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Layout for Testing 100 Circuits

4-TUBE SET FOR QUALITY DX

Christmas
Greetings
From

RADIO WORLD

Title Reg. U. S. Pat. Off.

195-143

VOL. 6 NO. 13

ILLUSTRATED

EVERY WEEK

*Why Are the Auto
and Phonograph
Industries Ahead
of Radio?*

*Using DC for
Charging Batteries*

BY
HERBERT HOOVER

*Radio No Longer
Just Fun, But
Becoming a
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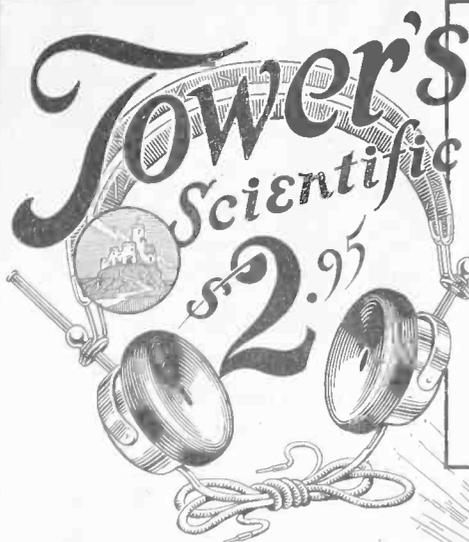
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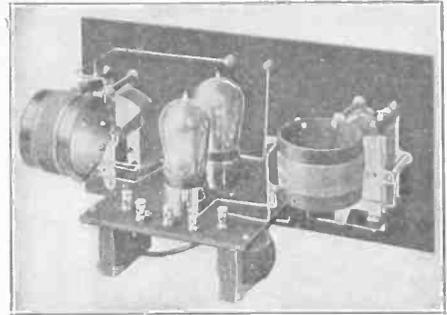
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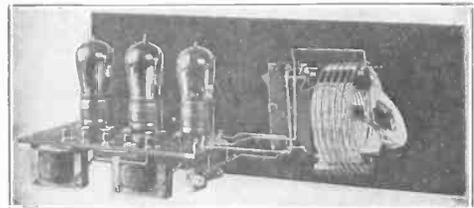
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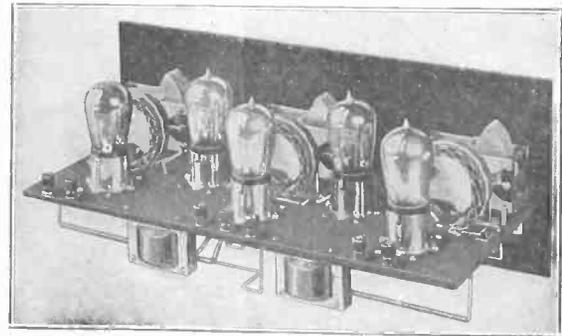
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This receiver has brought in broadcasting from coast to coast. In fact, anything that any radio receiver has ever done, you may expect from the A. I. R. SERVICE TYPE 5A. It is the most efficient type of receiver ever designed.

7x18 Genuine Mahogany Cabinet included (not an imitation).

\$50.00

Without tubes

No matter how experienced in radio you might be, we ask you to measure the A. I. R. SERVICE RECEIVERS against your most exacting ideas. Notice the quality of reception and that even distant stations come in on the loud speaker. Notice the neatness of the wiring and assembling. Examine the apparatus closely and notice the unusual high quality. Notice that we have adhered strictly to the low loss principle—low loss condensers, low loss coils, and even low loss tube sockets (something new). Notice the sub-bases and the neat arrangement of the parts. Also that most of the wiring is out of sight (no more ugly wooden baseboards). Notice our new shadow panel and that silky effect. Notice the original design of the beautiful cabinet—genuine mahogany (not an imitation). THEN NOTICE OUR PRICE.

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Choose the receiver here described which is best suited to your requirements. (We will entirely assemble it for a small additional charge, if you wish.) Then send your order by letter, post card or any way you wish.

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RADIO WORLD

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

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December 20, 1924

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A 1-Tube DX Superdyne Rich in Tone

By Herman Bernard

THE Superdyne principle, which in standard practice is employed in a stage of radio-frequency amplification ahead of a non-regenerative detector tube, may nevertheless be employed with great success in a straight 1-tube set in which the tube is used as detector. This distinguishes the present circuit from the 1-tube Superdyne in which the tube is used for the RF stage, with a crystal as the detector. Much greater distance is obtained when the tube is used as detector; in fact, the set is capable of as great DX reception as any other regenerative set and it is not uncommon to pick up stations 500, 800 or 1,000 miles away. The tuning is sharp and, as with virtually all forms of the Superdyne, somewhat critical. It takes somebody who knows something about tuning to bring in a DX station well, although the inexperienced can tune in the locals without difficulty. The quality of the signal received from DX stations is better than that obtained from the usual run of regenerative sets, this circuit sharing the Superdyne's faculty of imparting marvelous tone quality.

The set is extremely sensitive and its selectivity compares favorably with that the Super-Heterodyne. The hookup comprises the 3-circuit tuner, with the fixed plate coil L_4 added, and the signal returned from plate to grid at radio frequencies in an inverse direction. The plate is connected to one end of L_4 , the other end of which goes to the rotary coil L_3 of the coupler, called the tickler. Across the plate coil is a variable condenser, which tunes the plate to the same frequency as that to which the grid coil is tuned, thus producing resonance. The tickler coil is theoretically

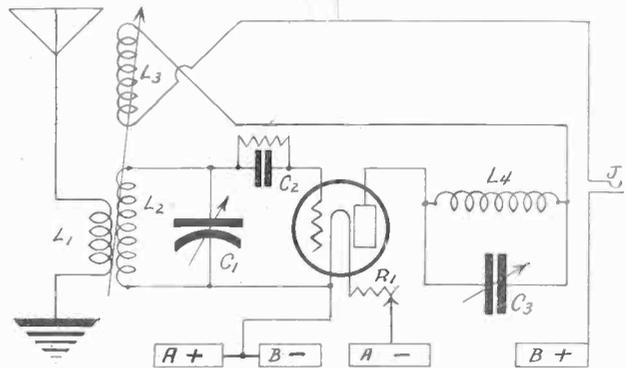


FIG. 1, the one-tube Superdyne circuit. Coils L_1 , L_2 , and L_3 are in inductive relationships, L_3 being variable. C_1 is a 43-plate variable condenser, rotor plates connected to the filament lead. This set, properly constructed, will cover the new waveband going into effect the first of the year.

the regeneration control. In attempts to simplify the terminology for laymen the condenser across the plate coil has been called the resonator and the tickler the volume control.

Tuning Requires Care

The tuning of this circuit will require some patient practice for those not familiar with the Superdyne, but it is something not difficult to master, and once mastered makes possible as fine a result as is obtained from a single tube. Unless regeneration is used in a 1-tube detector circuit it is next to impossible to get any DX. Regeneration therefore functions as a radio-frequency amplifier, being equal to at least one stage of RF ahead of a non-regenerative detector. Using the circuit I am describing I heard Aberdeen and Lon-

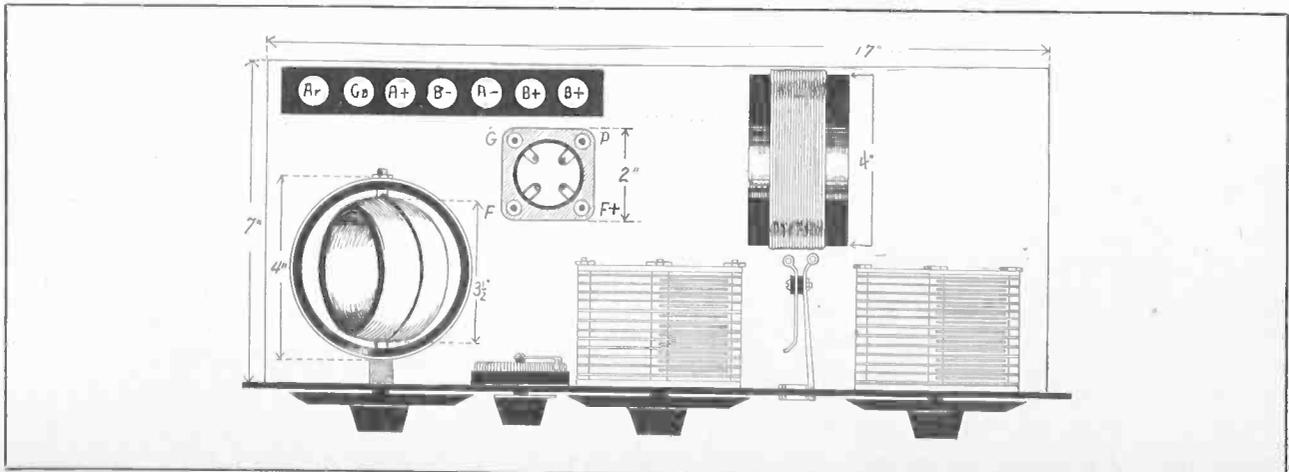
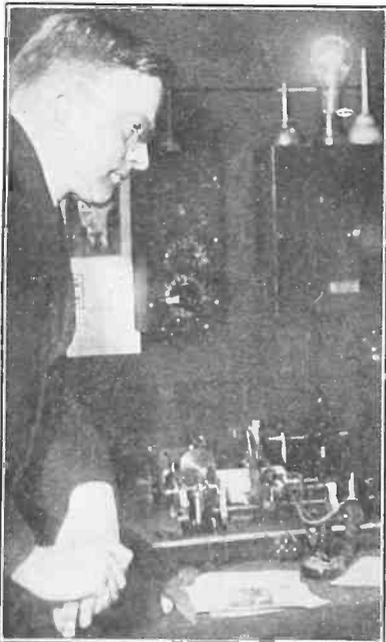


FIG. 2, the baseboard layout for the one-tube Superdyne. Note the position of the filament and B+ terminals.

Santa Broadcasts Greetings



"MERRY CHRISTMAS," is the greeting broadcast by Santa Claus (at right) before the microphone from hundreds of stations throughout the world. Thus was the thrill of Christmas joy amplified and even reflexed. The Romance which is Radio combined with the Blessing which is Christmas. The photo at left shows children's party at WGBS, New York City. The girl in foreground is exploring electrical mysteries while the one at top betokens an over-sufficiency of all that is edible, including candy. (Kadel & Herbert-Fotograms).



SUCH A DELIGHT is radio that Judge Alfred J. Talley, of New York City, recently declared that it should not be shared by prisoners, as that savors of reward for wrongdoing society. You see Victor Kraft, radio expert, inmate of Auburn Prison, N. Y., tuning in. The equipment was donated by W. R. Coe, New York philanthropist. (International Newsreel.)

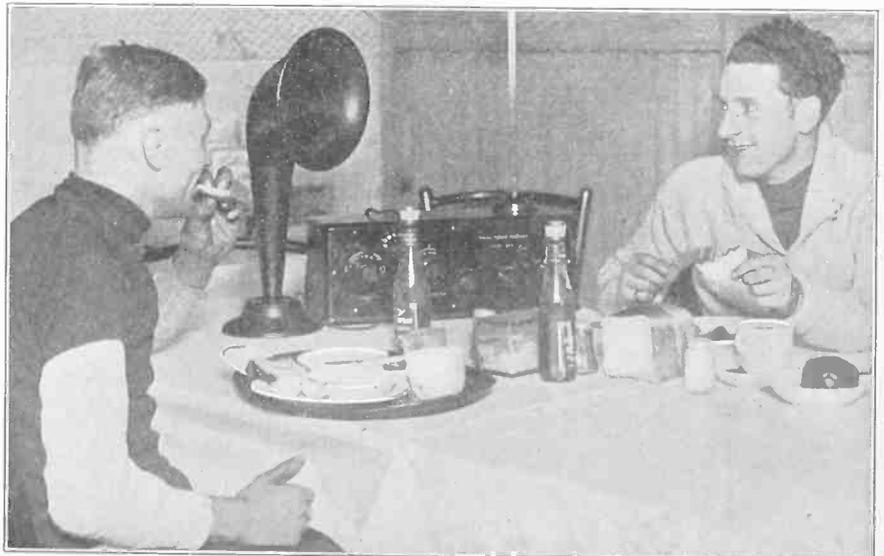


THE LAW took its course when a sailor was stopped in an automobile in Chicago because of a mysterious-looking carrying case. But it contained a set and the tar tuned in some jazz that both resolved was real peppy. (U. & U.)

THE MAN who had charge of the experiments that led to the transmission of photos by radio from London to New York was Capt. R. H. Ranger (above), testing improvements on his invention. The aim is to send the whole front page of the New York Times over the air, but just now all that can be done along that line is to transmit a front-page headline—from a Hearst paper. (United.)

