. Placing the neck over a bunsen burner, the rope through it, will make the glass melt so as to firmly hold the rope in place, thus preventing wear to the edges as it sways. (Kadel & Herbert.)



HIGH C? We should say, rather, low C, for Leo and Hippo voice their disapproval most strenuously at this intrusion. (International Newsreel.)



ALL coils, phones and transformers should be tested with a voltmeter, as shown, for a break in the winding. (Kadel & Herbert.)



A 15-WATT transmitter that has been heard in England. The photo shows Sergt. Frampton doing some repair work on a little sending set built by Capt. Thomas C. Reeves at Camp Vail, N. J. (United.)

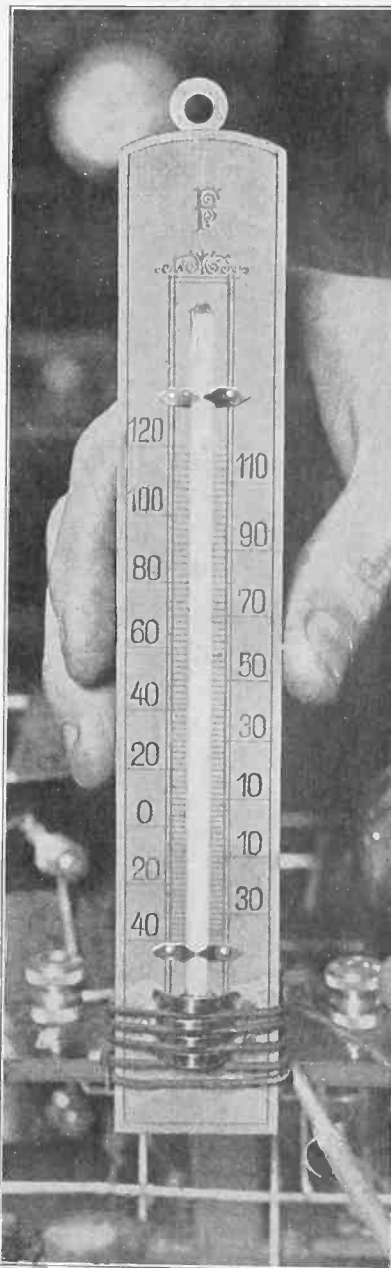


EARL CARROLL'S chorus solve cross-word puzzle "Vanities," Playing in New York

Prince on Air

Baby's Delight

Try This One



LISTENING TO "a discourse on the electronic emission of the Thermionic Valve?" Perhaps. Or maybe trying to tune in the Prince of Wales. However, 6-months old Roy Yates, Jr., of Atlanta, Ga., seems to be enjoying the program immensely. (Underwood & Underwood.)

THE PRINCE OF WALES spoke at the dinner of the Motor and Cycle Trades Benevolent Fund, London, and the radio fans tuned him in. (Underwood & Underwood.)



TRY wrapping your dry A battery leads around the fountain of a thermometer to see if you can make an ammeter of it.

HERE is a potential location of noise. When putting your set together be sure that every connection is tight, and when examining the various parts, don't overlook the rheostat. (Kadel & Herbert.)

STATIC? No! Bad B batteries? No! A loose wire? No! Yet the noise and crackling persists. Look to your sockets. See that the contact is firm and clean. Use the screw-driver, as shown, to bend to contact springs so as to make the connection on the tube more permanent. (Kadel & Herbert.)



with the help of radio. These girls are from [unclear]. (Underwood & Underwood.)



RADIO is a boon to the police. The Chicago fast squad has automobiles equipped with sending apparatus. The police in the car are always in touch with headquarters. (United.)

Radio's Advance During 1924

THE year 1924 will go down in the annals of radio history as record-breaking. In the four years of radio broadcasting, 5,000,000 fans have gathered under its beneficent influences.

The year saw the advent of educational broadcasting. Large universities throughout the country broadcast series of lectures on various subjects of a more general nature. The applause mail always indicates the appreciation of the public, and, like an encore, a desire for more.

The use of radio as a beacon was brought to realization with greater emphasis when 1924 brought the round-the-world aviation laurels to American fliers, when they completely circumnavigated the globe. Radio was a big factor in guiding these men, and keeping them on their course during night and fog flying.

1924 saw radio control brought up to a wonderful degree of perfection. Vehicles many miles away were completely controlled by a remote operator. Torpedoes were made to go directly to the mark by radio control. Automobiles were guided in heavy traffic by radio control. Big, bulky warships that require large crews were completely controlled by a land operator, even to the blowing of the whistle.

Attempt to Hear Mars

In 1924, Mars was as close to the earth as any man living could ever remember. Radio engineers thought this a good opportunity to make an attempt at signaling the planet to ascertain, if possible, by radio, if intelligent creatures inhabit it. Some "engineers" recognized the potential possibilities for securing some free advertising at this time, and reported the following day of the hearing of "some mysterious signals." However, this was obviously never confirmed, and since it was only a mere handful of people who reported hearing anything unusual, the incident was passed by without more comment. It will be many, many years before Mars will be in such close proximity again—better luck next time.

The year started with a movement to banish regenerative sets from the broadcasting waveband. The movement met with no great success, because of the sacrifice of distance and volume for the 1-tube-set owners. The majority decided that they would keep their sets, would do their best to keep it from re-radiating, and boost the non-regenerative set.

An important advance in broadcasting was the transmitting and receiving on short wavelengths. Its practicability has been thoroughly demonstrated at KFKX. We might expect near-future broadcasting to be accomplished entirely under 100 meters. At these short waves, interference will be greatly reduced, and it will be no feat to tune from 75 to 77 meters without the least semblance of interference. Stations will be tuned to fractions of a meter, for instance, we may read the wavelength of a future station thusly: WEAF, $72\frac{1}{4}$ meters; KGO, $72\frac{1}{2}$ meters; WGBS, $70\frac{3}{4}$ meters. This is not too distant, either.

Transmission on a Beam

Marconi did much experimental work along the lines of directional transmission. He was successful to small extent, having transmitted concentrated energy along the beam of a light for over a mile.

Perhaps the epoch-making event of the year was the transmission of photographs over 3,000 miles, by wireless. After two years of experiment, the task was at last completed and photos were actually transmitted over the 3,000 miles of ocean, and reproduced within 25 minutes. This is but a beginning in photo-transmission—watch 1925. When one of these pictures can be transmitted in 1/16 of a second,

Radio Cross-Word Puzzle

Send your solution to Radio Cross-Word Puzzle Editor, RADIO WORLD, 1493 Broadway, New York City. The names of those sending the correct solution will be published. Refer to Radio Cross-Word Puzzle No. 4.

HORIZONTAL

- 1—A set generating currents.
- 10—Symbol of Voltaic Alternatives (Abbr.)
- 11—That is (Abbr.)
- 13—Personal Pronoun.
- 14—Electrical Engineer (Degree).
- 15—Noun suffix occurring in diminutives.
- 16—Anode (Abbr.)
- 17—Symbol used in magnetic permeability.
- 18—Fifth letter of the alphabet.
- 22—Call letters: Berekley Gazette (Calif.)
- 26—London Radio Association (Abbr.)
- 27—Drawing.
- 30—Seventh letter of the alphabet.
- 31—A letter used to designate current in formulae.
- 33—To eat (past tense).
- 34—To mistake.
- 37—Abbreviation for detector.
- 38—Symbol for energy.
- 40—Symbol of resistance.
- 41—Battery (Abbr.)
- 43—Negative (Abbr.)
- 44—A well-known radio company (Abbr.)
- 46—To wrong.
- 47—A fool.
- 48—Symbol of amperage.
- 49—Power (Symbol).
- 50—An abbreviation used to denote filament battery.
- 51—Anode (Abbr.)
- 52—Below (Prefix).
- 53—A box containing two equal resistances.
- 54—It.
- 55—3.1416; used in finding circumference of forms; a Greek letter.
- 56—To say.
- 57—A signal of distress.
- 58—A dielectric used in variable condensers.

VERTICAL

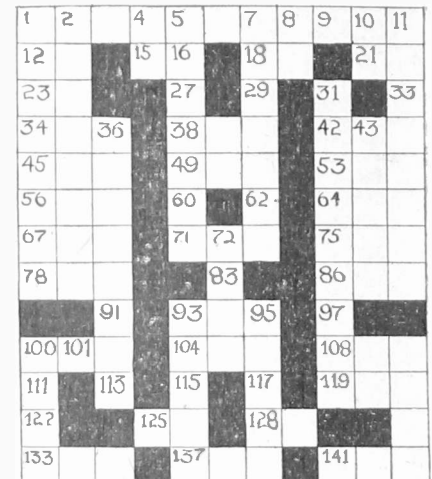
- 1—To overtax an instrument.
- 2—A point in regeneration at which the tube over-oscillates.
- 3—Evidence of egotism.
- 4—A loss.
- 5—An instrument for measuring current.
- 9—The minus pole of a battery.
- 21—A device for filtering the incoming wavelength.
- 18—The ground end of the ground wire (PI).
- 25—Incoming power.
- 35—Back of the cabinet.
- 41—Periodic vibration varying in amplitude.
- 42—Devices for selecting signals.
- 44—Due to the emission of a certain machine.
- Bus-Bar (Abbr.)

you may prepare yourself for the radio motion-picture. It's only a few steps now.

The trend for the past year in the popularity of circuits has been a bit backward. 1923 brought the Neutrodyne, its popularity was almost immediate, swelling like a gigantic wave, all through 1923, through 1924 and we would not be at all surprised that the crest will not be reached before 1925 is pretty well spent. It is a wonderful 5-tube circuit, very simple to tune and give good tonal quality. The Super-Heterodyne, at the beginning of 1924, was in the hollow of the cycle. However, at the finale of 1924 the Super-Het. has again placed itself over all radio circuits claiming to be "The Rolls-Royce of Radio." 1925 will see, without doubt, a tremendously increased popularity in the Super-Heterodyne, for after all, it is the only set for he who wants the best. In 1924 Major Armstrong, after developing the second harmonic Super-Het. placed it on the market. However, personally, we prefer the good, old, natural Super for DX. selectivity and modulation.