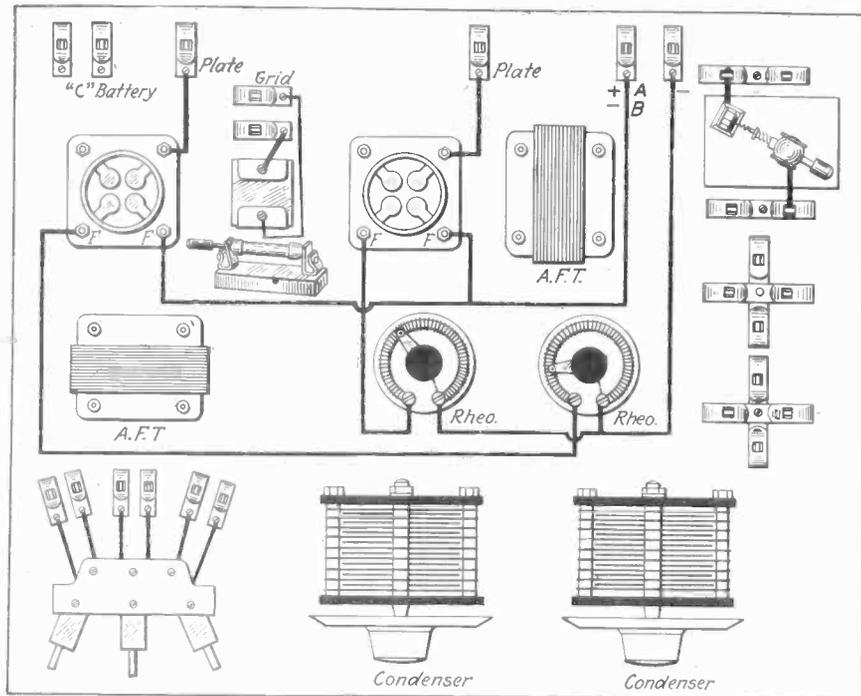


DISCORD in the family arises when a devotee of bedtime stories gets tuned in, by sister's playful effort, to a broadcast of cooking recipes. Even a year-old radio fan knows the difference. (L.N.A.)



THE RADIO invades even the Six-Day Bike Race, thus corroborating the fact that it touches every point of life. Although Benezatto and Gastman (above) were defeated, they found cheer in the radioed music that reverberated in their quarters at Madison Square Garden after the finish. (United.)

A Test Board to Try Out Hundreds of Circuits



THE LAYOUT (Fig. 1) for the experimental test board. The apparatus has been arranged for the shortest leads for the greatest number of hookups. It would be well to adhere, as near as possible, to the above scheme. All apparatus should be of the highest quality. If a baseboard is to be used, it should be of well-seasoned wood. Fahnestock clips are provided for A, B and C batteries as well as for the grid, crystal detector and duolateral honeycomb coils. Double clips are provided for multi-connections. At the back, left and center, are the tube sockets and the grid condenser. The variable gridleak is between them. At the right of the center socket is an audio-frequency transformer and to the right of that the crystal detector. The two rheostats are located in the center of the panel. Another audio transformer is situated near the first socket. Below the A.F.T. is the variable duolateral or honeycomb coil mounting. The two variable coils are at each end, the center honeycomb being fixed. Two Fahnestock clips are provided for each coil. The entire mounting is fastened directly to the board. To the right of the coil mounting are the two 23-plate condensers. If the condensers you have do not have a means of baseboard mount, they may be mounted on a small panel, and the panel mounted on the baseboard with right-angle braces.

By *Abner J. Gelula*

A LABORATORY on a 16 x 18 base-board!

For the radio man who desires to try out various circuits; for the radio man who cares to experiment; for the radio man who wants to study practical radio; for the radio man and dealer who must know the results of the latest circuits, the experimental layout is just the thing.

Hundreds of different circuits may be tried out on this board; anything from a simple crystal receiver to an inverse duplex. Duolateral or honeycomb coils enable the experimenter to cover all broadcast and amateur wavelengths, and, with the aid of the two variable condensers, any type of coupling or tuning arrangement may be employed.

Either clip or tip leads are to be used to make rapid connections, and, because

the filament leads are permanent, a complete reflex set may be hooked up in 20 minutes.

Placement is Important

If the layout is to be a success, the placing of the instruments is very important. Interacting fields cause losses and noisy reception, thus a circuit that may have possibilities is erroneously considered of no value merely because of the misplacing of the instruments.

This is to be a permanent affair. The use of slip-shod coils, condensers, transformers and sockets gives proportionately bad results. Use low-loss instruments and keep as many of the instruments insulated as possible. A bakelite or hard-rubber baseboard would be good, but dry wood is more convenient for mounting parts.

It is well to have fixed condensers of various capacities, duolateral or honey-

DEVICE SAVES LOTS OF TIME

Even a Complicated Reflex May Be Hooked Up in Twenty Minutes

comb coils from 25 turns to 200. A fixed RF transformer, not shown in Fig. 1, is optional. The necessities are shown mounted on the board. The extras are "luxuries," so to speak.

Use a Variable Leak

A variable gridleak is shown in Fig. 1. It is necessary that it be variable because of the various types of tubes used. Also, the leak may vary according to the type of circuit used.

The duolateral or honeycomb coils will be found very useful. The two end coils are variable within a 90-degree angle. Two coils may be used in radio-frequency circuits as a coupler, while the third coil will be used either for primary inductance or tickler. By connecting two coils in series, a variometer effect will result when the two free leads are connected in the circuit. It is often advisable with duolaterals or honeycombs to use the variable condenser across a tickler coil. However, should the circuit be of such construction that tuning by merely varying the coil is found to be sufficient, the condenser may be used elsewhere in the circuit.

Fahnestock clips are advised for connecting all end-wires. Two clips are used, as you will note, for each of the honeycomb coils.

After one week's use the experimenter will wonder how he ever managed to get along without a test board.

LIST OF PARTS

- One 16 x 18" board.
- One honeycomb mounting.
- Two 23-plate variable condensers.
- Two rheostats.
- Two sockets.
- Two AF transformers: 3½-to-1 and 5-to-1 or 6-to-1.
- One variable grid leak.
- One adjustable crystal detector.
- One grid condenser (.00025 mfd.)
- One each of 25, 100, 150, 200-turn duolateral or honeycomb coils.
- Two each of 50 and 75-turn duolateral or honeycomb coils.
- Two dozen single Fahnestock clips.
- Six double Fahnestock clips.

OPTIONAL ADDITIONS

- One each of .0001, .0005, .001, .002 and .006 mfd. fixed condensers.
- One variometer.
- One fixed RF transformer.
- One each of 1250 and 1500-turn duolateral honeycomb coils (for Super-Regenerative set).
- One potentiometer.

INDEX TO VOL. 5, RADIO WORLD

A complete index covering all the articles that appeared in Radio World from Jan. 5 to Sept. 20, appeared in Radio World dated Oct. 18, mailed on receipt of 15c., or start subscription with that number. RADIO WORLD, 1493 Broadway, New York City.

CRYSTALS successfully used as Oscillators and Amplifiers for the First Time. A two-part article, with diagrams of six hook-ups, in Radio World, issues of Aug. 9 and 16. Send 30 cents. Radio World, 1493 Broadway, New York City.

2,000 Gangs in Chicago Means Not Enough Sets

CHICAGO.

THE discovery that some 2,000 gangs or clubs exist with an aggregate membership of 100,000 boys was announced in connection with an extensive investigation of boys' gangs by Frederick M. Thrasher under the social science research program of the Laura Spelman Rockefeller Memorial at the University of Chicago. It was pointed out radio sets in the home would be a great deterrent to gang association.

Mr. Thrasher lived among them for

months and investigated 1,313 of them, uncovering the fact that their members, aside from carrying on criminal practices, often seek Civil Service positions through the influence of aldermen. Many of the groups studied were organized for good influences, he found.

They are supported by breweries, saloons and, in some cases, by athletic goods dealers, who derive revenue from the sale of sporting articles to groups functioning as athletic clubs, he said.

Hook-Ups for Your Test Board

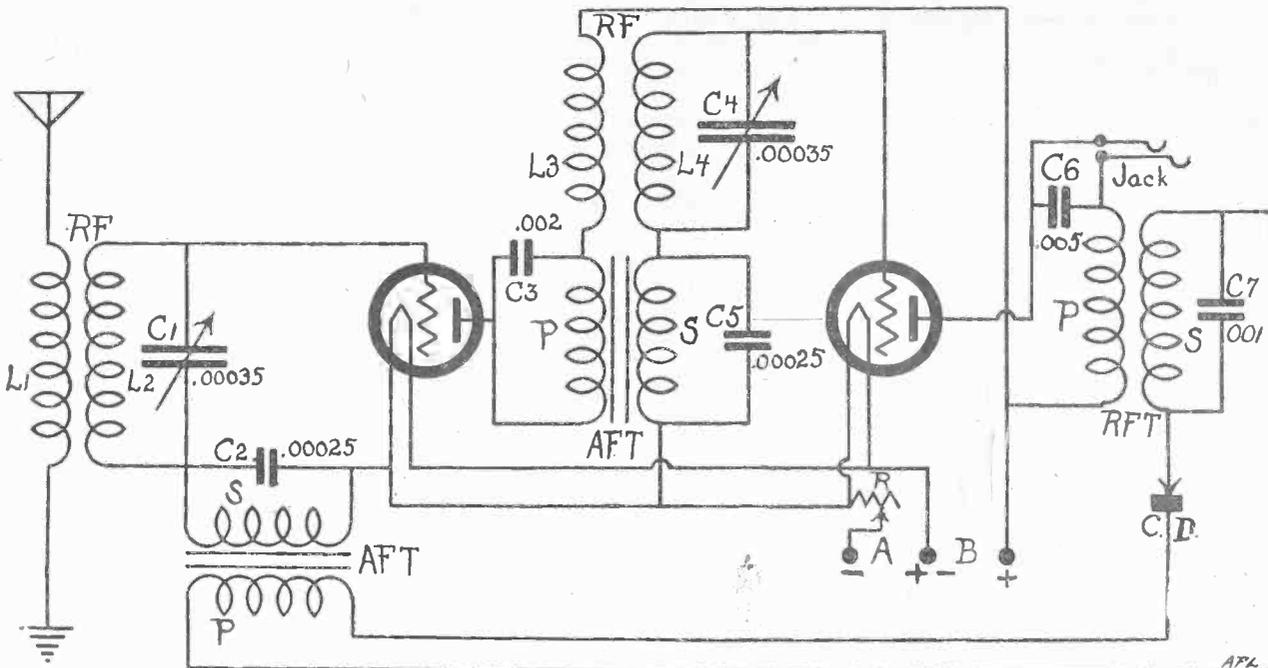


FIG. 4 (at right), is a circuit with a stage of transformer-coupled RF ahead of a regenerative detector. If L5 is a tickler, omit C3. If L5 is not in inductive relationship with L4, include C3, which is a variable condenser not included in the test board as shown in Fig. 1.

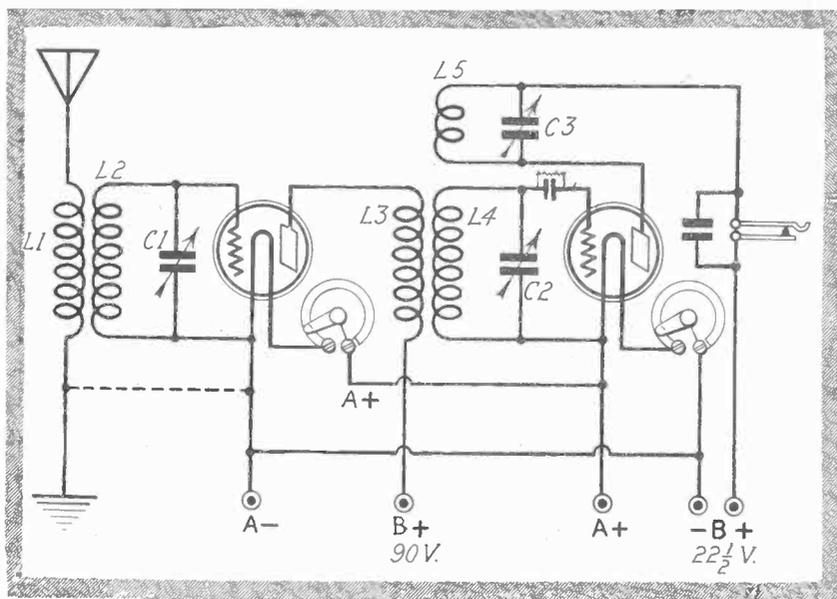


FIG. 5 (below), a simple one-tube set that you can log. L1 is a 75-turn duolateral and L2 has 50 or 75 turns. The coils need not be inductively coupled. This circuit, like the others on this page will not cover the entire broadcast band, with standard size DL coils, as it will be necessary to remove turns. No standard DL coil will cover the band in conjunction with 23-plate shunted condensers.