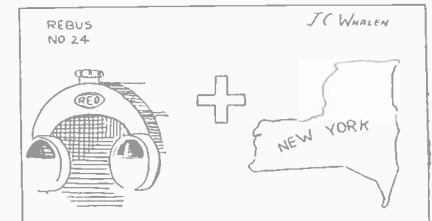
Radio Shows Popular

The recent radio shows were certainly indicative of the increased popularity of radio. 200,000 people in New York, and fully the same number in Chicago, paid 50c admission to see the latest in radio transmission and reception. Without doubt this number would have been 500,000 had not the police reserves and firemen been called out to keep the tremendous crowds out of the already overcrowded hall.



The Weekly Rebus

WHAT does this rebus represent? Send answer to Rebus Editor, RADIO WORLD, 1493 Broadway, New York City.



The names of those sending the solution will be published.

mendous crowds out of the already overcrowded hall.

McMillan again visited the North Pole region in 1924. This time, radio accompanied him, and he was in constant touch with civilization. He reported that the broadcasting from the United States and Canada came through very clear, although at the Pole reception seemed to be decidedly directional from the East and West, while stations to the North and South of him could hardly be heard at all.

Of interest to the entire radio fraternity is the fact that RADIO WORLD rose to nearly 100,000 circulation.

In November of 1924, during International Radio Week, many hundreds, even thousands of radio men refused to sleep till the "wee sma' hours" so as to record 2LO or PTT or other European stations. All stations in the United States signed off early so as to allow this distance reception. Thousands reported hearing Europe with everything from a simple 1-tube set to a complex multitude Super-Heterodyne. "A good time was had by all."

Summing up, 1924 saw the advent of: the international tests, super-power, improved remote-control, beam transmission, photographic transmission, increased popularity, McMillan's report, growth of paid radio advertising, attempts to signal Mars, RADIO WORLD'S increase in circulation, radio control by remote operators, broadcasting of educational lectures, and low wave transmission and reception.

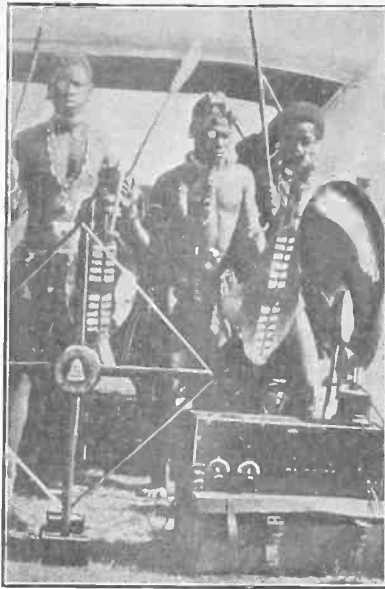
White Man's Wiles Used in Wilds

THAT the white man has not given the wild man a square deal the world 'round is an historic fact, and now we have simply another example of the imposition of civilization's trickery on the savage. In South Africa some white men made a trip with a black "magic box," fitted to which was a device that looked like a horn. The combined contraption was set up in successive villages of the Dark Continent and some of the simple-minded and not too fully clothed natives were enticed to the scene of the deception. These denizens of the Transvaal, some of them wearing monocles as if to prove that they are nothing if not refined, arrayed themselves with all their panoply and tomahawks. Although none of them could speak English, and nobody in the cheating party was master of the Zulu tongue, an effort was made to put across the gross deception.

One of the white men of the exhibition party planked down the box, which had round objects on its front elevation. Beside the box he placed a device that held square turns of wire. Atop the set he placed the horn-like instrument. Then, like Hermann the magician, he pulled up his sleeves a few inches, just to show there was nothing concealed thereunder, and made a few passes with his deft hands. He seemed to be invoking the sorcerers of history to the aid of his "medicine show." Then he turned the round objects on the set and moved the squared turns of wire in a given direction, saying:

"We will now listen to Station JB, Johannesburg, 300 miles away."

Then, further to carry on his queer trick, by some manner to the affiant unknown, he managed to obtain the reproduction of music. He beckoned to the headman of the tribe to come forward. The music, which was seemingly coming out of the horn, became suddenly subdued, after the magician turned a switch on the box. Then he passed a coupled pair of small round black objects to the headman and signified to that local potentate to place these objects on his ears. The headman obeyed, although rather cautiously, for he had been gypped out of two United Cigar Store coupons by a previous expedition of white men, and bitterness over that great loss was still smouldering within him. Once the uncanny objects were on his head the headman began rapidly to move his feet. The civilized spectators agreed that he was danc-



ZULUS arrayed before the mischievous box, horn and square-turned wire that was alleged to have received music and speech from Johannesburg, Africa, 300 miles from the spot where this photo was taken. (Gilliams.)

ing. The headman began to recede from the "singing and talking box" until it seemed he would pull the deceptive object off its base, but the white chief of the expedition restrained him. The headman was induced to give up the "earphones," as his wily host termed them, only on being bribed with an English penny, for adornment of his ear.

Thus the party travelled from village to village and town to town, actually in some manner obtaining the production or reproduction of music and speech, which led many of the wise white natives to suppose that a phonograph was concealed within the mischievous box. The stop-and-skip party was composed of scientists who talked about their achievements being merely a reception of electrical impulses broadcast from Johannesburg. They called their dark business "radio." None of the black natives subscribed even one colored bead to the stock of the corporation backing the deviltry.

An investigation is under way.



MAGNAVOX Vacuum Tubes

THESE Amplifier and Detector Tubes are a most important contribution to the efficiency of radio reception.

As radio frequency amplifiers Magnavox Type A Tubes are especially useful, having less than one-half the internal capacity of ordinary tubes.

The Magnavox Detector Tube is free from microphonic noises and will operate without a grid leak.



Type A and Type D—Six-volt storage battery tubes with standard base \$5.00

Magnavox Radio Products are sold by good dealers everywhere. Catalog on request.

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

Local Reception Is Preferred to DX by Chief Radio Supervisor

WHY is it that most everybody with a large radio set prefers a distant program to that of the local station? This is a question that is perplexing Chief Radio Supervisor W. D. Terrell.

Mr. Terrell himself is perfectly satisfied with the local programs, because better reception is possible. But Mrs. Terrell would rather listen-in on Philadelphia, Springfield, Mass., New York, Chicago, or other distant stations.

The same thing applies to around 100,000 other fans, judging from letters Mr. Terrell has received from different parts of the country.

"I suppose it's because most people

prefer something hard to get to something that is easily obtainable," said Mr. Terrell. "The local station can be brought in without difficulty under almost any circumstances. On the other hand, it is difficult to get a clear program consistently from distant stations. It may come in good for half an hour, and then static, interference or fading may spoil it for an hour. Things that you miss sometimes seem more desirable than they really would be if you should get them.

"Again, I suppose a lot of persons haven't gotten over the wonder of listening in on voices or music far away."

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The year started with a movement to banish regenerative sets from the broadcasting waveband. The movement met with no great success, because of the sacrifice of distance and volume for the 1-tube-set owners. The majority decided that they would keep their sets, would do their best to keep it from re-radiating, and boost the non-regenerative set.

An important advance in broadcasting was the transmitting and receiving on short wavelengths. Its practicability has been thoroughly demonstrated at KFKX. We might expect near-future broadcasting to be accomplished entirely under 100 meters. At these short waves, interference will be greatly reduced, and it will be no feat to tune from 75 to 77 meters without the least semblance of interference. Stations will be tuned to fractions of a meter, for instance, we may read the wavelength of a future station thusly: WFAF, 72¼ meters; KGO, 72½ meters; WGBS, 70¾ meters. This is not too distant, either.

Transmission on a Beam

Marconi did much experimental work along the lines of directional transmission. He was successful to small extent, having transmitted concentrated energy along the beam of a light for over a mile.

Perhaps the epoch-making event of the year was the transmission of photographs over 3,000 miles, by wireless. After two years of experiment, the task was at last completed and photos were actually transmitted over the 3,000 miles of ocean, and reproduced within 25 minutes. This is but a beginning in photo-transmission—watch 1925. When one of these pictures can be transmitted in 1/16 of a second,

Radio Cross-Word Puzzle

Send your solution to Radio Cross-Word Puzzle Editor, RADIO WORLD, 1493 Broadway, New York City. The names of those sending the correct solution will be published. Refer to Radio Cross-Word Puzzle No. 4.

HORIZONTAL

- 1—A set generating currents.
- 10—Symbol of Voltaic Alternatives (Abbr.)
- 11—That is (Abbr.)
- 13—Personal Pronoun.
- 14—Electrical Engineer (Degree).
- 15—Noun suffix occurring in diminutives.
- 16—Anode (Abbr.)
- 17—Symbol used in magnetic permeability.
- 18—Fifth letter of the alphabet.
- 22—Call letters: Berkeley Gazette (Calif.)
- 26—London Radio Association (Abbr.)
- 27—Drawing.
- 30—Seventh letter of the alphabet.
- 31—A letter used to designate current in formulae.

- 33—To eat (past tense).
- 34—To mistake.
- 37—Abbreviation for detector.
- 38—Symbol for energy.
- 40—Symbol of resistance.
- 41—Battery (Abbr.)
- 43—Negative (Abbr.)
- 44—A well-known radio company (Abbr.)
- 46—To wrong.
- 47—A fool.
- 48—Symbol of amperage.
- 49—Power (Symbol).
- 50—An abbreviation used to denote filament battery.
- 51—Anode (Abbr.)
- 52—Below (Prefix).
- 53—A box containing two equal resistances.
- 54—It.
- 55—3.1416; used in finding circumference of forms; a Greek letter.
- 56—To say.
- 57—A signal of distress.
- 58—A dielectric used in variable condensers.

VERTICAL

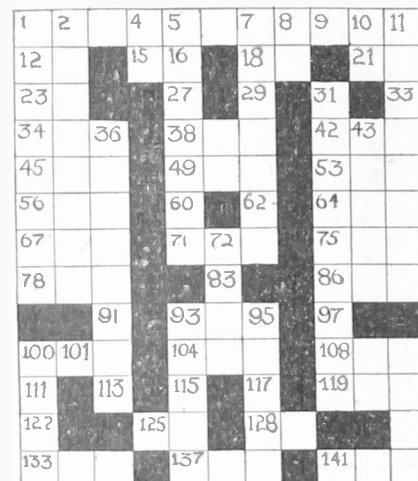
- 1—To overtax an instrument.
- 2—A point in regeneration at which the tube over-oscillates.
- 3—Evidence of egotism.
- 4—A loss.
- 5—An instrument for measuring current.
- 9—The minus pole of a battery.
- 21—A device for filtering the incoming wavelength.
- 18—The ground end of the ground wire (P1).
- 25—Incoming power.
- 35—Back of the cabinet.
- 41—Periodic vibration varying in amplitude.
- 42—Devices for selecting signals.
- 44—Due to the emission of a certain machine.
- Bus-Bar (Abbr.)

you may prepare yourself for the radio motion-picture. It's only a few steps now.