FIG. 3, a 2-tube reflex (above), uses each tube for a stage of radio-frequency amplification and also for a stage of audio-frequency amplification. A crystal is used for detection. The values of the fixed condensers are given in microfarads. C1 and C4, variable condensers, are given as .00035, normally 17 plates, but the variable condensers on the test board may be used instead by having the inductances as follows: L1, 12 turns wound on a 75-turn duolateral or honeycomb coil; L3, 7 turns on L4, a 75-turn coil. This circuit is difficult to construct properly. Try making the second tube, at right, the first audio stage and the other tube the second audio stage after you have experimented with the diagram as shown. The reversal will constitute the circuit an inverse duplex.

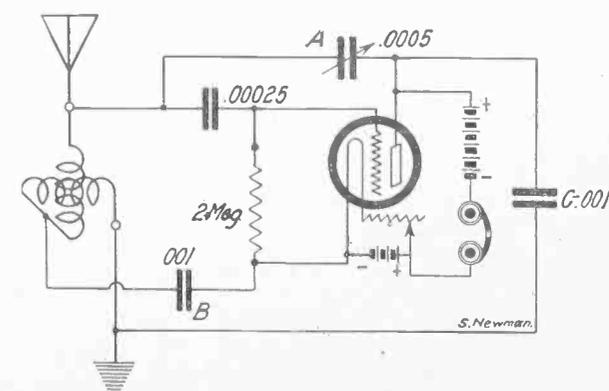
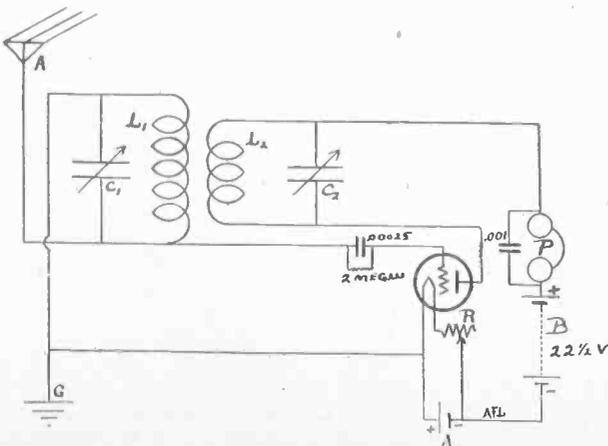


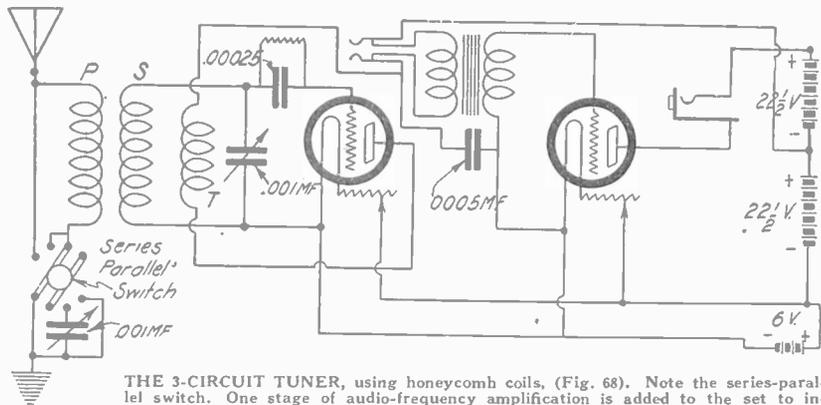
FIG. 6, a single-circuit 1-tube regenerator. The variometer effect may be obtained by hooking two honeycombs in series and varying the inductive relationship.

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.

WILL you kindly give me the standard honeycomb circuit, with the series-parallel switch? Also a stage of audio-frequency amplification added.—Charles Henry, 1532 Atlantic Ave., Atlantic City, N. J.
See Fig. 68.

power house. Can you suggest a remedy?—Henry Sang, Jr., 115 Lake Drive, Oshkosh, Wis.
Is there an arc light near your home? Try using a choke coil in series with the aerial. An iron core choke may be taken from an old Ford spark coil. Use the primary coil only. Make sure



THE 3-CIRCUIT TUNER, using honeycomb coils, (Fig. 68). Note the series-parallel switch. One stage of audio-frequency amplification is added to the set to increase the practical receptive distance. Two of the 201A or 199 tubes may be used to advantage in this circuit. The series-parallel switch places the 43-plate variable condenser in either the secondary or ground lead, as required. The wavelength is increased when the condenser is in the secondary, decreased when in the ground.

I BUILT the Bernard 3-circuit tuner that can be logged, as described in the issue of Nov. 8. I get wonderful results but for one thing. There is a continual whistle in the set that, shield as I might, I am unable to eliminate. Can you suggest anything that will cut this out?—W. W. Stockton, Healdton, Okla.

Get the proper value grid-leak and vernier rheostat. Also, shielding the entire back of the panel, grounding the shield, will eliminate this trouble.

I WISH to use spider-web inductances for my Neutrodyne receiver, but have 23-plate variable condensers instead of the required 17-plate. Can you tell me the approximate number of turns for the primary and secondary of each neutroformer?—John A. Sokel, 2117 S. Ridgeland Ave., Berwyn, Ill.
Primary: 6 turns; secondary: 47 turns.

IS IT possible to use a loop with the Neutrodyne? In the issue of Nov. 8, I saw the article explaining how, by adding another tube, it can be done, but in the issue of Nov. 15, Chas. H. M. White states that to date no good way of using the loop with a Neutrodyne has been found. Can you set me straight on this? (2) When adding the other tube for the loop, which tube is the detector?—H. E. Winter, 1033 Winters St., Milwaukee, Wis.

Yes, a loop may be used in conjunction with a Neutrodyne, but not with the usual five tubes. That was the point Mr. White made. But later he showed how to add a tube and get the desired results. The method of using a loop with the 6-tube Neutrodyne works. (2) The addition of the extra tube does not mean that the detector changes. The detector tube is the fourth from the left, thus it remains the same.

I HAVE a set that works well in the daytime but at night there is a terrible rasping sound in the receivers. I live a half block from the street-car barns and three blocks from the electric

that the coil is not broken, by testing it with a light or buzzer, in series with the coil.

CAN you give me the approximate number of turns for the Neutrodyne coils using 13-plate variable condensers?—M. N. Stickney, 27 Church St., Stonington, Conn.
Primary: 6 turns; secondary: 65 turns.

HOW is the coil wound, as to direction, in the 1-tube Superdyne by Herman Bernard in the issue of November 15?—A. A. Constein, 375 W. Johnson St., Sandusky, Ohio.
All coils are wound in the same direction.

INSTEAD of a 23-plate condenser, in Lieut. P. V. O'Rourke's circuit in the issue of November 29, can I use an 11-plate and add turns to the coil?—Henry Puchts, 7015 Fletcher St., Pittsburgh, Pa.
Yes; add 8 turns.

I HOOKED UP Lieut. P. V. O'Rourke's set, but I can hear the voice only faintly. Can you help me?—W. H. Messenger, 915 E. 9th St., Pittsburgh, Kansas.

See that the grid condenser is of the right value and not shorted. Be sure of the value of the grid leak. Use a variable gridleak if possible. The fact that signals do come through shows that it is a minor detail that is annoying you. Do not use more than 22 1/2 volts on the plate of the detector if it is a soft tube, and not more than 30 on a hard tube. See that the grid returns are according to diagram.

HOW FAR will the reflex described in the issue of November 8 receive? Is volume good? Can a fixed coupler be used? If so, how many turns on the primary and secondary? Can a fixed detector be used?—Ralph E. Witts, Quitman, Ark.
Of course reception is different in various locations. Under good conditions, distance, 1,000 miles; volume, fair. In this circuit it would be

best to use a variable coupler. A fixed detector may be used with a corresponding decrease in sensitivity and volume.

ASIDE from the fact that it will make tuning slightly more critical can I use 23-plate condensers in place of 17 plates? Can I use the RF transformers as hooked up in the Acme Reflex without breaking the wiring between the RF and AF transformers? Will another jack ahead of the last audio stage effect balance of circuit. What form of indoor aerial would you suggest for your circuit?—Sheridan L. Weaver, 38 N. Phelps St., Youngstown, Ohio.

Yes, you may use a 23-plate condenser. The tuning will be more critical, not sharper. The RF and AF transformers in the Acme Reflex may be used as hooked up in the reflexed part only. Another jack may be a convenience, but will not act as a balance. If you must use an indoor aerial, a couple of turns around the moulding of the room.

USING a 2 1/2-inch form in series with a 23-plate condenser, please tell me how many turns I should wind to cover the band between 250 and 500 meters. I have a crystal set.—N. R. King, 686 St. Peter St., St. Paul, Minn.

Considering that the aerial is about 100 feet long and the ground lead about 50 feet long, the coil, an autocoiler, should be 60 turns.

I HAVE a Westinghouse RC set. Would the addition of a C battery be of any improvement to the tone, and would it save the B batteries? (2) Could I build a power-amplifying attachment without getting into trouble if I sell them?—E. A. Haeuser, Fountain City, Wis.

Yes; it would be of benefit to both tone and B batteries. (2) We cannot undertake to answer legal questions; consult a lawyer.

IN reference to the 4-tube Anderson Superdyne: What is the highest and lowest wavelength that it will receive? (2) What is the new wave band to go into effect January 1?—L. C. Rinehart.

With an aerial of approximately 100 feet in length, it will cover approximately 250 to 500 meters. (2) 200 to 545 meters.

WILL any changes in the Magnadyne be necessary for covering the new wave band? (2) Would a variometer in the plate of a Neutrodyne be a good stunt?—Henry C. Murir, Box 15, Cove, Ore.
Yes. See the issue of Nov. 1. (2) Yes, but neutralize the set.

IN reference to the 4-tube Super-Heterodyne as described in the issue of July 26 by C. H. M. White: Can this circuit be operated with an outdoor aerial and how connected? (2) Is there a potentiometer connecting the AFTs and acting on tube No. 3? (3) What should be the plate voltage on the first tube?—Maurice A. Malandain, 234 West 111 St., New York City.

Yes, you may use an outdoor aerial with increased volume and distance. In place of the loop, the secondary of a variocoupler is connected, the aerial and ground to the primary. (2) Yes. (3) 22 1/2 volts on a soft tube; 22 1/2 to 45 on a hard tube.

WHAT is the ratio of the AF transformers in a standard amplifier?—I. W. Johnson, Ardmore, Okla.

First stage: 6 to 1; second stage: 3 1/2 to 1.

CAN you suggest a good radio book that is thoroughly technical?—J. C. Porter, Amargosa, 23, Cuba.

Morecroft's, at Brentano's, New York City.

CAN you give me a hook-up for adding a stage of RF to my present regenerative set without losing the regeneration?—J. C. Young, 2544 Fourteenth Ave., Washington, D. C.
The circuit you request appears in this department.

I BUILT O'Rourke's 3-tube 'Wiz' and it works fine. However, I get a continual whistle and noisy reception. Can you help me clear this up with a few suggestions?—J. Wilt, 3 W. Burnside Ave., Bronx, N. Y.

All indications, as far as whistling goes, points to the coils being mounted too close to condensers and other parts. They should be no nearer than 2". As to noisy reception, see that the B batteries are up, connections are firm and tubes are good. Test the tubes in another set. The wrong value fixed condensers often cause the complaint you make. Try others.

IS the Radiola IIIA considered a good DX set? (2) Is it selective? (3) Will it operate on a loop? (4) Will it operate a loudspeaker on DX successfully?—E. F. LeBlanc, Church Point, N. S.

Yes. (2) Fairly. (3) Yes, in a good location and on a broadcast station within a radius of 25 miles. (4) 500 miles under ideal conditions.

IN reference to the Neutrodyne article on page 5 of Radio World for Nov. 22: Using 201A tubes, does it matter which side of the rheostat the grid return is connected to? (2) What value grid-leak condenser should be used? (3) Will the spider-web Neutrodyne kit be all right? (4) Where is the C battery connected?—C. J. Minder, Muscatine, Ia.

Grid return to the positive filament, not to the rheostat, for detector; to A— for RF stages. (2) .0025 mfd. condenser with a one to two megohm grid-leak. (3) Yes. (4) Positive C battery to the filament lead, negative C battery to the grid return leads of the two radio and two audio tubes. See diagram in Superdyne trouble-shooting article, December 6 issue.

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An Interchangeable Detector

By Charles H. M. White

Consulting Engineer

HERE is a neat single-tube receiver that has a good range, using ear phones, and is cheap in maintenance.

In every large city there are one or more broadcasting stations that operate at 500 or more watts of power. These stations generally come in with too much volume for tube reception on the ear phones, but they do afford wonderful reception with a crystal detector. Besides, by using a crystal no external energy is needed at the receiving end. Therefore, I have designed this receiver using a crystal detector for local reception, hence saving on battery drain, and a dry cell tube detector for distant reception. The tube chosen is a 12 type, which will operate with one dry cell as an A battery and a medium-size block of 22.5 volts B battery. The crystal detector was the new Freshman semi-permanent type, which affords a panel mount adjustment. For the switch S an ordinary push-pull type will suffice. The condensers C2 and C3 are .004 mica fixed condensers. The condenser C1 is a low-loss .0005 mfd. variable condenser with a vernier gear or dial.