The trend for the past year in the popularity of circuits has been a bit backward. 1923 brought the Neutrodyne, its popularity was almost immediate, swelling like a gigantic wave, all through 1923, through 1924 and we would not be at all surprised that the crest will not be reached before 1925 is pretty well spent. It is a wonderful 5-tube circuit, very simple to tune and give good tonal quality. The Super-Heterodyne, at the beginning of 1924, was in the hollow of the cycle. However, at the finale of 1924 the Super-Het. has again placed itself over all radio circuits claiming to be "The Rolls-Royce of Radio." 1925 will see, without doubt, a tremendously increased popularity in the Super-Heterodyne, for after all, it is the only set for he who wants the best. In 1924 Major Armstrong, after developing the second harmonic Super-Het. placed it on the market. However, personally, we prefer the good, old, natural Super for DX, selectivity and modulation.

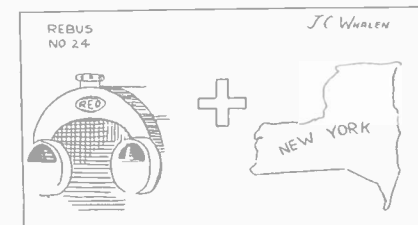
Radio Shows Popular

The recent radio shows were certainly indicative of the increased popularity of radio. 200,000 people in New York, and fully the same number in Chicago, paid 50c admission to see the latest in radio transmission and reception. Without doubt this number would have been 500,000 had not the police reserves and firemen been called out to keep the tre-



The Weekly Rebus

WHAT does this rebus represent? Send answer to Rebus Editor, RADIO WORLD, 1493 Broadway, New York City.



The names of those sending the solution will be published.

mendous crowds out of the already overcrowded hall.

McMillan again visited the North Pole region in 1924. This time, radio accompanied him, and he was in constant touch with civilization. He reported that the broadcasting from the United States and Canada came through very clear, although at the Pole reception seemed to be decidedly directional from the East and West, while stations to the North and South of him could hardly be heard at all.

Of interest to the entire radio fraternity is the fact that RADIO WORLD rose to nearly 100,000 circulation.

In November of 1924, during International Radio Week, many hundreds, even thousands of radio men refused to sleep till the "wee sma' hours" so as to record 2LO or PTT or other European stations. All stations in the United States signed off early so as to allow this distance reception. Thousands reported hearing Europe with everything from a simple 1-tube set to a complex multitude Super-Heterodyne. "A good time was had by all."

Summing up, 1924 saw the advent of: the international tests, super-power, improved remote-control, beam transmission, photographic transmission, increased popularity, McMillan's report, growth of paid radio advertising, attempts to signal Mars, RADIO WORLD's increase in circulation, radio control by remote operators, broadcasting of educational lectures, and low wave transmission and reception

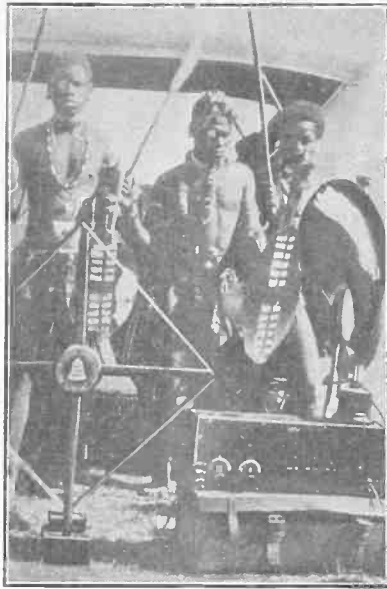
White Man's Wiles Used in Wilds

THAT the white man has not given the wild man a square deal the world 'round is an historic fact, and now we have simply another example of the imposition of civilization's trickery on the savage. In South Africa some white men made a trip with a black "magic box," fitted to which was a device that looked like a horn. The combined contraption was set up in successive villages of the Dark Continent and some of the simple-minded and not too fully clothed natives were enticed to the scene of the deception. These denizens of the Transvaal, some of them wearing monocles as if to prove that they are nothing if not refined, arrayed themselves with all their panoply and tomahawks. Although none of them could speak English, and nobody in the cheating party was master of the Zulu tongue, an effort was made to put across the gross deception.

One of the white men of the exhibition party planked down the box, which had round objects on its front elevation. Beside the box he placed a device that held square turns of wire. Atop the set he placed the horn-like instrument. Then, like Hermann the magician, he pulled up his sleeves a few inches, just to show there was nothing concealed thereunder, and made a few passes with his deft hands. He seemed to be invoking the sorcerers of history to the aid of his "medicine show." Then he turned the round objects on the set and moved the squared turns of wire in a given direction, saying:

"We will now listen to Station JB, Johannesburg, 300 miles away."

Then, further to carry on his queer trick, by some manner to the affiant unknown, he managed to obtain the reproduction of music. He beckoned to the headman of the tribe to come forward. The music, which was seemingly coming out of the horn, became suddenly subdued, after the magician turned a switch on the box. Then he passed a coupled pair of small round black objects to the headman and signified to that local potentate to place these objects on his ears. The headman obeyed, although rather cautiously, for he had been gypped out of two United Cigar Store coupons by a previous expedition of white men, and bitterness over that great loss was still smouldering within him. Once the uncanny objects were on his head the headman began rapidly to move his feet. The civilized spectators agreed that he was danc-



ZULUS arrayed before the mischievous box, horn and square-turned wire that was alleged to have received music and speech from Johannesburg, Africa, 300 miles from the spot where this photo was taken. (Gilliams.)

ing. The headman began to recede from the "singing and talking box" until it seemed he would pull the deceptive object off its base, but the white chief of the expedition restrained him. The headman was induced to give up the "earphones," as his wily host termed them, only on being bribed with an English penny, for adornment of his ear.

Thus the party travelled from village to village and town to town, actually in some manner obtaining the production or reproduction of music and speech, which led many of the wise white natives to suppose that a phonograph was concealed within the mischievous box. The stop-and-skip party was composed of scientists who talked about their achievements being merely a reception of electrical impulses broadcast from Johannesburg. They called their dark business "radio." None of the black natives subscribed even one colored bead to the stock of the corporation backing the deviltry.

An investigation is under way.

Local Reception Is Preferred to DX by Chief Radio Supervisor

WHY is it that most everybody with a large radio set prefers a distant program to that of the local station? This is a question that is perplexing Chief Radio Supervisor W. D. Terrell.

Mr. Terrell himself is perfectly satisfied with the local programs, because better reception is possible. But Mrs. Terrell would rather listen-in on Philadelphia, Springfield, Mass., New York, Chicago, or other distant stations.

The same thing applies to around 100,000 other fans, judging from letters Mr. Terrell has received from different parts of the country.

"I suppose it's because most people

prefer something hard to get to something that is easily obtainable," said Mr. Terrell. "The local station can be brought in without difficulty under almost any circumstances. On the other hand, it is difficult to get a clear program consistently from distant stations. It may come in good for half an hour, and then static, interference or fading may spoil it for an hour. Things that you miss sometimes seem more desirable than they really would be if you should get them.

"Again, I suppose a lot of persons haven't gotten over the wonder of listening in on voices or music far away."



MAGNAVOX Vacuum Tubes

THESE Amplifier and Detector Tubes are a most important contribution to the efficiency of radio reception.

As radio frequency amplifiers Magnavox Type A Tubes are especially useful, having less than one-half the internal capacity of ordinary tubes.

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Toronto, Montreal, Winnipeg

A THOUGHT FOR THE WEEK

"I DIDN'T Raise My Boy To Be a Radioist," sings many a fond American mother. And she adds jubilantly: "But I'm glad he is one. It's better than wearing a peaked hat with the other loafers on the corner." She's right, too.

RADIO WORLD

File Reg. U. S. Pat. Off.



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

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PUBLISHED EVERY WEDNESDAY
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FROM PUBLICATION OFFICE
HENNESSY RADIO PUBLICATIONS CORPORATION
ROLAND BURKE HENNESSY, President
M. B. HENNESSY, Vice-President
FRED S. CLARIS, Secretary and Manager
1493 BROADWAY, NEW YORK, N. Y.
(Putnam Bldg., Times Square and 43rd Street)
European Representative: The International News Co.,
Breems Bldg., Chancery Lane, London, Eng. Paris,
France. Brentano's, 28 Avenue de l'Opera.

EDITOR, Roland Burke Hennessy
MANAGING EDITOR, Herman Bernard
TECHNICAL EDITOR, Abner J. Gelula

SUBSCRIPTION RATES

Fifteen cents a copy, \$6.00 a year, \$8.00 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.

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RATES—Page, 7 1/2 x 11", \$200.00; half page, 3 1/2" D. C. or 5 1/2" x 3 col., \$100.00; quarter page, 4 1/2" D. C., \$50.00; one col. 3 1/2 x 11" \$66.66, \$1.00 per inch. Per agate line, 50c. Times Discounts: 53 Consecutive Issues, 25%; 25 Times Consecutively, or M. O. W. One Year, 15%; 4 Consecutive Issues, 10%.

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

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

DECEMBER 27, 1924

All Readers Asked to Co-operate in Survey

EVERY reader of RADIO WORLD should do his or her share in trying to solve the problem of why radio, the greatest invention that ever conferred its blessings on the world, should rank only thirty-second as an industry. This ranking means that only a meagre percentage of the families in the United States have radio sets. For instance, the farmers have not taken to radio as they should. There is some underlying, undiscovered reason for this aloofness in city, town and countryside.

That there may be abundant opportunity for all to contribute their suggestions and comment, RADIO WORLD asks its readers to send in their own answers to the five questions published elsewhere on this page. For every letter published \$1 will be paid, merely as a token of appreciation, not as an appraisal of the value of the answers, which may be worth inestimably more. Address Survey Editor, RADIO WORLD, 1493 Broadway, New York City.

What's the Matter with Radio?

Great Responses Follow RADIO WORLD'S Announcement of Survey Designed to Give the Industry the Ranking It Deserves

THE announcement in RADIO WORLD, issue of December 20, of the undertaking by this publication of a Survey to determine why the number of phonographs, automobiles, etc., in use so far outranks the number of radio sets, has stirred up a great amount of interest throughout the United States. Both the trade and the fans have taken up the work of helping to solve this problem with as much interest and enthusiasm as if it were one personal to themselves.

As the first step toward discovering the reasons and doing something about them, RADIO WORLD is authorizing the members of the American Broadcast Club to solicit the opinion of The Man on the Street—the best-known as most popular person in the world and whose voice counts in everything—to determine what he thinks of radio and what should be done to gain for it the place it deserves.

A committee of experts will be convoked and before them all the reports gathered by RADIO WORLD, through its readers and its Statistical Bureau, will be laid. This expert committee will formulate recommendations, which will be submitted to fans and the industry for co-operative effort in putting the recommendations into effect.

The Survey is important to every one who has any interest in radio. Its progress will be watched with keen interest by radioists. Any suggestions regarding the Survey will be welcome indeed. Address Survey Editor, RADIO WORLD, 1493 Broadway, New York City.

The A. B. C. is Mobilized in Radio World's Industrial Survey

THE members of the A. B. C., as the American Broadcast Club founded by RADIO WORLD is called, are hereby asked to constitute themselves reporters to ascertain what The Man on the Street thinks about radio. This applies to present and future members. The object is to compile an accurate report representing public opinion of radio.

Each member of the A. B. C. is authorized to interview persons to determine

1. Whether the person interviewed has a radio.
2. If not, why.
3. If so, what does he or she think of radio as a provider of information, entertainment and instruction.
4. Whether he or she is a radio experimenter, trying out various hook-ups at home.
5. What fault, if any, he or she has to find with radio reception, programs or policies, and what remedies to overcome the objections?

The questionnaire is a part of RADIO WORLD'S Natural Survey to discover why radio is so far outranked by the automobile, phonograph and other inventions as to the number in use.

The questions may be asked of any one you know, or passersby may be stopped on the street and interviewed by the inquiring reporter. When members of the A. B. C. send in their reports they should be sure to give their own name and address and the names and addresses of those interviewed.

RADIO WORLD will pay \$1 for every separate interview published. That means if your interview with John Jones is published you will receive \$1, and if your interview with Alice Smith also is published

you will receive \$2, etc. You are at liberty to ask the interviewed person any other question pertinent to the Survey, but be sure to include all five questions enumerated above.

Those who are not members of the A. B. C. may become such simply by sending in their names and address to A. B. C. Editor, RADIO WORLD, 1493 Broadway, New York City, and requesting that they be placed on the list of the members. The coupon may be used, if desired. There are absolutely no obligations involved, no dues, no assessments, no cost of any sort whatsoever. The object of the A. B. C. is to unite those interested in radio for the promotion of its welfare whenever opportunity arises, and even then co-operation on the part by members is entirely optional with them.

Members who desire identification cards, on which the five questions are printed, with room for answers, names, addresses, etc., may obtain them free by addressing A. B. C. Editor.

Fill Out This Coupon

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

Please enroll me as a member of
the American Broadcast Club.

Name

Address

City or Town

State

Class B Stations Slated to Divide Time on Air

WASHINGTON.

NEARLY every class B broadcasting station in the country, with the exception of those on the Pacific Coast, may be required to divide time at least two ways by Christmas. This prediction, which is made by the Radio Bureau of the Department of Commerce, is based on the expected increase of this class of stations during the next few weeks.

It was believed by radio officials that the National Radio conference had made provision for a sufficient number of new class B channels to accommodate all such stations that might be licensed during the next several months.

During the last week, the Radio Bureau has learned of 36 new class B stations which are either under construction, or which are now in classes A or C and intend to transfer to B. In addition, the Radio Bureau knows

of 20 more new class B stations which are being contemplated.

As the wave length situation now stands, there are 47 class B channels or wavelengths. With two stations on each wavelength and dividing time, these 47 channels will accommodate 94 stations.

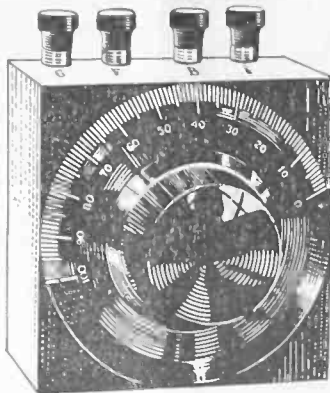
According to estimates of the Radio Bureau, within a very short time the total number of class B stations will be increased to 100. However, 13 of these stations will be located on the Western coast, which will eliminate them from the problem. Because

of the difference in time and distance, stations on the Pacific Coast use the same wave lengths as stations on the Atlantic.

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

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The *Cosmopolitan Phusiformer*, which has won the Universal praise of Radio Engineers, —enables you to start in with the small expense of a crystal or a one-tube set and to build, by degrees, a multi-tube set with as many stages of tuned R. F. as desired, simply by adding more tubes and Phusiformers. Radio sets that use Phusiformers as tuning units are free from oscillation, squeals and howls. Phusiformers are self-neutralizing, no extra condensers or coils are necessary to balance the capacity of the tubes. Build a Phusiformer tuned radio set and learn with what clarity and volume distant stations can be received.

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Diagram of circuit, \$1.00

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by RADIO WORLD Artist

By HAL SINCLAIR



Literature Wanted

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

Service Editor,
Radio World,
1493 Broadway, New York City.
I desire to receive radio literature.

Name

City or town

State

Are you a dealer?.....

If not, who is your dealer?.....

His Name

His Address

A. C. Vollmann, 220 2nd St., Trenton, N. J.
Ernest Vigt, Boerne, Tex.
Chas. S. Safford, Warsaw, Route 1, New York
Genesee Service Corp., 814 E. Genesee St., Syracuse, N. Y. (Dealer)
L. A. Strader, Box 342, West Haven, Va.
A. D. Parker, 1126 Grand Ave., East, Nashville, Tenn.
H. A. Tegarden, Union City, Ind.
Wm. A. Callahan, Box 183, Grafton, Ill.
Joseph A. Sumner, 18 Morton St., New Bedford, Mass.
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H. J. Grey, 3511 Mifflin St., Huntington, Pa.
E. F. Kerwin, 103 Myrtle Ave., Albany, N. Y. (Dealer)
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L. Hamptner, 604½ 2nd St., Asbury Park, N. J.
Miss Adelaide Noll, Mt. Dechantal, Wheeling, W. Va.
B. J. Killeen, 34 Indiana St., Wheeling, W. Va.
C. Homewood, 7025 Glenloch St., Philadelphia, Pa.
John E. Hagstrom, 3011 Euclid Ave., Berwyn, Ill.
B. E. DeJaunette, Eden, Ala.
W. E. Savage, Box T, Taft, Cal.
Jos. A. Opsionce, 3075 W. 121st St., Cleveland, O.
Nels Olands, Ft. Landerdale, Fla., Box 911.
William Filler, 4031 Third Ave., Bronx, N. Y. C.
Mildred Johnson, 317 53rd St., Brooklyn, N. Y.

NEW CORPORATIONS

Brece Radio Corp., Bronx, N. Y. C., \$10,000; A. Bischoff, F. Zambuhl, H. J. Bauer. (Attorney, O. E. Davis, 3210 3rd Ave., Bronx, N. Y. C.)
Aer-a-Dyne Mfg. Co., Utica, N. Y., 3,000 shares common stock, no par; D. De Wolf Smyth, H. G. Low, W. B. Foster. (Attorneys, Hart & Senior, Utica, N. Y.)
Auroradio Corp., New York City, \$15,000; W. R. Haight, E. R. Martin, F. B. Sparks, Jr. (Attorney, R. M. Simpson, 115 Broadway, New York City.)
Amerex Radio Corp., New York City, \$50,000; S. and S. and C. Rattner. (Attorneys, Greenspan & Morris, 305 Broadway, New York City.)
Spider Web Radio Corp., New York City; \$30,000; H. V. Drusbach, F. J. Herschfield, I. Bresalier. (Attorney, M. D. Kopple, 66 W. 40th St., New York City.)
New Dry Cell Battery Corp., New York City; K. and H. R. Cowan, G. W. Billups. (Attorney, C. T. Lark, 527 5th Ave., New York City.)

The Radio Trade

SUPER-HETERODYNE PATENT
GOES BEFORE COURT
WASHINGTON.

THE Court of Appeals has rendered a decision which may result in the American Telephone and Telegraph Company obtaining patent rights on sending and receiving apparatus for short wave lengths and certain features of the Super-heterodyne.

Lucien Levy, on August 12, 1918, filed an application for a patent on those inventions. Levy's application was rejected by the Patent Office on the ground that some of the things he claimed were not patentable. Levy sold his rights under the invention to the Telephone company.

On Feb. 8, 1919, Major Armstrong filed an application for practically the same features, and a patent was granted. Levy took the case to the Court of Appeals, which decided that his claims were patentable. The case will be taken to court to determine priority.

NEW TYPE OF SPEAKER

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., announced that a loud speaker has been developed which, because of the material from which it is made, is claimed to be perfect in performance. The new loud speaker is made of pyroxylin plastic which is a non-vibrating material and therefore cannot impress a false note upon that set up by the diaphragm. Its shape is the one which is best calculated to eliminate distortion, it is claimed. The peculiar qualities of pyroxylin plastic have been shown by tests, it is claimed, to reproduce the range of tone, instrumental or vocal, with clarity and fidelity.

GLOBE GETS PATENT IN
LESS THAN 3 MONTHS

UNDER the reorganized Patent Office speed is being accomplished. The Globe Radio Equipment Co., 217 West 125th Street, New York City, believes it holds the record for having obtained a patent. The grant covers tuners of the Globe Low-Loss type. Claim was filed Sept. 18 last, patent was allowed Nov. 18 and finally granted Dec. 9. The entire idea was protected in less than three months. Companies manufacturing coils of this type have been warned, says the Globe firm. Their patent lawyer was J. Granville Meyers, 200 Fifth Ave., N. Y. C., aided by his associate, Dempster M. Smith.