The coils EFG form a low-loss tuner, Bruno or Uncle Sam coils. These are wound with Litz wire which insures extra sharp tuning. The coils marked E and F are the stator coils and the coil G is the rotor. To get the best possible results reverse the terminal connections to the coil G and see which connection gives the loudest signals. The phone jacks J1 and J2 are ordinary open-circuit jacks. When it is desired to use the crystal detector for local reception just turn the tube off by means of the rheostat, close the switch S and plug the phones in J1. After adjusting the crystal for maximum sensitivity there is only one

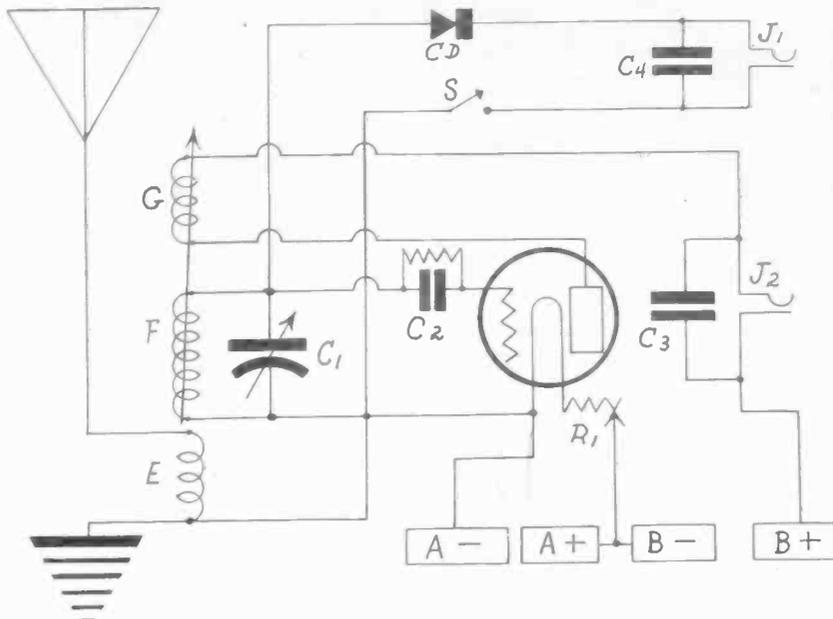


FIG. 1, wiring diagram of the White convertible set, using a crystal for quality reception of locals and the tube (with crystal omitted) used as detector for DX work.

control and that is the tuning condenser C1. To operate with the tube for distant reception open S and plug the telephones in J2, lighting the tube by means of the rheostat to the correct brilliancy. The set is now a single tube receiver and the crystal is cut out. The station tuning is still accomplished with C1 but the volume and sensitivity control is obtained by varying the coupling between G and F, by slowly rotating G.

Charging from DC

CHARGING the A battery or using the direct current for filament heating is greatly simplified when there is a DC current supply for the house lighting.

Of course using the voltage direct to the tubes in place of the storage battery is not quite as satisfactory as the good old A battery because of a slight hum present, although using the DC line, cut down, is absolutely practical, especially for local reception. The signal will be of sufficient volume to eliminate the hum.

However, the real convenience of the DC line will be realized readily after you hear how exceedingly simple it is to charge the storage battery with that current.

As shown in Fig. 1, wiring is simple and foolproof. There is nothing to go wrong or burn out, unless it be one of the lamps, which may be replaced for 40 cents rather than a rectifier lamp costing \$4. Two line fuses care for a possible short and, should you short something accidentally, you will merely have to replace a 5c fuse.

Two switches, six sockets, a piece of board and suitable wire is all the apparatus required. Lamps may be readily found lying about the house, or, as the battery will usually be charging during the night, lamps may be taken out of sockets about the house.

Lay the apparatus out on the board as shown in the accompanying photograph. At the top of the board place a double-pole single-throw switch with fuse blocks on each side of the line. At the lower end of the board place a double-pole double-throw switch of the standard porcelain-base type. Between the two switches are mounted the six lamp sockets arranged three on a side,

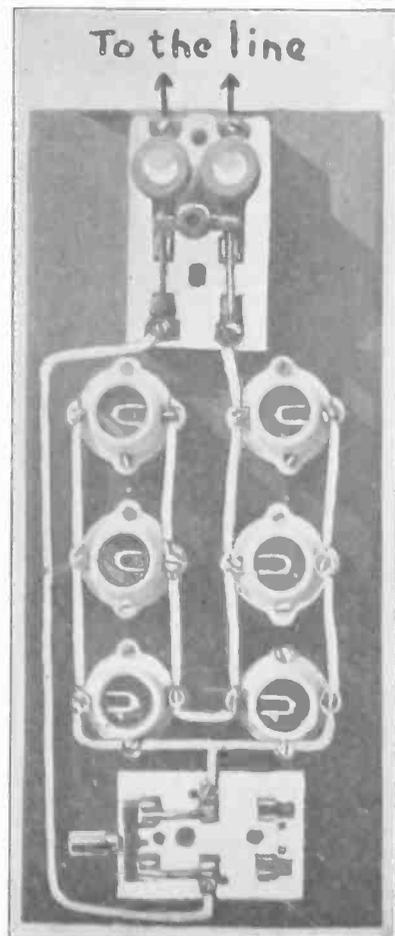
which will save space and facilitate wiring. On the DPST switch, now connect one of the posts to one side of the DC line, the other side to the other post. One knife of the same switch goes to one side of the sockets, which are hooked up in parallel, the other knife to one knife of the DPDT switch. The other knife of the DPDT switch connects to the other side of the parallel sockets. The battery is then connected to the two poles of the DPDT switch.

Be sure, when connecting the battery to be charged, that the polarity of the battery is placed in accordance with the polarity of the line. Ascertain the polarity of the line by dipping the leads from the two poles of the DPDT switch in a glass of salt water. The wire which produces the more bubbles or gas is the negative terminal. Connect the negative pole of the A battery to the corresponding pole on the charger, the positive being the other pole.

As to lamps: insert as many lamps in the sockets as desired. A simple method to use in determining the number of watts necessary to be placed in the line is to divide the number of ampere-hours, which is marked on the battery, by 8. The quotient is the number of amperes required to properly charge the battery.

For instance, if your battery is a 6-60, meaning 6 volts and 60 ampere-hours, the quotient will be 7½. Assuming that the voltage of the line is 110, multiply 110 by the quotient, or, in this case, 7½, the result will be 825, which is the total voltage of the lamps which should be placed in the line.

Keep close tabs on battery and the charging, by means of a hydrometer. Never allow

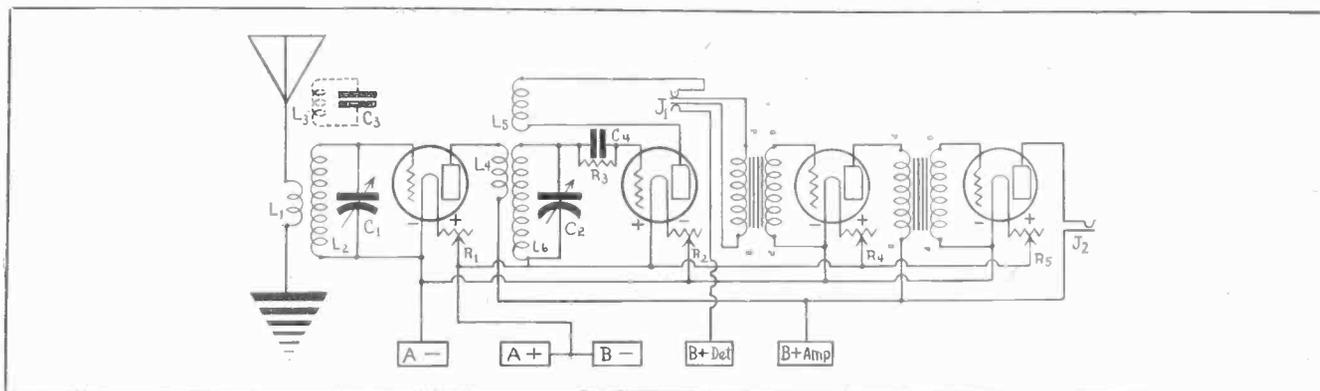


A CHARGER (Fig. 1) for direct current. Note that all sockets are in parallel, to cut down the voltage. All wires are easily discernible. To conserve your battery, be sure that the output voltage is not greater than 5 volts. Use a voltmeter.

the battery to be either under or over-charged. A battery is a good three or four-year proposition if proper care is taken, and you will find that it pays financially.

Loudspeaker DX on 4 Tubes

One Stage of Balanced RF Ahead of a Regenerative Detector, if Low-Loss Parts Are Used, Made Efficient Combination by Proper Adjustment



THE 4-TUBE DX SET (Fig. 1), using a rejector coil, L3, bridged by a fixed condenser, C3, to clarify the received signals and eliminate possibility of interference. The set is very selective. Constructed of low-loss parts, it brings in DX with volume and clarity. L1L2L3 constitute a variocoupler. C1 and C2 are low-loss .0005 mfd. variable condensers normally 23 plates. Their rotary plates are designated by the curved line in the condenser symbol. Two stages of transformer-coupled audio-frequency amplification are included in the circuit for loudspeaker operation. Two jacks are used, one for the detector tube for earphone service, and the other for the last or second audio tube, for loudspeaker service. A rheostat must be used for R2, in the detector circuit, but the wiring and controls may be simplified by using Amperites instead of the three other rheostats. This was done in the circuit constructed by the author. The 199 or 299 type tubes work best in this circuit. If audio transformers of different ratios are used the higher ratio should be used in the first stage of audio. This is the AFT shown second from right in the diagram. Any two good 3-circuit tuning couplers may be used.

By Jay Hollander

SOME experimenters seem under the impression that the only safe way in which radio-frequency amplification may be obtained is through the use of the Neutrodyne system. Such is not the case. The Neutrodyne served only to make it popular. As a matter of fact, several commercial receivers incorporated it long before the advent of the famous Hazeltine circuit.

The circuit shown in Fig. 1 performs with four tubes the same duties as the Neutrodyne with five. It is very simple. It uses regeneration.

Advantage is taken of the low internal capacity of 199 tubes or those of the peanut type. The set also operates with 201A type but their incorporation adds greatly to the care necessary in the construction of the set.

Lay out the panel. Follow an assembly plan that keeps all parts at least 2" away from nearest neighboring parts. Other placement of the parts may lead to unwanted capacity between the various circuits.

A 7 x 8" panel is drilled.

The circuit embodies two Gen-Win low-loss tuners and two good low-loss condensers.

Any good pair of audio-frequency transformers will suffice as long as they amplify well throughout the entire range of audio frequencies.

The first Gen-Win coupler is put in place and wired to the condenser and the tube. A word might be said here about the coupler. According to the Bureau of Standards ratings, the chief resistance of radio tuning apparatus lies in the skin resistance of the wire with which it is wound. If the windings are silver plated, and wound with comparatively heavy wire well spaced, the minimum resistance to the extremely minute currents found in radio reception will result. Such savings in efficiency must be had if the best is to be obtained from any given hookup. The condensers must have the minimum of dielectric (aside from the air between the plates) so that losses from this quarter will be stopped down as far as possible.

After the first stage is installed, the second Gen-Win coil and the second condenser should be placed. The tickler of the coupler used in the first stage is left intact but unconnected. A word will be said about it later. It has a very definite use when the large tubes are used.

Some of the old-timers will say immediately, when they see the tickler in the ac-

customed position used in conjunction with radio-frequency: "It can't be done." The kink which enables it to be done is the use of aperiodic coils as the primaries of both couplers and their ample spacing from the secondaries. This distance has been figured out to a nicety so that it gives the maximum transfer of energy and at the same time holds the interference of the two circuits at a minimum. The idea has been in use with the old-timers for a long while.

The final step in the assembly of the set is the installation of the two audio-frequency stages.

After the apparatus is in place and the batteries connected everything is in readiness to test the set. Connect the aerial and ground to their respective posts and turn on the tubes.

If everything has been constructed in accordance with the plans the set will work without further trouble if the 199 type tubes is used. If the larger tubes are employed the results may not be so successful at first, since a few adjustments may have to be made.

See that the bus bar connecting the instruments has been run as straight as possible, that there is not an extra half-inch of wire not directly used in the set, and use the best of instruments.

The system of running all leads as straight as possible is a good one on any set but it is imperative in this one. The care necessary in construction is more than repaid when the advantages gained are considered. Clear signals and distance are possible with the set.

When the tests are started, if operation is not all that could be desired in the way of signal intensity, look to the grid leak. For this circuit it is well to use a Bradley leak or a Fil-ko-Leak. These are adjustable and correct. If a cartridge type or other fixed leak is used one megohm will usually be found sufficient.