Business Opportunities
Radio and Electrical

Rates: 50c a line; Minimum, \$1.00

AN INVESTMENT IN THE RADIO FIELD.
A company is about to put on the market electrically operated clocks, automatically regulated by radio from the U. S. Naval Observatory at Washington, D. C., at prices which bring them within the reach of every one, and will give general use to those clocks. Its officers and engineers are men of the highest standing. Those in control of the company have put their own money into it and are now adding largely to the amount. They will at this time welcome a few other substantial investors, especially those familiar with mechanical or electrical work, who are able to understand the great commercial value of the opportunity offered. The insertion of this advertisement is by direction of the officers of the company. Full information will be furnished, but only to responsible inquirers who mean business. The Engineering Business Exchange, Charles Whiting Baker, Director, 30 Church St., New York City.

RADIO OPPORTUNITY—RADIO MANUFACTURER offers exceptional opportunity to individual furnishing \$50,000 or more added working capital; we manufacture only highest grade radio receiving sets and distribute through well-known jobber to high-class retailers; our products have established a first-class reputation and additional business can be had for the asking; this is not a speculation, but an investment; owners are business men of standing and can give highest references; only individuals of similar standing need apply; no brokers. Box 60, Radio World.

RADIO—EXECUTIVE DESIRES ACTIVE interest, wholesale jobbing, retail; moderate investment in attractive proposition. Box 111, Radio World.

THE OWNER OF A LONG-ESTABLISHED business now carrying radio has opened a branch handling radio exclusively in downtown radio centre and would desire a partner for the radio business only; this man must have retail radio experience; all replies treated in strict confidence. Apply by letter to Box R. S. G., Room 500, Tribune Bldg., New York.

WE GUIDE your patent or secret process to success; tell us what you have; international references. Rubenstein Adjustment Bureau, 236 West 55th St., N. Y. C.

PATENTS PROCURED for mechanical, electrical, chemical, inventions; recording blank and book free. W. T. Criswell, Attorney, 150 Nassau St., N. Y. C. Phone 39-43 Beekman.

RADIO "B" BATTERIES, ALSO SEMI-DRY storage "B" batteries; like to hear from party desiring manufacture this line. Box 241, 1,180 Fulton St., Brooklyn, N. Y.

AN ESTABLISHED WHOLESALE RADIO distributor wishes to expand their business and is interested in hearing from party with necessary capital this is a fine proposition for the right party; no stock promoters need apply. Box IX, Radio World.



ROYALTRONS
NOW **\$3.00**


Approved by Radio News Laboratories

TYPES
400—6 V. 1/2 Amp.—Det.
401A—6 V. 1/4 Amp.—Det. and Amp.
412—1 1/2 V. 1/4 Amp.—Det. and Amp.
499—2 V. .06 Amp.—Det. and Amp.
402—Transmitter.

At all good dealers
Every ROYALTRON must give satisfaction.

ROYAL MFG. CO.
Dept. RW, 208 Broadway, New York City

His Utopia



YEA, OMAR, THIS WERE PARADISE ENOW!

THOUGH HE LIVES IN MONTREAL
Editor, RADIO WORLD:

I thought it might please you to be informed that although I live in Montreal I have been a constant reader of your splendid paper. This magazine has given me much valuable information of the latest devices and improvements in radio. I have followed Herman Bernard's suggestions for making a low-loss single dial set, getting marvelous results at a considerable saving. Another feature which gives me particular pleasure are the illustrated jokes and cartoons by Irving Hoffman.

SAMUEL HARRIS.
1020 Tupper St., Montreal, Can.

There's CONSTANT SATISFACTION In CONSTANT SERVICE.

PETER J. CONSTANT INC.

91 SEVENTH AVE., NEW YORK CITY
— CHELSEA 0665 —

Exclusive Distributors for
HANSEN "BIRD-CAGE" RADIO SETS
Featuring for the First Time
GOLDFINCH 5 TUBE.....\$75.00
Bobolink 2 Tube Set.....\$25.00
Nightingale, 4 Tube, Series II.....\$32.50
Nightingale, 4 Tube, Series III.....\$37.50
and Other Unique Receivers
MURDOCK NEUTRODYNE—DONEYUE
ADAPTO CONSOLE RADIO CABINETS

DEALERS, the "Bird Cage" is a high grade and profitable line, selling at prices that bring radio within the reach of every home.
STANDARD nationally advertised radio merchandise always on hand.



NEW AMPLITRON TUBES \$2.50

Our special introductory price
All tubes repaired Buy direct
(Detectors or Amplifiers) from
Guaranteed like new manufacturers

American Radio Tube Works
28 Central Avenue Newark, N. J.
Agents, Please Write

DUMP me somewhere East of Suez—
Loaf and jug—and my ol' set,
Where they ain't no wiv'es—or bosses—
(Oh, the stations that I'd get!)
Where the gardens grow transformers,
Grid condensers, rheostats,
And, in speaking of pajamas—
I would say: "This is the cat's!"

Non-Resonant Static Eliminator

WASHINGTON.

Soldered Connections

Insure Clearer Reception

Our Electric Soldering Outfit, consisting of an Electric Iron, Cord, Plug, Solder and Flux, will assure positive connections. ALL FOR \$1.98

KENT RADIO SPECIALTY CO.
Dept. W. 1412 Sherman Street, S. E.
Grand Rapids, Michigan



Bracket mounting type, complete, \$4.50.

One Pull instantly disconnects antenna, on the Jones **MULTI-PLUG** in-ground, A and B batteries from your set. One push reconnects. And it can't be plugged in wrong! Eight foot cable permits placing batteries out of way—in basement, closet or elsewhere. Makes your set portable. All leads plainly coded.

Jones MULTI-PLUG

THE STANDARD SET CONNECTOR

Used by
Howard-Workrite-Zenith-Mu-Rad

Write for illustrated folder of Panel Mounting and Binding Post types.

HOWARD B. JONES
618 S. Canal St. Chicago

YOUR CRYSTAL SET

will work 400 to 1,000 miles if made by my plans. No tubes or batteries. Copyrighted plans \$1.00; or furnished FREE with complete parts for building set, including special coil and panel correctly drilled for only \$5.00. Satisfaction guaranteed or money refunded. Dissatisfied customers everywhere. Particulars free.

LEON LAMBERT
562 Kaufman Bldg. Wichita, Kansas

AS SYSTEM, claimed to eliminate static, has been invented by Joseph Slepian, of Pittsburgh, Pa., and a patent granted. The static elimination is accomplished, according to the claim, by including in a local receiving conductor, a resistor having such value as to effectively damp the receiving system. Non-resonant means are then associated with the resistor, whereby the voltage-drop therein may be substantially neutralized for currents of predetermined frequency only.

"Heretofore," says Mr. Slepian, "various systems have been proposed embodying resonant circuit arrangements tending to reduce interference between stations and to eliminate the undesirable effect of static impulses. However, such systems have proved only partly successful in that the resonant circuits embodied in such systems have a tendency to be set in oscillation by shock excitation, despite the utilization of various shielding schemes."

RADIO Buyers' GUIDE

For Consumers **FREE** 100 Pages
Get it now—before you buy any set or parts to build one. Just send your name. Particulars in all kinds of complete sets, Parts and Accessories (Will you be so kind as to add the name of one or more friends you believe will soon want radio goods? Thank you!)

Liberty M. O. House, Dept. 681 - Z 106 Liberty St. N.Y.

"A 3-CIRCUIT TUNER YOU CAN LOG"
by Herman Bernard. A 3-tube set that gets speaker DX, described in RADIO WORLD issue of November 8. One stage of radio-frequency ahead of this circuit, making 4 tubes, described by Mr. Bernard in the December 13 issue. 15 cents a copy. Send 30 cents for both to RADIO WORLD, 1493 Broadway, New York City.

NEW BROADCASTERS

WASHINGTON.

TWO new class A stations were licensed by the Department of Commerce. One station was transferred from class C to A. The new stations follow:

Call	Station	M	W
KFRX—J. Gordon Klemgard, Pullman, Wash.		217.3	10
WLB—University of Minnesota, Minneapolis, Minn.		278	5

The transfer follows:
WQAA—Horace A. Beale, Jr., Parkersburg, Pa. 220 500

FRESHMAN MASTERPIECE

A 5-Tube Tuned Radio Frequency Receiver that represents the greatest value ever offered in a radio set.

Write for particulars.

Chas. Freshman Co., Inc.
FRESHMAN BUILDING
240-248 W. 40TH ST. NEW YORK

The Genuine Mastertone Tubes At Reduced Prices

Type M200, Type M201A, Type M199, Type M12, 199A Standard Bases

\$4.00 LIST ALL TYPES

ALL TUBES GUARANTEED

50% OFF

\$2.00 Net

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

SHIPPED PARCEL POST C. O. D. WHEN ORDERING MENTION TYPE

We will refund your money if not satisfactory (providing they are not burnt out). We want good, live dealers to handle these tubes. Write for our "Exclusive Agency Proposition."

RADIOTUBE COMPANY, 903 Broad Street, Newark, N. J.



SUPER RADIOS

that mark an advance in radio receivers which will stand the most severe comparison test with any receiving outfit on the market. In tone quality, selectivity, long distance reception, elimination of harsh noise—the SLAGLE SUPER RADIO reigns supreme. We make these statements in all earnestness—because every SLAGLE RADIO is sold with an ironclad money-back guarantee.

If your dealer does not have them, write direct.

SLAGLE RADIO CO.
432 Masterton Avenue Fort Worth, Ind.

NEW BOOKS

The Radio Gunner: Fiction; Houghton Mifflin Co., \$2.00. Four illustrations.

A BOOK of this type always appeals to the imaginative mind. He who enjoys scientific fiction will find hours of intense interest in this book.

In 1937, Sam Mortimer is Secretary of the Navy, and Jim Evans is an almost unknown but highly successful physicist who has made radio his life study. A war breaks out and the United States is, after a few months, inevitably drawn in. Sam Mortimer calls upon Evans as the most capable scientific man available. So Evans becomes the Radio Gunner. From this

LOUD SPEAKING CRYSTAL SET

Stations brought in from over 1000 miles and must be heard all over the room right from crystal set with the STEINMETZ AMPLIFIER. Get our complete catalog.

STEINMETZ WIRELESS MFG. CO.
5057 Baum Blvd., Pittsburg, Pa.

HERCULES Aerial Mast

All Steel Construction

Painted black complete with galvanized steel guy wires and masthead pulley. 20' mast \$19. 40' mast \$35. 60' mast \$45. We pay freight. Ideal for receiving or transmitting. Greater range. More satisfactory results. Write for literature and large

FREE BLUEPRINT

S. W. HULL & CO., Dept. E-110
2048 E. 79th St. Cleveland, Ohio



point on every page becomes more interesting.

Dynamo Electric Machinery: Erich Hausmann, E. E., Sc.D., D. Van Nostrand Co., \$4.50. 447 illustrations.

THIS book will be useful to the practical radio man who has studied electrical engineering and is worth its weight in gold. It contains formulae for every electrical circuit as well as many applied helps. It deals practically wholly with motors, generators, transformers and currents.

It is exceedingly well written and planned. Without doubt Mr. Hausmann certainly knows his subject thoroughly.

Standard Electrical Dictionary: Prof. T. O'Connor Sloane, A.M., E.M., Ph.D. \$5.00. The Norman W. Henley Pub. Co., 2 West 45th St., New York City.

A NEW edition of 790 pages and 497 illustrations, brought up to date and greatly enlarged, is this dictionary. Prof. Sloane proves himself an expert. The 790 pages bespeak much reference and painstaking care in compiling the vast amount of knowledge in this book. It is indeed an electrical library. From a radio experimental viewpoint it is as necessary as the soldering iron.

Practical Radio: James A. Moyer and John F. Westrel. \$1.75. McGraw-Hill Book Company, 370 7th Ave., New York City.

THE authors certainly are to be commended for this fine volume dealing truly with practical radio. The field has been so thoroughly covered with treatises on theory that a book of this type should find its way in the library of every radio man—whether he is experimentally inclined or not.

This book, of 249 pages, is composed of 13 chapters, an appendix giving an electrical history, and an alphabetical index.

It is written in strictly non-technical language.

WCCO on 1,500 Watts by April 1

MINNEAPOLIS.

THE new 5,000-watt station, WCCO, which will go on the air about April 1, will be located 18 miles northwest of Minneapolis and St. Paul. The new station will succeed the present 500-watt station which has been on the air since October 1.

The site for the new station has been purchased outright by Washburn Crosby Company, who co-operate with the business men's associations of Minneapolis and St. Paul in operating it.

The station will occupy a space of ground 500 x 700 feet, and will be two miles from the nearest town. Its aerial towers will be of the three-legged type and 200 feet high, set in concrete bases.

TO RADIO SET BUILDERS

"MORSING BUS-BAR UNION"

(Patent Pending)

Assemble Round or Square Bus Bar and Solder Three Wires at a Time.



Quick Assembling. Repairs Can Be Made Without Taking Set Apart.

AT ALL RADIO DEALERS

Newark Watch Case Material Co.
15 Ward Street Newark, N. J.

DISTRIBUTORS WANTED

Set for Each Police Station in N. Y. C.

IF plans under consideration by Mayor John F. Hylan, of New York City, do not miscarry, each police station, and some of the police booths, will be equipped with radio sets early next year.

The Mayor made these plans known during a visit to Police Headquarters. He explained that the installation of radio sets would allow police intercommunication.

RADIO BARGAINS

Radio Set Complete, with R. C. A. Tube Batteries and Antenna Equipment, ready to tune in. \$19.95
Journal Low-Loss Coils, set. 3.95
Engraved Blinding Posts, complete set. 1.00
Guaranteed Crystals. 3.99
Famous Chapin Transformers, 6-1 or 3-1. 8.95
Mail orders filled promptly C.O.D. Parcel Post
FREE—Write for Big Bargain Sheet
RADIO-ELECTRIC MFG. CO.
Dept. 4, 442 Clinton Ave., Newark, N. J.

LITTLE WONDER!

SOLDERLESS LUG

Holds Bus Wire Like Chip!
Connect or Disconnect Wires
Without Disturbing Terminal!
Price 10 for 50. Ask your dealer.
Distributors Wanted.
Mfd. by PAUL GLAMZO
203 Lafayette St. New York

USE

EVEREADY Radio Batteries

—they last longer

If Your Neut Won't "Neut"

Here's the missing link. Uses same panel, same layout, same (but fewer) parts. Selective, deep resonant volume from "Coast to Coast." Hundreds have bought this kit—nary a kick, but scores of enthusiastic testimonials. For \$8.99 we will send prepared the only extra part, 22 feet gold sheathed bus wire, lithographed circuit and complete, simple instructions, with unlimited privilege of mail substitution. Nothing else to buy. Satisfaction guaranteed. Data about circuit—10c. 48 page radio catalog—2c. Stamps taken same as cash.

Kladag Radio Laboratories
KENT, OHIO

RE-NU Radio "B" Batteries

RE-FILL-A-BLE ALWAYS FULL VOLTAGE



Use any brand standard flashlight cells. No springs—No loose connections. Can replace one or more cells without soldering. Cost less to maintain. Order direct—Mail orders our speedily. Money-back guarantee. Free descriptive literature upon request. Price complete with cells: 22.5 Volt—\$2.75. 45 Volt—\$4.50, postpaid in U. S. A.

Ten cents (10c) additional when sent C.O.D.
STEINER BATTERY CO., Lancaster, Ohio

Free Mailing Lists

Will help you increase sales
Send for FREE catalog giving
counts and prices on classified names
of your best prospective customers—
National, State, Local—Individuals,
Professionals, Business Firms.

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

ROSS-Gould Co. SEN. St. Louis
10th St.

Dependability is another word for reputation.

Have you noticed how many prominent writers and engineers specify

Daven Grid Leaks?

Read the "RESISTOR MANUAL"—A thirty-two page handbook on Resistance Coupled Amplification with interesting data and hookups.

Price 25 cents

At Your Dealers.

Daven Radio Corp.

"Resistor Specialists"
Newark New Jersey

"ROUSING DORMANT NEUTRODYNES," by Charles H. M. White, noted radio authority. Send 15 cents for November 22 issue, RADIO WORLD, 1493 Broadway, New York City.

"THE BEST AERIAL FOR YOU," described by P. E. Edelman in the November 8 issue. Send 15 cents for copy to RADIO WORLD, 1493 Broadway, New York City.

TEAR OFF AND MAIL TODAY

8 Weeks' Trial Subscription, \$1.00

KEEP ABREAST OF THE LATEST
RADIO DEVELOPMENTS
RADIO WORLD
1493 BROADWAY NEW YORK CITY

Invention Prevents Ships Grounding

WASHINGTON.

SHIPWRECKS due to vessels going aground may soon be a thing of the past as the result of a radio invention by Dr. E. A. Eckhardt, physicist, and M. Keiser, of the Bureau of Standards.

QUALITY — CABINETS —

Easy to Build your Set with NATIONAL Cabinets. Latest styles in knocked-down type and Leatherette covered. Write for prices and descriptive matter.

NATIONAL CABINET CO., 6 Cent. St., Dayton, Ohio

Greater Distance Clearer Reception

Reduced losses, less noise are the results of a good outside aerial. Efficient long distance sets, including ships at sea, use best possible aerial to get results.

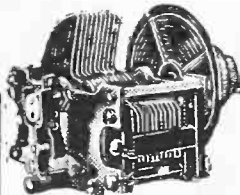
EAGLE RADIO TOWERS

Take the place of unsightly home-made masts. Adjustable to fit single or double slope or flat roof. Additional height added by fitting standard pipe to top. Strong, hollow-tube construction.

One Tower FREE

Towers shipped knocked down complete with instructions. Weight 50 lbs. Boy can assemble in an hour. Write for literature, prices and plan whereby you can get one tower free. Money-Back Guarantee.

J. R. Burrell Co.
356 Folsom Place
Dept. 18
Milwaukee, Wis.



DUAL RATIO

GROUNDING ROTOR

LOW-LOSS CONDENSER

PLAIN & VERNIER TYPE

PRECISION MOVEMENT, ABSENCE OF GEARS OR COMPLICATED PARTS



Improved Type RHEOSTATS and POTENTIOMETERS All Sizes

GENUINE BAKELITE SUPERIOR CONSTRUCTION



United Scientific Laboratories, Inc.
92-94 E. 10TH STREET NEW YORK CITY

Index to Radio World

Issues from Jan. 5 to Sept. 20, 1924, thoroughly indexed and cross-indexed. Send 15 cents for copy of Oct. 18 issue to Radio World, 1493 Broadway, New York City.

Radio-Active Treatment Called Disease Cure

OSKALOOSA, IA.

RADIO as a cure for disease is called an actuality. While science is prophesying advent of the radio doctor an Oskaloosa physician is effecting scores of physical betterments through the use of a wireless device of his own invention.

Dr. C. A. Abbott at the Abbott hospital is treating hundreds of patients in their homes by radio and reports splendid success with his treatment.

The plan is working so satisfactorily that Dr. Abbott has taken steps to protect his invention by patent and is now studying the development of the apparatus to broaden its use and extend it beyond the medical field.

The theory of Dr. Abbott's radio-active treatment is that each germinal disease has its electronic wavelength and that for each germ wavelength there is a curative electrical wavelength that neutralizes the effects of the germ and permits the rebuilding of the body.

An Ellis machine that records accurately the wavelength of any material or object is utilized for the testing of patents and the findings of the tests are the basis for treatment.

Central broadcasting apparatus located in the hospital send out electrically energized wavelengths that can be used for treating persons outside as well as inside the building. The only requirements of the patient is the use of the receiving apparatus perfected by the doctor.

Persons have been receiving tuberculosis, cancer and other disease treatments from the Abbott hospital as far distant as Chicago, Minneapolis and Peoria, while literally hundreds of patients are located in Iowa and in the neighborhood of Oskaloosa.

A 24-Volt "B" Storage Battery positively given FREE with each purchase of a WORLD "A" Storage Battery. The WORLD Battery is famous for its guaranteed quality and service. Backed by years of Successful Manufacture and Thousands of Satisfied Users. You save 60%.

Prices That Save and Satisfy

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

Shipment Express C. O. D. subject to examination. 5 per cent discount for cash in full with order.

2-Yr. Guarantee Bond in Writing With Each World Storage Battery

proves satisfactory World performance. Mail this ad with your name and address—we will ship battery day order received; and give you your choice of "B" Storage Battery or a handsome nickel finish Auto Spotlite, FREE. Write TODAY.