After the adjustment of the grid leak things should go perfectly. The regeneration will of course come in for its own adjustment. However, a short period of practice with the set will soon teach the operator how it should be worked for best results. It will work best just under the point of oscillation. This can be done, because I have been using the idea for five months with fine results.

If the large tubes are used and the set persists in "boiling over" or oscillating, it is only necessary to give it a little extra

work to do. Like everything else, it will do only so much work. The tubes have a strong union and follow the strictest of schedules in their labors. Therefore, if you would make it stop using up its surplus energy by cavorting into oscillation, just hand it a bit of extra work which will keep it occupied and at the same time will not interfere with good reception.

The Radio Corporation discovered this union law among tubes some months ago and has been incorporating it in their sets for some time. The extra work is in the form of an absorption circuit. In the radio-frequency stage, take the tickler (which was left in place if the early instructions were followed) and short circuit it with a small condenser, about .0025 mfd. will usually be sufficient, although the value may have to be changed until the best value is found. A little experimenting with the size of the condenser and the position of the tickler will soon prove what is the best value.

After the proper value is found and the set again put into operation a station is tuned in with the tickler almost at right angles with the coil. I refer now to the regular tickler in the detector tube circuit. Then the tickler is brought up into the tight coupling position. That is, it is brought nearer parallel to the coil. As this is done the signals increase in volume. Just under the point of oscillation stop. One must learn where the point is. After the set goes into oscillation turn it back slightly until the music or speech is clear and free from the oscillation distortion. If the tube persists in "boiling" even after the tickler has been turned well back from the critical point and the music remains mused, the chances are that the radio-frequency tube still has a little spare energy. In such case the remedy is to turn the first tickler up a bit until the howling stops. It will take some practice to enable the operator to get familiar with the working of this set. When he does though, he needn't be afraid of his DX records.

Wiring Directions

The two couplers used in the circuit are identical. The first one, used in the RF stage, is L1L2L3 in Fig. 1. The rotatable coil in this coupler is not used as a tickler but as a rejector circuit, with a fixed condenser across it, the best value to be determined by experiment, as previously suggested. Thus this coupler requires only the variable condenser C1, which is

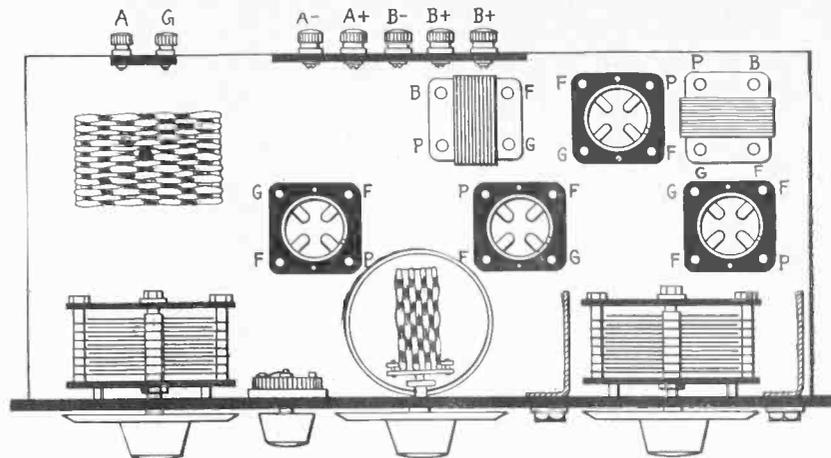
Wiring Balanced Regenerator

a 23-plate low-loss condenser, for tuning and necessitates only one control, the primary L1 being aperiodic. The coupler L1L2L3 is shown in Fig. 3 mounted at right angles to the baseboard. Two brass angles may be used. They are secured to the baseboard and to the insulation binding strips on the coil. Do not let the coil touch the baseboard.

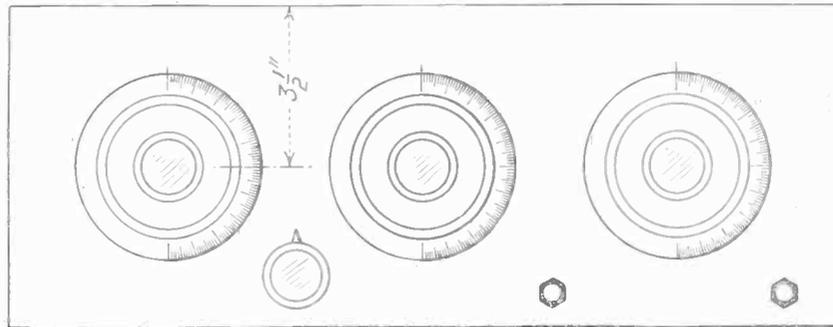
It is necessary to have a rheostat only in the detector circuit, if three Amperites are used to control the filament heating of the three amplifier tubes, the one radio and the two audio stages. It is also possible to use one Amperite for the TWO audio tubes and one for the radio tube, but be sure to get the correct value. In that case get one Amperite marked as suitable for a type tube you are using and one of half that value for the two audio tubes, if these two tubes are the same as the detector tube. That is because two tubes require half the resistance of one.

1. Considering that three rheostats are used, connect the A— direct to the F— post of the first tube, which is the RF tube, at extreme left in Fig. 1. This same lead goes to one side of the detector rheostat, R2, the other side of this rheostat R2 being wired to the F— post of the detector tube socket (second from left). The lead from the A— battery also goes direct to the F— posts of the two audio sockets, those at extreme right in Fig. 1. It is good practice to have the rheostat in the A battery lead other than the lead to which the grid return is connected, thus keeping the grid return from contact with the resistance in the rheostat. The A+ goes to one side of the RF rheostat, R1, the other side of that rheostat to the F+ post on the RF socket. The A+ goes direct from battery to the F+ post of the detector tube socket, the one second from left in Fig. 1. This same lead from A+ on battery goes direct to one side of each of the two rheostats R4 and R5. The other side of each of these two rheostats goes to the F+ posts of the two audio sockets. In carrying connections from socket to socket be sure that the connections are made, as described, from the A battery post, if a rheostat in the lead, and not from the socket side of the rheostat. If three Amperites are used, one each would replace R1, R4 and R5, but never R2, the detector rheostat. If two Amperites are used, one is used in place of R1 and the other, of half the value, in place of R4 and R5, the Amperite doing double duty would be connected with one side to the A+ and the other side to BOTH the F+ posts of BOTH audio sockets. This completes the A battery wiring. At this stage you may try out the tubes and see whether they light. If they do not, check up on your wiring and find out your mistake.

2. Connect the aerial to one end of L1, the aperiodic primary wound on the outside of the first coupler. This is heavy bare copper wire. The beginning of L2, the large secondary coil of the coupler, connects (a) to the stator plates of C1 and (b) to the grid of the RF tube. The end of L2 connects (a) to the rotor plates of C1 and to the A— on the battery. The rotor coil L3 of this coupler is not metallically connected to the set, but a fixed condenser, C3, is connected, one side of the condenser to one terminal of the rotary coil, L3, the other side of the fixed condenser to the other terminal of the coil. If the assembly plan (Fig. 3) is followed, with a separate little terminal strip for the aerial and ground binding posts, you may drill two holes in this strip (besides those for the binding posts) and bolt a short piece of bus bar through these new holes, soldering the other ends of the bus bar upright to the fixed condenser and to the respective leads of L3. Another way would be to solder the fixed condenser in-



ASSEMBLY PLAN (Fig. 3), showing how the parts are placed on the baseboard. The first coupler, L1L2L3, is shown at extreme left, rear, mounted with its side parallel with the baseboard. The other coupler, L4L5L6, is panel-mounted. The variable condenser at left controls the secondary, L2, while the one at extreme right governs the secondary, L6, of the respective couplers. The panel-mounted coupler is therefore at right angles to the other coupler, thus minimizing possibility of feedback of radio currents. Also, the two AFT are shown at right angles. The grid condenser and leak are not shown. The grid condenser should interrupt the lead from the G post of the second socket from left and the beginning of L6, secondary of the right-hand coupler. The terminal strip at left rear is for aerial and ground posts, the one at right for the battery connections. One B+ is for the detector tube, 22½ to 45 volts, the other B+ for the three amplifier tubes.



PANEL LAYOUT (Fig. 2), showing how the dials, jacks and rheostat are placed. Only one rheostat is shown, instead of the optional three appearing in the circuit diagram, because in the author's circuit Amperites, self-balancing rheostats, were used for the amplifier tubes, both radio and audio. The dials, left to right, are for C1, L5 and C2.

side the rotatable coil to the terminals of that coil, but there may be some losses sustained in putting the fixed condenser in the magnetic field. A small dial, say 2", may be placed on the shaft of this coupler, so that the L3 may be turned until it is in just the right position for best results, whereupon it is left that way forever. The dial is not vital, however, as the coil may be turned simply by pushing it into the correct position, where it will remain. The beginning of L2, the secondary, is the lead to the top of that coil when you look at the coil as if it was mounted on a panel, that is, the shaft is pointing toward you. The beginning would be that lead corresponding to the one to which the aerial is connected to L1, in other words the winding at the beginning of L2 points in the same direction as does the winding at the point where L1 was connected to the aerial.

3. The other coupler used is L4L5L6 in Fig. 1. L4 is connected, one end to the plate of the RF tube, the other end to B+ amplifier, which may be between 67½ and 90 volts. Try different voltages for best results.

4. The beginning of L6, the secondary of the detector coupling coil, is connected (a) to the stator plates of C1 and (b) to one side of the grid condenser. The other side of the grid condenser goes to the G post of the detector tube socket. Across the grid condenser is mounted the variable grid leak, or the leak may be panel-mounted, or mounted elsewhere, but

connected as shown. The end of L6 goes (a) to the rotor plates of C2 and (b) to the A+. Do not connect this to A—, for only amplifier circuits have the grid return to A—.

5. The plate or P post of the detector socket goes to the beginning of L5 (rotor coil), the end of L5 going to the outside spring of the double-circuit jack J1. The outside frame or right angle of the jack goes to detector B+, usually from 22½ to 45 volts. On the 199 and 299 tubes 45 volts on the detector plate usually work fine. If the tubes light, connect B— with A+. Listen in on the detector by plugging in the earphones. If your set does not work in the detector stage, check up the wiring and instruments. Correct your mistake before going farther.

6. Connect the inside spring that makes contact with the plate lead of the jack J1 to the P post of the first AFT. The remaining unconnected leaf of this jack goes to the B post of this AFT. The first AFT is the one at left in Figs. 1 and 3. These AFT posts are sometimes marked P1 and P2, respectively. The G post or S2 of this AFT goes to the grid of the third tube and the F post or S2 to the A—. The plate of the third tube goes to the P post of this AFT and the B post of this AFT is connected to the amplifier B+. The G post goes to the grid and the F post to A—. The plate of the last tube goes to the spring of the single-circuit jack J1 and the frame or right-angle of this jack to B+ amplifier (high voltage).

BROADCAST PROGRAMS

THURSDAY, DECEMBER 18

WEAF, New York City, 492 (E. S. T.)—11 A. M., musical program and Talks to Housewives; market and weather. 4 P. M., Mary and Madeline Foy, Harmony Singers; lecture-recital on "Robert Schumann" by Victor Biart. 6, WEAF Instrumental Quartet; mid-week services; Vincent Lopez orch.

CKAC, Montreal, Can., 425 (E. S. T.)—4 P. M., weather and stock market reports. 8:30, Canadian National Railways concert.

WGY, Schenectady, N. Y., 380 (E. S. T.)—6:30 P. M., Hotel Ten Eyck Trio. 7:45, "A Few Moments with New Books," by L. L. Hopkins. 8, "Border Ballads," by Dr. Charles Alexander Richmond. 8:15, comedy, "Wedding Bells," by Salisbury Field. 11:30, organ recital by Stephen E. Boisclair.

WMH, Cincinnati O., 309 (E. S. T.)—8 P. M., organ recital; songs, the Radio Franks; tenor solos 9, the Avon Dance Orch.

WNYC, New York City, 526 (E. S. T.)—7:10 P. M., Sinking Fund Commission. 7:30, police alarms. 7:35, sports analysis by Thornton Fisher. 7:45, Fletcher Henderson's Roseland Orch. 8:30, a Hot Stove League Chat for the baseball fans. 8:45, recitations by Binky Lieb. 8:55, Gramatan Quartet. 9:30, "Timely Topics," by Francis P. Bent. 9:40, "A Night in Camp," 10, weather. 10:30, police alarms.

KFDY, Brookings, S. D., 273 (C. S. T.)—8 P. M., Viking Male Choir. 8:15, "Curing and Canning of Farm Meats," by F. Helmreich. 8:25, "Some Hints on Radio Receiving Sets," H. N. Crothers. 8:35, "Farm Census and Crop Estimates," by O. L. Dawson. 8:45, Viking Male Choir.

WJY, New York City, 405 (E. S. T.)—7:30 P. M., Larry Funk's Orch. 8, "Wedding Bells," comedy playlet. 9:45, organ.

WJZ, New York City, 455 (E. S. T.)—10 A. M., Menu, Mrs. Julian Heath. 10:20, "The Progress of the World." 10:30, "Household Equipment," Ethel R. Peyser. 10:40, "Last Minute Gifts," 10:50, Eleanor Gunn's fashion talk. 1 P. M., Nathan Abas' Hotel Pennsylvania Orch. 4:30, Bernhard Levitow's Tea Music. 5:30, State and Federal agricultural reports; farm and home reports; closing quotations of the New York Stock Exchange; foreign exchange quotations; news. 7, Bernhard Levitow's Orch. 7:55, "Don't for Dumb-Bells," by John B. Kennedy. 8, Wall Street Journal review. 8:10, N. Y. U. Air College; "Sociology," Prof. E. George Payne. 8:30, American Orch. Society Concert. 9:45, Frank Anderson, baritone; Keith McLeod, accompanist. 10, "Humor," Fred C. Kelly. 10:15, Sanchez and Milstead, "The Texans." 10:30, Waldorf-Astoria Dance Orch.

WIP, Philadelphia, 509 (E. S. T.)—1 P. M., Gimbel Tea Room Orch. 1:30, weather. 3, Women's City Club News. 3:15, artists recital by Mary Buchanan Wagner, soprano; G. Edwin Frederick, violinist; Galileo Romanelli, baritone; Mrs. Harry A. Orr and Flora Ripka at the piano. 6:05, weather. 6:07, dinner music. 7, Uncle Wip's Roll Call and Birthday List. 8, "Barber of Seville," an opera in three acts, by Giachino Rossini. 11, dance music by Harvey Marburger and his Vaudeville Orch.

KYW, Chicago, 536 (C. S. T.)—6:30 A. M., calisthenics. 9:30, news and comment of the financial and commercial markets. 10:30, Farm and Home service. 11:35, table talk by Mrs. Anna J. Peterson. 2:35 P. M., "Afternoon Frolic." 6:02, news, financial and final markets. 6:35, children's bedtime story. 7, Joska DeBabary's Orch. 7:10, Coon-Sanders Original Nighthawks. 7:20, De Babary's Orch. 8, "Twenty Minutes of Good Reading." 8:20, Lillian Hershfield, soprano; Irving Schuster, tenor. 10, "Evening at Home."

WDAR, Philadelphia, 395 (E. S. T.)—11:45 A. M., daily almanac. 12:02 P. M., organ recital; Studio; Arcadia Concert Orch. 2, Arcadia Concert Orch., from the Studio. 4:30, artist recital. 5, educational talks. 7:30, Dream Daddy.

WLW, Cincinnati O., 423 (C. S. T.)—10:45 A. M., weather. 12:15 P. M., program by Mu Phi Epsilon. 1:30, business reports. 3, market reports. 4, French lesson by Madame Ida Teimpidis; piano recital by Adelaide Apfel. 6, Santa Claus Hour. 10, message from Civil Service Department. 10:03, cello solos by Karl Kirksmith, first cellist with the Cincinnati Symphony Orch.; selections by the Milnor Instrumental Trio; Doherty Melody Boys; Milnor Instrumental Trio.

WHAS, Louisville, Ky., 400 (C. S. T.)—4 P. M., Alamo Theatre Orch.; police bulletins; weather; "Just Among Home Folks"; readings; late news. 4:55, market reports. 5, time. 7:30, "Dix" Bluegrass Serenaders, Henry L. Dixon, director; International Sunday School lesson; four-minute welfare talk; late news; time.

WCBD, Zion, Ill., 345 (C. S. T.)—8 P. M., Cornet Quintet; Mrs. Mayfield, Mrs. Faassen, Mr. Maynard, and Mr. Reid, mixed quartet; Mrs. Evelyn Dewep, contralto P. B. Newcomer, cornet; Carl Newcomer, saxophone; Messrs. Newcomer and Newcomer, cornet and saxophone; Ida Peterson, soprano; Ida Peterson and Mrs. Evelyn Dewep, vocal duet; Mrs. Grace Lund and Erwin Rendall, piano; Erwin Rendall, flute.

KGO, Oakland, Cal., 312 (P. S. T.)—10:40 A. M., classroom instruction. 1:30 P. M., N. Y. and S. F. stock reports and weather. 4, concert orch. 6:45, stock reports; weather; S. F. produce news,

and news items. 8, Viennese Orch.; George Anderson, baritone; Grace LePage, soprano; address, "The Automobile." F. N. Coats; male quartet selections; Mazda Banjo Quartet; Ruth Waterman, contralto; duets for steel guitars, by Norman Dean and Gladys Steel; KGO Mixed Quartet; Carl Anderson, tenor; Richard Lundgren, bass; Julia Hannas Cochrane, violinist; "The Vocal Teacher and His Japanese Pupil," by Carl Anderson and Al Evers. 10, Henry Halsead's Orch.

WFAA, Dallas, Tex., 476 (C. S. T.)—12:30 P. M., address, DeWitt McMurray, editor The Semi-Weekly Farm News. 8:30, musical recital. 11, Adolphus Hotel Orch.

KFMT, Minneapolis, 261 (E. S. T.)—9 P. M., dance program by Roy Ewald's Orch.

WWJ, Detroit, 517 (C. S. T.)—8 A. M., setting-up exercises. 9:30, "Tonight's Dinner" and a special talk. 9:45, Public Health Service bulletins. 10:25, weather. 11:55, time. 3 P. M., The Detroit News Orch. 3:50, weather. 3:55, market. 8:30, Jean Goldkette's Orch.; Mrs. T. Earl Ouellette, soprano. 10, dance music. 11:30, the News Orch.

WDAF, Kansas City, Mo., 411 (C. S. T.)—3:30 P. M., Star's radio trio. 5:50, marketgram, weather, time and road report. 6:7, School of the Air; reading, Miss Cecile Burton; The Tell-Me-a-Story Lady; the Hanlein-Knutson Trianon Ensemble. 11:45, Nighthawk Frolic.

WBZ, Springfield, Mass., 337 (E. S. T.)—11:55 A. M., time, weather. 6 P. M., L. S. Wiggin ensemble. 6:30, Leo Peisman Hotel Lenox ensemble. 7, market report. 7:05, bedtime story. 7:15, letter from the New England Homestead, "At the Theatres" with A. L. S. Wood. 7:45, Charles R. Hector with his St. James Theatre orch. 8:15, Whitman S. Brown, tenor; Edward I. Adelman, violin; Evelyn Murray, dramatic interpreter; J. R. Rouse, pianist. 9:15, concert. 9:55, time, weather. 10:01, continuation of musical program.

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

KGW, Portland, Ore., 492 (P. S. T.)—11:30 A. M., weather. 12:30 P. M., concert. 5, children's program. 7:15, markets, weather, news and police reports.

WKAQ, San Juan, P. R., 360 (P. S. T.)—8:30 P. M., musicale.

WAAM, Newark, N. J., 261 (E. S. T.)—11 A. M., reading of the latest amateur news. 11:10, Rev. Edmont Haines and John A. Scott, undemonstrational religious service and sacred music.

WOR, Newark, N. J., 405 (E. S. T.)—7 A. M., morning gym class. 2:30 P. M., Claude Warford, composer; artists from Claude Warford studios. 3, Nellie Savage, in songs. 3:15, Claude Warford, composer. 3:45, Nellie Savage. 6:15, "Bunny from Bunnyland." 6:20, Albert E. Sonn, "Radio for the Layman." 6:30, Tom Cooper's Country Club orch. 7:15, resume of the day's sports by "Jolly Bill" Steinke.

WHN, New York City, 360 (E. S. T.)—12:30 P. M., Chas. Strickland and his Palais D'Or orch. 5, Tangoland ballroom orch. 6:30, Vincent Catinese and his Almac orch. 7:10, WHN employment broadcasting. 9:30, bulletin news. 9:37, Spear's dance orch. 10, What Becomes of Old Watches? 10:05, Loew's vaudeville artists. 10:30, The Wohnman and his Club Madrid orch. 10:45, Healey and Camp. 11, Connie's Inn with Leroy Smith's orch. 11:30, Leo Wood's entertainers. 11:45, Bob Schaefer, songwriter and composer. 12, Ted Lewis and his symphonic clowns. 12:30, Lou Gold and his orch.

FRIDAY, DECEMBER 19

WCCO, Minneapolis, 417 (C. S. T.)—10:45 A. M., Betty Crocker, "Stuffing for the Christmas Bird." 2 P. M., "Why Not Be Healthy and Happy?" R. H. Coombs. 2:30, musical matinee. 4, "With Dogs After Russian and Siberian Bear," by W. von Meck. 5:30, children's hour. 6, sport hour. 6:30, Hotel Radisson Ensemble. 7:30, lecture hour. 8:30, St. Cloud Chamber of Commerce music. 10, silent.

KDKA, E. Pittsburgh, Pa., 326 (E. S. T.)—7 A. M., morning exercises conducted by O. Shannon. 8, morning exercises. 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. 6:30, concert by the Hotel Schenley Meyer Davis Orch. 7:30, Stockman reports. 8:15, Monthly Book Review. 9:55, time; weather.

WEAF, New York City, 492 (E. S. T.)—11 A. M., musical program; talks; and market and weather. 4 P. M., musical program and Stories for Children. 6, Dinner Music by the WEAF Instrumental Quartet; Thomas Morris, Jr., baritone. Stories for Children; Zona Maie Griswold, soprano; The Happiness Candy Boys; concert by the U. S. Navy Band Orch.; Jascha Fishberg, String Quartet; Meyer Davis' "Palm Beach Orch."

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

WGY, Schenectady, N. Y., 380 (E. S. T.)—7:45 P. M., health talk. 8, address, "Religious Influence in Colleges," by Warren C. Taylor. 8:15, reading of Dickens' "Christmas Carol." 10:30, Blue Bird Dance Orch.

WNYC, New York City, 526 (E. S. T.)—7:30 P. M., police alarms. 7:35, Board of Estimate. 8:30, William Laug, concert violinist. 8:45, Joseph M. White, tenor. 9, William Laug, concert violinist. 9:15, Joseph M. White, tenor. 9:30, popular melodies by Shirley Grupp, piano. 10, weather. 10:10, Board of Education lecture. 10:30, police alarms. 10:35, Ben Bernie's Hotel Roosevelt Orch.

WOO, Philadelphia, 509 (E. S. T.)—11 A. M., grand 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; Candelori and Orch. 8:30, Studio program from the Fox Theatre. 9:10, cantata, "The Christ Child," Hawley; Dorothy Warhurst, soprano; Lucy V. Graham, contralto; William H. Wilson, tenor; Charles H. Dunnet, baritone; Jane F. Why, accompanist. 9:55, time. 10:02, weather. 10:03, grand organ recital, Harriette G. Ridley. 10:30, dance program by Vincent Rizzo and his Hotel Sylvania Orch.

WJZ, New York City, 455 (E. S. T.)—10 A. M., Menu, Mrs. Julian Heath. 10:20, Book Review by Grace Isabel Colborn. 10:40, Arts and Decorations, Mrs. Mary Roberts. 10:50, Eleanor Gunn's fashion talk. 1 P. M., Hotel Ambassador Trio; Henry Vander Zanden, director. 4, specialty numbers. 5:30, State and Federal agricultural reports; farm and home reports; closing quotations of the New York Stock Exchange; foreign exchange quotations; news. 7, Savarin Ensemble. 8, Wall Street review. 8:10, N. Y. U. Air College; "Sociology," Prof. E. George Payne. 8:30, Ray Walker's Radiolians. 9, "Christmas Dinner for All." 10, Looseleaf Current Topics; William H. Allen. 10:30, Beaux Arts Orch., direct from Studio Art Club.

KFGZ, Berrien Springs, Mich., 286 (C. S. T.)—7 P. M., Bible Bed-time Story. 9, Luther Frantz, pianist. 9:10, reading; "The Two Mites." 9:20, group of old-time songs by Ira D. Sankey; biographies by Professor H. L. Pearson; songs by Radio Choir. 9:40, Bible Chat, Tobias E. Unruh. 10, Catherine Borgen, violinist.

WJY, New York City, 405 (E. S. T.)—7:30 P. M., Billy Wynne's Greenwich Village Inn Orch. 8:15, "Taxes," Frank Shevit. 8:25, Anne Tyndall, soprano; Keith McLeod, accompanist. 8:45, Outlook literary talk. 10, Abraham & Straus' Choral Society.

WIP, Philadelphia, 509 (E. S. T.)—1 P. M., Gimbel Tea Room Orch. 1:30, weather. 3, Mark Fisher and his Hotel Walton Orchestra. 6:05, weather. 6:07, popular numbers by Mark Fisher and Joe Burke. 6:15, dinner music by Harvey Marburger and his Vaudeville Orch. 6:45, livestock and produce market reports. 7, Uncle Wip's Bedtime Story, Roll Call and Birthday List.