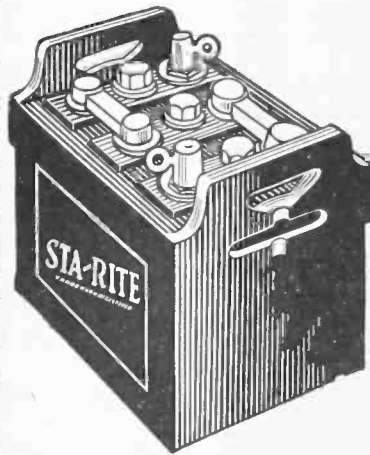
WORLD BATTERY COMPANY

1219 So. Wabash Ave. Dept. 17 CHICAGO, ILL.
This FREE "B" Storage Battery takes the place of dry cell "B" batteries. Can be recharged and will last indefinitely. To be sold retail for \$8.00. It is the only battery of its kind equipped with solid rubber case—and insurance against acid and leakage. Take advantage of this remarkable introductory offer NOW. (To those who prefer it, we will send FREE a handsome nickel finish Auto Spotlite, instead of the "B" Battery. Be sure to specify which is wanted.)

GIVEN FREE To introduce this new and superior World "B" Storage Battery to the Public



STA-RITE RADIO BATTERIES



Save you 60% and guarantee you in writing 2 years of better battery performance.

IN ALL RUBBER CONTAINERS

Try to Beat These Prices

100 Amp. Hour	\$ 9.45
140 " "	10.55
185 " "	14.95

Get Yours Today—NOW—Send No Money

The batteries are fully guaranteed in writing and shipped subject to examination on the day your order is received. You pay on delivery or deduct 5 per cent. if full cash accompanies order. You may deduct 10 per cent. if two or more are ordered at one time.

STA-RITE BATTERY CO., Dept. R.W., Louisville, Ky

LEWIS Specials

MEYERS TUBES

Unbreakable, noiseless, non-hissing detectors and amplifiers. Can be used with any make of tubes. Adaptor or Mounting FREE! \$4.00

Genuine Factory Sealed

Acme Kit Set
Best 4-Tube Reflex Loop Set
Reg. \$65.00—\$42.50

TRANSFORMERS

Amertran—All Ratios
\$4.40

3-Inch BELL DIALS
GENUINE BAKELITE
29c

New Transcontinental Low-Loss Tuner
Adjustable primary and tlecker.
Special Feature \$7.00

72" Battery Harness
Complete with Lugs and Battery Clips.
Special \$1.10

J. L. LEWIS, INC., 132 West 32nd Street, New York

RESULTS

WHAT Results Did You Obtain from Constructing Sets or Parts Following Data Published in Radio World? Write to Results Editor, Radio World, 1493 Broadway, New York City

Results Editor:

HAVE taken your paper for a year in preference to others and follow

hook-ups that appear every week. I have just finished building the Dandy 1-Tube DX set by Herbert E. Hayden, Oct. 4 issue, and I must say it is a dandy. I know what I am talking about as I have built most circuits for the last four years. I have a Super-Heterodyne. When you compare the two, the Dandy with two stages of audio it will work a loud speaker on stations 1,000 miles away. Also using a 200 tube I get good volume on the phones. In one evening up here I got the following stations: WCCO, KSD, WCBH, WFAA, WEAF, KYW, CFCF, CFAC, KFNF, KDKA, WHO, KFKX, WSAI, WOAW and various others I did not log. I found the circuit very selective but easy to tune and it does all the tricks

that Mr. Hayden said it would do. Keep up the good work. Best regards to Herbert.

ARTHUR H. PHILLIPS,
1201 Clifton St.,

NEW NAME FOR SPEAKER

EDITOR RADIO WORLD:

FROM time to time I have noticed inquiries for a better name for the loud-speaker. The word radiocasting has been used to denote the giving out of radio waves. Why not "soundcaster" for the projector of sound waves? T. J. MAIN,
350 West End Ave.,
New York City.



MUSIC EVERYWHERE — Tra-la-la-la

TOWER'S Scientific headsets are guaranteed to be made of the best materials money can buy, highest-test enamel, insulated magnet wire, best grade five-foot tinsel cord, unbreakable caps, polished aluminum cases, using the famous scientific headband constructed for maximum comfort.

To bring happiness into the lives of millions is to have accomplished a worthy purpose in this progressive era of Radio achievement.

TOWER'S Scientifics are used by MILLIONS, being approved by all newspapers, magazines and technical laboratories wherever submitted.

If your dealer cannot supply you, order direct by post card—we will ship immediately, Parcel Post, C. O. D., plus postage.

THE TOWER MFG. CORP., 98 Brookline Ave., Dept. D Boston, Mass.

RADIO WORLD'S QUICK-ACTION CLASSIFIED ADS.

10 CENTS A WORD. 10 WORDS MINIMUM

JOIN THE RADIO PARTS EXCHANGE CLUB. Your parts inspected (Fee 25c) and exchanged for the parts you need. What have you? What parts do you require? Write us for details. The Radio Parts Exchange Club, 112 So. Homan Ave., Chicago.

SINGLE TUBE ERLA; complete parts, \$15.00. Particulars, write S. Pellow, 15 Hope Ave., Worcester, Mass.

RADIO SUPPLIES. \$58.00 worth for \$27.00. List free. D. J. Bishop, Littleton, N. H.

TUSKA SUPERDYNE, type 228; perfect; cost \$125.00; sacrifice for \$65.00. Dr. Addison, Gloversville, N. Y.

DEALERS. Investigate new 4-tube Mity-dyne. Great volume on locals and distance. Seliger's, 959 Frankford Ave., Philadelphia, Pa.

CABINETS. We supply them. All sizes, all prices. A postage stamp brings details. Pearson Cabinet Concern, Jamestown, N. Y.

AUDIO AMPLIFIER, \$7.00 POSTPAID. Completely assembled, including tube. Works with any kind of tube or crystal set. Unassembled, \$6.00. Trelcott Co., 2118 Hale, Louisville, Ky.

LOW-LOSS INDUCTANCE FORMS—Linen Impregnated Bakelite. 50c each. The Kehler Radio Laboratories, Abilene, Kansas.

AGENTS—Write for free samples. Sell Madison "Better-Made" Shirts for large Manufacturer direct to wearer. No capital or experience required. Many earn \$100 weekly and bonus. MADISON MILLS, 564 Broadway, New York.

DINING & SLEEPING CAR CONDUCTORS (white), Exp. unnecessary. We train you. Send for book of Rules and application. Supt. Railway Exchange, Sta. C, Los Angeles.

ALL ABOUT THE SUPERDYNE. Covered by text and diagrams in RADIO WORLD dated Nov. 22, 29, Dec. 6, 13, and 20. 15c per copy, 5 copies, 75c; or start your subscription with any number. RADIO WORLD, 1493 Broadway, New York.

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

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

BRAINARD FOOTE, noted radio authority, describes his favorite receiver in Radio World, issue of Oct. 18. One stage of impedance RF, one transformer RF stage, crystal detector and two audio stages. Four tubes. Great quality set. Send 15 cents for copy of issue or start subscription with hat number. RADIO WORLD, 1493 Bway., N. Y.

RADIO FACTORY REPRESENTATIVES WANTED BY RADIO WORLD. Represent this live weekly and make money. Address, Circulation Mgr., RADIO WORLD, 1493 Broadway, N. Y.

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

'Radio Indispensable', says Chief

WASHINGTON

COVERING in detail the many phases of the operations of the Bureau of Navigation, Commissioner D. B. Carson, in his annual report to the Secretary of Commerce, stresses the phenomenal growth of radio. He says: "Broadcasting may be considered as indispensable in the average home as the telephone. The success achieved in this country has encouraged many other countries to utilize this important means of establishing direct contact with the people."

The question of who will pay for broadcasting, says Mr. Carson, does not require immediate consideration. "The public will probably continue to contribute liberally through cost of equipment purchased," he adds. "At present there does not appear to be a more equitable way of distributing the cost, while, on the other hand, such stations must have considerable advertising value justifying the expense of operation where owners are not benefited through sales of radio apparatus."

Army Stations Now 100

WASHINGTON.

MAJOR General Charles McK. Saltzman, Chief Signal Officer, United States Army, announced that with the installation of powerful radio stations at Ft. Douglas, Utah, and Ft. Leavenworth, Kansas, the army this year completed a network of radio communications which covers the entire country and assures in times of emergency transmission of military intelligence or other necessary Government messages.

"The Army Communication Net," as it is called, involves over one hundred army-owned stations and certain leased lines and has replaced to a great extent the use of commercial telegraph and radio by the military service. The Veterans' Bureau, too,

has been extended the privilege of the use of the army net and many other Government departments have applied for the service.

Fog Signals Reduce Navigation Risks

WASHINGTON.

THE value of radio as an aid to navigation, especially as a protection against fog, the greatest of all dangers to the mariner, has been further demonstrated

during the past year," said George R. Putnam, Commissioner of Lighthouses, in his annual report to the Secretary of Commerce.

One Cent Radio Sale!

- Variable Gridleak 1 for 15c, 2 for 16c
 - Columbia 180° Coupler 1 for \$3.50, 2 for \$3.51
 - Columbia Molded Couplers 1 for \$5.99, 2 for \$6.00
 - 3 plate Vernier Condensers 30c each, 2 for 31c
 - 5 plate Condensers 49c each, 2 for 50c
 - 23 plate Condensers 89c each, 2 for 90c
 - 43 plate Condensers 99c each, 2 for \$1.00
 - 4 Paper Condensers 10c
 - New Type Rehnartz Coil \$2.50, 2 for \$2.51
 - W.D.-1 Bakelite Socket 75c, 2 for 76c
 - Latest Type Ajax Socket and Rheostat Panel Mount. Comb. \$2.49, 2 for \$2.50
 - Journal Filter Tuner \$2.50, 2 for \$2.51
 - N. P. Binding Posts 2 for 3c
 - Stiers' Litz Wire Wound 3-Circuit Tuners \$6.00 each, 2 for \$5.01
 - Kel-Coil—Litz Wire Wound—3-Circuit Tuners, \$6.00 each, 2 for \$6.01
 - 3 1/2" Dials 1 for 49c, 2 for 50c
 - 4 1/2" Dials 1 for 50c, 2 for 51c
 - 2" Dials 1 for 23c, 2 for 24c
 - Star Rheostats—with N. P. Dial and Knob, 1 for 99c, 2 for \$1.00
 - 43 plate Vernier Montrose Condensers (Bakelite Ends) 1 for \$5.49, 2 for \$5.50
 - Framingham Vernier Rheostats, 6, 12, 20, 25, 30 Ohms 1 for \$1.25, 2 for \$1.26
- Goods are fully guaranteed, and will be shipped C. O. D., or Money Order accepted in advance.

FEDERAL RADIO PRODUCTS CO.

712 Broadway Schenectady, N. Y.

Famous for Quality and Service

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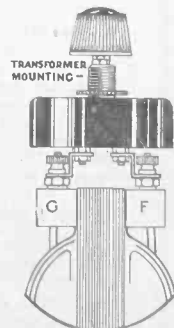
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Causes Too Much Interference is the Complaint Made

and land radio stations may receive considerable attention in the next Congress.

For the past several months there has been agitation of the subject. A number of interests, including radio engineers and editors, think legislation should be enacted to abolish spark equipment on the theory that it causes undue interference to broadcast reception. On the other hand are the marine interests, which assert that such a step would be arbitrary and would tend to place the industry in a "straight jacket."

The basis for the agitation is the assumption that tube transmitters do not cause near so much interference as spark equipment. The fact is even admitted by the marine interests which object to legislation instructing them as to what type of apparatus they can or cannot use.

According to recent estimates there are 11,227 vessels on the high seas equipped with radio apparatus. Of this number, it is claimed, 10,949 use spark equipment, 127 tube installations and 152 both tube and spark.

A rough estimate of the value of spark equipment in use on vessels is placed at around \$30,000,000. To replace the spark with more modern equipment would probably cost another \$30,000,000 or more.

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New Patents in the Radio Field

WASHINGTON.

EIGHT patents on radio inventions were granted during the past week. A brief description of each of these inventions follows:

Measuring instrument for vacuum tubes, invented by George Crisson, of Hackensack, N. J., and assigned to the American Tel. & Tel. Co. The purpose

of Mr. Crisson's invention is to permit the measurement or testing of the characteristics of tubes.

Oscillation detector, invented by Albert W. Bowman, of Winthrop, Mass. This invention relates to oscillation detectors of the crystal type and its object is to provide a detector which, although enclosed within a cartridge or envelope, may be readily adjustable, both as to the point of contact and as to the pressure of such contact.

Receiving system, invented by Harry O. Rugh, of Chicago. This invention is of a hook-up which will permit the set to draw its current from electric light power lines.

Radio telegraphy device, invented by Leonard F. Fuller, of Barberton, Ohio, and assigned to the Federal Telegraph Co. The objects of this invention are: To reduce the ohmic resistance of the ground system of transmitting stations and raise the overall efficiency; to provide an antenna which requires a lesser number of towers for its support, and to provide a radiating system which will transmit in a chosen direction.

Amplifier, invented by John Thomas Rhamstine, of Detroit, Mich. The object of this invention is to provide an amplifier which may be used in connection with the telephone head set for blending together and enlarging the sounds produced at the receivers of the head set.

Detector for use in radio circuits, invented by Charles J. Everett, of New York, N. Y. This invention provides useful improvements in detectors for use in radio sets.

Wireless telegraphy device, invented by Raymond Dorrington Bangay, of London, England, and assigned to the Radio Cor-

poration. This invention provides means for tuning the primary and secondary circuits of a transmitting station together when it is necessary to vary the length of the aerial used.

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Wiring Radio World Set

(Continued from page 9)

posedly mounted upside down, when the beginning will be on bottom.

3. Connect the beginning of L2, the secondary on the coupler stator (the under or large winding) to (a) the stator plates of C1, the variable tuning condenser at left in Figs. 2 and 3, and (b) to one side of the grid condenser C2. The beginning of L2 is that terminal which corresponds to the beginning of L1, that is, if L1's beginning is on top, so is that of L2. The other side of the grid condenser goes to the grid, which is the G post of the detector socket at left in Fig. 1. The end or opposite terminal of L2 goes (a) to the

rotor plates of C1 and to A+. Be sure not to make this connection to A—, for although the set will work well that way with the 12 type tube, it works better when the connection is to A+.

4. The plate of the detector tube, represented by the P post on the socket, is connected to (a) the beginning of L4, the plate coil and (b) the stator plates of C3, the variable condenser that tunes the plate. The end of L4 connects to the rotor plates of C4 and to the END of the tickler or rotary coil within the coupler. The beginning of the tickler goes to the outside spring of the double-circuit jack J1. The beginning and end of the plate coil are best determined by placing the plate coil on top of the coupler stator, looking at two corresponding terminals, say the top terminals of the two coils, and seeing whether, regarded as arrows, these terminal wires point in the same direction. If they do NOT point in the same direction their poles are opposite. Turn the plate coil upside down. Now they will correspond. Hence if the beginning of L2, the secondary on the coupler, points to the left, on top of the coil, then the beginning of L4 also at its own top will point to the left. Therefore tie a piece of string on the beginning of the plate coil to identify that lead as such.

5. The outside right-angle or frame of the jack J1 is connected to B+ 22½ volts. Try lower voltages and also higher ones, up to 45, for best results. This is the detector B+. If a by-pass condenser is desired, and one might be tried, although it is not usually necessary, it may be soldered to the outside leaves of the jack, that is, those connections that were made from the beginning of the tickler and the B+ 22½ volts.

6. Now for the audio stages. The leaf or spring of the jack J1 that, when the plug is out, makes contact with the outside spring that was joined to the beginning of the tickler is connected to the P post of the first audio-frequency transformer, the one at left in Fig. 1. The primaries and secondaries of audio-frequency transformers are not always marked the same. P1 and P, P2 and B, S1 and G and S2 and F are corresponding designations. Sometimes B+ is used instead of B, and S2 is sometimes marked F— or A— instead of just F. S represents secondary, and P primary. The remaining unconnected leaf of J1 is joined to the B post of the first AFT. The F post of that AFT already has been connected to F—, so there remains only the connection from the G post of this AFT to the G post on the socket second from left in Fig. 1 virtually to complete the wiring up to and including the first audio stage. The second audio stage is wired with the plate of the first audio tube, second tube from left, going

to the P post of the last AFT, the B post of this AFT going to B+ high voltage, usually 67½ to 90, as this is the amplifier plate voltage. The G post of this AFT goes to the grid or G post of the last tube and the F post of this AFT already has been connected to A—. Now join the plate of the third and last tube to the spring of the single-circuit jack and join the frame of that jack to B+ high voltage, which will be the same voltage used at the B post of the second AFT. Hence, these two leads may be joined from B on the second AFT to J2, if desired, a common connection being made to the B battery.

7. Now turn up the rheostats and see if the tubes light. If either rheostat lights the tube rather brightly at once, then continues to diminish as you turn the rheostat further, you have the connections to that rheostat reversed, so just switch them, so that the tube lights dimmest at first and rather more brightly as you continue turning the rheostat on. Test the

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THE SUPERDYNE

(Concluded from preceding page)

other rheostat for the same condition. These tests may well be made before the wiring to the rheostats is permanently connected, especially if solder and lugs are used, for then the reversal requires a little work.

Granting that the rheostats actuate the filament heating in proper fashion, connect one minus post of a 45-volt B battery to one plus post of the other 45-volt B battery. The amplifier B+ is connected to the free 45 volt plus post of the block. The detector is tapped at the 22½-volt post of the B battery OTHER than the one to which the amplifier B was connected. Now there is a remaining B-, which is to be connected to A+. This completes all wiring.

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- One Superdyne plate coil.
- One Superdyne coupler.
- Three sockets.
- One single-circuit jack.
- One double-circuit jack.
- One 6-ohm rheostat.
- One 2-ohm rheostat.
- One terminal block.
- One 7x21" panel.
- One pair earphones.
- One loudspeaker.
- Two .0005 mfd. low-loss variable condensers, with vernier (C1-C3).
- Three 1½-volt dry cells.
- Two 45-volt B batteries.
- Three WD 12 tubes.
- One leak.
- One .00025 mfd. fixed grid condenser.
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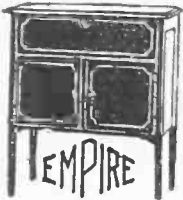
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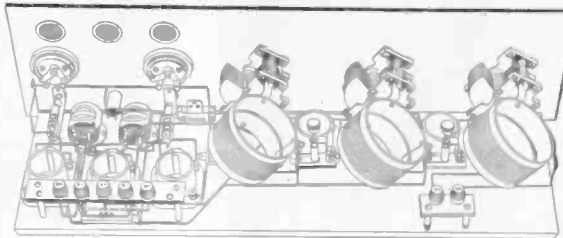
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- 5 Brunswick Bakelite Sockets.
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- 1 Baseboard.
- 20 Feet Tinned Bus-bar.
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- 1 Tubular Glass Grid Leak.
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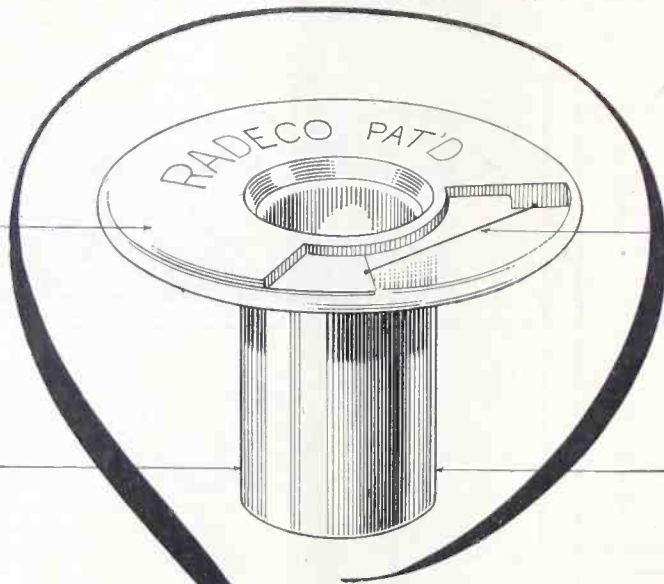
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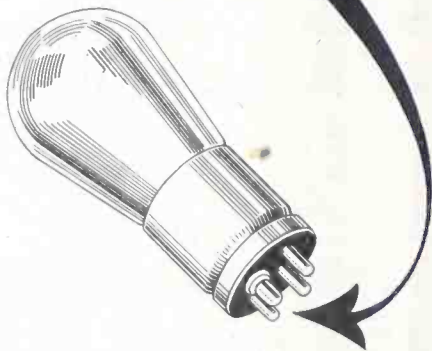
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