KYW, Chicago, 536 (C. S. T.)—6:30 A. M., morning exercises. 9:30, news and comment of the financial and commercial markets. 11:35, table talk by Mrs. Anna J. Peterson. 6 P. M., news, financial and final markets; Dun's Review, and Bradstreet's Weekly Review. 6:35, children's bedtime story. 7, Joska DeBabary's Orch. 7:10, Coon-Sanders Original Nighthawks. 7:20, DeBabary's Orch. 7:30, From KYW's Studio. 9, midnight revue. 11, midnight revue continued.

WDAR, Philadelphia, 395 (E. S. T.)—11:45 A. M., Daily Almanac. 12:02 P. M., organ recital; Arcadia Concert Orch. 2, Arcadia Concert Orch. playlet. 4:30, dance program. 7:30, Dream Daddy. 8, "Turning the Pages," a book review. 8:10, "Fifteen Minutes with Sam Wingfield, Humor Editor. 10, meeting of the Morning Glory Club; Arcadia Dance Orch.

FRIDAY, DECEMBER 19

WHAS, Louisville, Ky., 400 (C. S. T.)—4 P. M., Alamo Theatre Orch.; police bulletins; weather; "Just Among Home Folks"; readings; late news. 4:55, market reports. 5, time. 7:30, concert under auspices of the Louisville and Jefferson County Children's Home Glee Club; Miss Grace Deppe, director; late news; time.

WLW, Cincinnati O., 423 (C. S. T.)—10:45 A. M., weather. 1:30 P. M., market reports. 3, stock quotations. 4, French lesson by Madame Ida Teimpidis; musical features.

WFAA, Dallas, Tex., 476 (C. S. T.)—12:30 P. M., address, Dr. Robert Stewart Hyer. 8:30, musical recital.

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

WWJ, Detroit, 517 (E. S. T.)—8 A. M., setting-up exercises. 9:30, "Tonight's Dinner." 9:45, Public Health Service. 10:25, weather. 11:55, time. 3 P. M., The News Orch. 3:50, weather. 3:55, market. 8:30, Jean Goldkette's Orch.; Three Knights of Harmony; Norman Butterfield, baritone Mrs. Claudine Secor, soprano; Anne Campbell, News poet.

WDAF, Kansas City, Mo., (C. S. T.)—3:30 P. M., Star's radio trio. 5:50, marketgram, weather, time and road report. 6, School of the Air; address; the Tell-Me-a-Story Lady; the Hanlein-Knutson Trianon Ensemble. 8, popular program; WDAF minstrels. 11:45, Nighthawk Frolic.

KFAE, Pullman, Wash., 336 (P. S. T.)—Violin solos, Jaroslav Sotola; Essentials of Successful Farm Management, Prof. Geo. Severance; Berry Diseases in Washington, George L. Zundel; Book Reviews, Alice L. Webb.

WBZ, Springfield, Mass., 337 (E. S. T.)—11:55 A. M., time, weather, market. 6 P. M., Westinghouse Philharmonic trio. 7, market report. 7:05, bedtime story for the kiddos. 7:15, current book review. 7:30, lesson of a course in "Musical Appreciation." 9:55, time, weather. 10, Bessie M. O'Connell, soprano; Lillian C. Kivlan, accompanist. 10:30, to be announced. 10:45, John Doherty, the man who plays and sings. 11, concert by the Westinghouse Philharmonic trio, and Tony Mastroianni, violinist; Rena Breglio, accompanist.

KGW, Portland, Ore., 492 (E. S. T.)—11:30 A. M., weather. 12:30 P. M., Original Serenaders of the Winter Garden. 5, children's program. 7:15, markets, weather, news and police reports. 8, popular lecture. 10:30, Hoot Owls.

WAAM, Newark, N. J., 261 (E. S. T.)—11 A. M., Rev. Edmont Haines and John A. Scott. 11:15, Miss Ada Bessie Swann, cooking school. 11:30, Rev. Edmont Haines and John A. Scott. 8 P. M., Home and Heart Problems by the Ledger Lady. 8:10, Ben Friedman, Broadway's Joy Boy. 8:20,

musical surprise. 8:30, Frank Catello's orch. 9, Four Jewels. 9:15, Frank Catello's orch. 9:25, Four Jewels. 9:40, Miss Ida Wysocki, soprano. 9:50, Frank Catello's orch. 10:10, Miss Ida Wysocki, soprano. 10:20, Irving Porter, tenor. 10:45, The Singing Trio.

WOR, Newark, N. J., 405 (E. S. T.)—7 A. M., morning gym class. 2:30 P. M., recital by Frederick D. Moss. 2:45, Florence Conroy. Holle in monologues. 3, Shirley Vernon, in songs. 3:15, "How to Keep a Job," by Allan R. Cullimore. 3:30, Frederick D. Moss, tenor. 3:45, Shirley Vernon. 6:15, "Bunny from Bunyanland." 6:20, duets by G. Edgar Dean, bass, and Ethel Hargraves, soprano. 6:30, "Man-in-the-Moon" stories. 7, duets. 7:15, resume of the day's sports by "Jolly Bill" Steinke.

WHN, New York City, 360 (E. S. T.)—6:30 P. M., Vincent Canese and Alamac orch. 7, Harry Richman and his entertainers. 9:30, bulletin news. 9:37, Dan Gregory and his Crystal Palace orch. 10, fashion chats by Mme. Belle. 10:10, Bob Miller, popular songs. 10:25, "Storage Batteries," by H. B. Shrant. 10:30, Roseland dance orch. 11, Judith Roth and Al. Wilson, songs. 11:30, Sam Wooding and his Club Alabam orch. 12, Ted Lewis and his symphonic clowns.

SATURDAY, DECEMBER 20

WCCO, Minneapolis, 417 (C. S. T.)—10:45 A. M., Betty Crocker, Talk to Girls. 7 P. M., silent hour 8, "Fireside Philosophies," Rev. Roy L. Smith, pastor. 8:30, musical program. 9:30, Minneapolis Athletic Club Orch.

KSD, St. Louis, Mo., 546 (C. S. T.)—8 P. M., Christmas Cantata presented by Choir of Westminster Presbyterian Church.

WEAF, New York City, 492 (E. S. T.)—1:45 P. M., speeches at the Foreign Policy Assn. Luncheon. 4, Clifford Lodge Orch. 6, dinner music by the WEAF Instrumental Quartet; stories for boys; David Dacca, cowboy songs; Artists Trio of the Hotel Edgemere, East Orange, N. J.; Joseph Knecht's Orch.; Vincent Lopez and His Orch.

CKAC, Montreal, Can., 475 (E. S. T.)—7 P. M., kiddies' stories. 7:30, Rex Battle and His Mount Royal Hotel Orch. 8:30, Studio concert. 10:30, Joseph C. Smith and his Mount Royal Hotel Orch.

WGY, Schenectady, N. Y., 380 (E. S. T.)—9:30 P. M., dance music by Phil Romano's orch. 10 P. M., WMH, Cincinnati, O., 309 (C. S. T.)—10 P. M., songs, the Radio Franks; piano solos by Edward Schelwiler; organ selections. 11, contralto solos, Marie Turner; piano solos, Lelia LeMar; tenor solos, Howard Hafford; Murray Horton's Hotel Alms Orch.

WNYC, New York City, 526 (E. S. T.)—6:20 P. M., Uncle Robert. 6:30, Sam Wooding's Club Alabam' Orch. 7:30, police alarms. 7:35, Capt. John H. Ayers on the work of the Missing Persons Bureau. 7:47, The Chateau Four. 8:30, police quartet. 9, Algard Trio. 9:30, humorous sketches by Mary Adelia Gleason. 9:45, Charles Wold, soloist. 10, weather. 10:02, Charles Wold, Musical Glasses. 10:10, Captain Kilroy Harris, "Out Back in Australia." 10:30, police alarms.

WOO, Philadelphia, 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, organ and trumpets. 9:55, time. 10:02, weather.

WIP, Philadelphia, 509 (E. S. T.)—1 P. M., organ recital by Karl Bonawitz. 1:30, weather. 3, Dal Ruch and his Arcadians. 6:05, weather. 6:07, dinner music by the Hotel St. James Orch. 6:45, livestock and produce market reports. 7, Uncle Wip's Bedtime Stories and Roll Call. 8, historic rambles about Philadelphia. 8:15, the WIP Male Quartet. 9, Stetson Banjo and Mandolin Club. 10:05, "Timely Topics for Motorists." 10:15, Art Coogan and his Club Madrid Orch. 11:05, organ recital by Karl Bonawitz.

WJZ, New York City, 455 (E. S. T.)—1 P. M., luncheon music. 4, Sara V. TuRits, soprano. 4:15, J. Vincent Moore, tenor with ukulele. 4:30, Harold Stern's Belleclair Orch. 5:30, State and Federal agricultural reports; farm and home reports; closing quotations of the New York Stock Exchange; foreign exchange quotations; news. 7, Waldorf-Astoria Dance Orch.; Joseph Knecht, director. 8, the George Junior Republic. 8:30, concert by Liederkrantz Society. 9:30, Penn Society Banquet. 10:30, Hotel Astor Dance Orch.

KYW, Chicago, 536 (C. S. T.)—6:30 A. M., morning exercises. 9:30, news and comment of the financial and commercial markets. 10:30, Farm and Home service. 11:35, table talk by Mrs. Anna J. Peterson. 6:02 P. M., news, financial and final markets. 6:35, children's bedtime story. 7, dinner concert; Joska DeBabary's Orch. 7:10, Coon-Sanders Original Nighthawks. 7:20, Joska DeBabary's Orch. 8, Adele Brandt; contralto; Lewis Mechan, tenor. 9:05, Youth's Companion. 9:35, late show. 10, "Congress Carnival."

WDAR, Philadelphia, 395 (E. S. T.)—11:45 A. M., daily almanac. 12:02 P. M., organ recital. 2, dance program by the Cotton Pickers. 7:30, Arcadia Concert Orch.

WHAS, Louisville, Ky., 400 (C. S. T.)—4 P. M., Alamo Theater Orch.; police bulletins; weather; "Just Among Home Folks"; readings; late news. 4:55, market reports. 5, time. 7:30, concert by the Louisville Flute Club; late news; time.

WLW, Cincinnati, O., 423 (C. S. T.)—10:45 A. M., weather. 1:30 P. M., weather reports. 3, Herbert Buschle and his Orch.

WFAA, Dallas, Tex., 476 (C. S. T.)—12:30 P. M., address, Epps G. Knight. 8:30, Mrs. H. H. White and assisting musicians. 11, Adolphus Hotel Orch.

KGO, Oakland, Cal., 312 (P. S. T.)—12:30 P. M., stock reports and weather. 4, concert orch. 8, Band of the Salvation Army; "A Christmas Message." Violet Simpson, singer; Chas. P. Bourne, cornetist; piano duets, Wm. P. and Bonita Keasbey; Frank Terramore, Jr., tenor; Dorothy Dunyon, violinist; L. Harlan McCoy, bass; address;



ABNER J. GELULA, Technical Editor of RADIO WORLD, who broadcasts from WGBS, Gimbel Bros., N. Y. City, every Wednesday at 6:35 P. M., discussing hook-ups and answering questions.

"Benares, India," by Ford E. Samuel. 10, Henry Halstead's Orch.

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., The News Orch. 3:50, weather. 3:55, markets.

WDAF, Kansas City, Mo., (C. S. T.)—3:30 P. M., The Star's Radio Orch. 5:50, marketgram, weather, time, and road report. 6, School of the Air; address: The Tell-Me-a-Story Lady; The Hanlein-Knutson Trianon Ensemble. 11:45, Nighthawk Frolic.

KGW, Portland, Ore., 492 (P. S. T.)—11:30 A. M., weather. 10 P. M., George Olsen's Metropolitan orch.

WBZ, Springfield, Mass., 337 (E. S. T.)—11:55 A. M., time, weather. 6 P. M., Leo Reisman Hotel Lenox ensemble. 6:30, Copley Plaza orch, under the direction of W. Edward Boyle. 7, market report. 7:05, bedtime story. 7:30, concert by the Hotel Kimball trio. 8, Norwood Woman's Club chorus. 9:15, to be announced. 9:55, time, weather. 10, concert by John Merkel, tenor; Mrs. E. L. Alexander, accompanist. 11:30, Leo Reisman and orch.

WHN, New York City, 360 (E. S. T.)—6:30 P. M., Vincent Canese and his Alamac orch. 7:30, Hotel Carlton Terrace orch. 8, Arthur Stone, blind jazz pianist. 8:15, Metropolis Trio, popular songs. 8:30, Strand Roof entertainers. 9, Alfred Dulin, concert pianist. 9:15, Frances Kirsch, coloratura soprano. 9:30, Ed. Heckmann's Club orch. 10, Jimmy Flynn, dramatic tenor. 10:15, Fitzpatrick Brothers. 10:30, Jimmy Clarke and his entertainers. 11, Connie's Inn with LeRoy Smith's orch. 11:30, Roseland dance orch.

SUNDAY, DECEMBER 21

CKAC, Montreal, Can., 425 (E. S. T.)—4:30 P. M., Studio concert.

WHAS, Louisville, Ky., 400 (C. S. T.)—4 P. M., selections by the Alamo Theatre orch.; police bulletins; weather forecast; "Just Among Home Folks." 4:55, local livestock, produce and grain market reports. 5, time. 7:30, concert by the K. & I. Terminal Railroad Orch.; selections by the String Division of the K. & I. Terminal Railroad Orch.; "Billy and Jane" stories; late news; time.

WCAE, Pittsburgh, Pa., 462 (E. S. T.)—10:45 A. M., services from Rodef Shalom temple. 3 P. M., People's Radio church. 4, piano recital by Prof. Otto Kalteis. 6:30, dinner concert.

KGO, Oakland, Cal., 312 (P. S. T.)—11 A. M., service of the First Methodist Episcopal Church. 3:30 P. M., KGO Little Symphony Orch. 7:30, special musical service.

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

KTHS, Hot Springs, Ark., 375 (C. S. T.)—11 A. M., complete services of the First Presbyterian Church. 8:30, Sunday night concert.

WOO, Philadelphia, 509 (E. S. T.)—10:30 A. M., morning services from Bethany Presbyterian Church; Rev. A. Gordon MacLennan, pastor. 2:30 P. M., musicale. 6, old time hymns and melodies.

WIP, Philadelphia, 509 (E. S. T.)—4 P. M., services, under the auspices of the Germantown Y. M. C. A. 7:15, evening service; Rev. Floyd W. Tomkins. 9:30, Ben Stad and his WIP Symphony Orch.

KFGZ, Berrien Springs, Mich., 286 (E. S. T.)—10:15 A. M., group of Christmas hymns. 10:30, Christmas readings. 10:40, Christmas anthem. 11, sermon: "The Christian's Christmas." 7 P. M., Christmas Bedtime Story. 8:15, group of Christmas hymns. 8:30, Christmas anthems. 8:50, Prof. L. P. Thorpe, violinist. 9, Mrs. S. A. Smith, soprano. 9:15, sermon, Pastor John Knox.

WCBD, Zion, Ill., 345 (C. S. T.)—Mixed Quartet, assisted by Mr. and Mrs. G. R. Sparrow, tenor and contralto; Erma Reynolds, soprano; Edith Carey, contralto; G. R. Sparrow, tenor; Mrs. G. R. Sparrow, contralto; Carey Sisters, duet; Wiedman, Taylor, Pihl, and Mrs. Bishop, celestial bells; Messrs. Daniel and Gerald Mason, trombone and cornet; Hermann Becker, cello; Richard F. Hire, piano.

KGW, Portland, Ore., 492 (E. S. T.)—10:30 A. M., service from First Presbyterian Church, Dr. Harold Leonard Bowman, pastor. 3 P. M., municipal concert. 6, church services. 7, Colburn Concert orch.; soloist, Minnie Pelz, soprano. 8, Pre-Christmas concert by St. Mary's Cathedral choir.

WCAE, Pittsburgh, Pa., 462 (E. S. T.)—12:30 P. M., news; weather. 3:30, news. 4:30, stock

WFAA, Dallas, Tex., 476 (C. S. T.)—12:30 P. M., address, George F. Thomas. 8:30, John Thorward, baritone.

market reports. 6:30, dinner concert. 7:30, Uncle Kaybee. 7:45, address. 8, weekly music chat. 8:15, Radio Dancing Lesson. 8:30, concert. 10:30, Flight of the Mythical Drigible. 11:30, P. M., KGO, Oakland, Cal., 312 (P. S. T.)—9 A. M., music and lectures. 10:40, classroom instruction. 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, dance music.

KTHS, Hot Springs, Ark., 375 (C. S. T.)—8:30 P. M., Mrs. Anna M. Berberich concert. 10:30, "Chicago Serenade" dance concert.

WCBD, Zion, Ill., 345 (C. S. T.)—Mixed quartet, Messrs. Mehaffey, Rendall, Sach and McElroy; Celestial Bells; Fred Faassen, organ; J. D. Thomas, baritone; Mr. and Mrs. J. D. Thomas, soprano and baritone; Mrs. J. D. Thomas, soprano; Richard F. Hire, violin; Mrs. Susie Smith, reader; Mr. and Mrs. David McElroy, piano duet.

WWJ, Detroit, 517 (C. S. T.)—8 A. M., setting-up exercises. 9:30, "Tonight's Dinner." 9:45, Public Health Service bulletins. 10:25, weather. 11:55, time. 3 P. M., Detroit News orch. 3:50, weather. 3:55, market reports. 8:30, Detroit News orch. Marguerite Priestart, soprano; Miss Clara Ferguson, contralto; T. Stanley Ferry, tenor.

KOB, State College, 36 (C. S. T.)—7:30 P. M., musical program.

WOO, Philadelphia, 509 (E. S. T.)—11 A. M., grand organ. 5:40, 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 orch. 8:30, Glee Club of the Glenside M. E. Church. 9:55, time. 10:02, weather. 10:03, special rendition of "Bethlehem," Maunder. 10:45, Vincent Rizzo and his orch.

KFGZ, Berrien Springs, Mich., 286 (E. S. T.) 7 P. M., bed-time story. 8:15, Christmas carols.

KGW, Portland, Ore., 492 (E. S. T.)—11:30 A. M., weather. 5 P. M., children's program; story by Aunt Nell. 7:15, markets, weather, news bulletins and police reports. 8, The Oregonian concert orch. 10, dance music by George Olsen's Metropolitan

WLW, Cincinnati, O., 423 (C. S. T.)—9:30 A. M., school by staff of Sunday School Publications. 11, services of the Church of the Covenant; Dr. Frank Stevenson, minister. 7:30 P. M., services of the First Presbyterian Church; Dr. Frederick McMillan, minister. 8:30, concert by the Western and Southern orch.; soloist, Joseph Vito, harpist.

KFI, Los Angeles, 469 (P. S. T.)—10 A. M., L. A. Church Federation. 4 P. M., vesper services. 6:45, musical appreciation talks. 7, Metropolitan Theatre program. 8, one-act plays. 9, Examiner studio. 10, Huxley's Lake Arrowhead orch.

WBZ, Springfield, Mass., 337 (E. S. T.)—10:45 A. M., church services. 7:30 P. M., Marion Kingsbury, dramatic soprano, accompanied by Henry Gideon. 8:30, "Who Does Your Thinking for You," by Margaret Slattery.

MONDAY, DECEMBER 22

WEEL, Boston, 303 (E. S. T.)—6 P. M., Mansion Inn orch. 7, Big Brother Club. 7:30, "A Few Minutes with Santa Claus." 7:45, Winchester Laundries orch. 8:45, "Buddy's Bostonians" from the Fenway Theatre, Boston. 9:30, musicale, Haines & Scott. 10:30, Duk-Eisenbourg and his Sinfonians.

KFI, Los Angeles, 469 (P. S. T.)—5 P. M., news bulletins. 5:30, news. 8, Herald program. 9, Walter M. Murphy Motors Co. program. 10, program from studio.

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, a few minutes with Santa Claus. 7:30, lesson in a course in modern American literature, Robert Emmons Rogers, professor. 8:05, broadcast of hockey game. 9:55, time, weather. 10:15, Westinghouse Philharmonic trio; Bernice M. Mosher, coloratura-soprano; Mrs. Eleanor Turner LaZazera, accompanist. 11:30, McEnelly's singing orch.

WLW, Cincinnati, O., 423 (C. S. T.)—10:45 A. M., weather and business reports. 12:15 P. M., Cincinnati Conservatory of Music. 1:30, business reports. 3, market reports. 4, Babson reports; musicale. 7:30, Santa show and festival; Walter Esberger's concert orch. 9, program from WLW studios. 10, Al. Roehrs' music makers.

TUESDAY, DECEMBER 23

WFAA, Dallas, Tex., 476 (C. S. T.)—12:30 P. M., address, Charles E. Osborne, physical director. 8:30, Mrs. Mamie Folsom Wynne and her Carolers. 11, Dwight Brown, organist, in recital at the Pace Theatre.

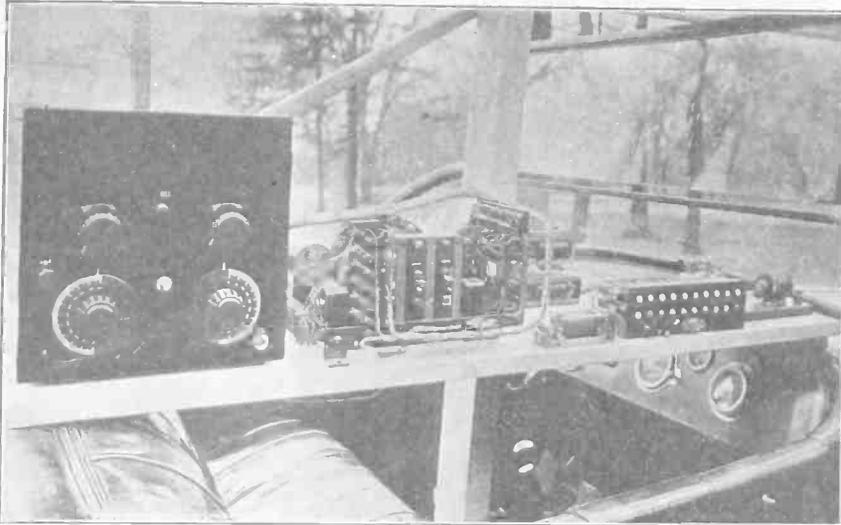
WHAS, Louisville, Ky., 400 (C. S. T.)—4 P. M., selections by the Alamo Theatre orch.; police bulletins; weather; "Just Among Home Folks"; readings; late news. 4:55, local livestock, produce and grain market reports. 5, time. 7:30-9, concert by Rosson's entertainers; beginning the "Billy and Jane" stories; late news; time.

CKAC, Montreal, Can., 425 (E. S. T.)—4 P. M., weather and stock reports. 7, kiddies' stories. 7:30, Rex Battle and his Mount Royal Hotel ensemble. 8:30, studio entertainment. 10:30, Joseph C. Smith and his Mount Royal Hotel orch.

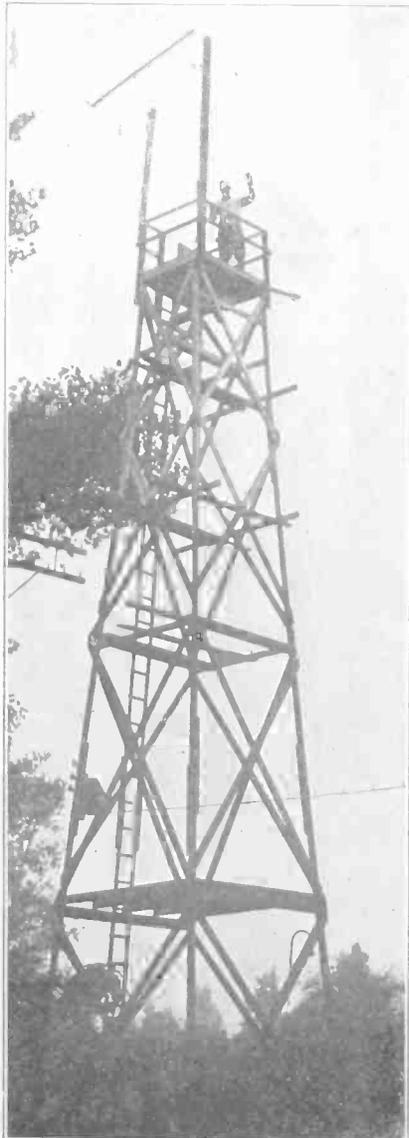
WOO, Philadelphia, 509 (E. S. T.)—11 A. M., grand organ. 11:30, weather. 11:55, time. 12, Tea Room orch. 5:40 P. M., police reports. 5:45, grand organ and trumpets. 9:55, time. 10:02, weather.

WCAE, Pittsburgh, Pa., 462 (E. S. T.)—12:30 P. M., news, weather. 3:30, news. 4:30, stock (Concluded on page 18)

Radio Runs Auto at Distance



CHAUFFEUR A LA RADIO at the University of Illinois. This auto is controlled in every way by radio, even to dimming the lights, blowing the horn, reversing, forward, shifting gears, steering and applying the brakes. This machine was operated by radio "remote control," the operator being a mile away and nobody in the car. (Underwood & Underwood.)



JOHN IRINGLE, of 7138 Harvard Ave., Chicago, has one of the best equipped outfits in the city. The fact that John is only 14 didn't prevent him from constructing this aerial tower himself. (Underwood & Underwood.)



"WHO'S trying to make a monkey out of me?"
(Underwood & Underwood.)



HARRY SCOTT, blind genius of San Francisco, constructing a 3-tube set following a 3-tube set of blue-prints by Braille, which bring the easy construction of radio outfits within the reach of the blind. Judging from the photo, the set appears to be a complicated one. However, we'd place our money on Mr. Scott that it will work. (Kadel & Herbert.)

By HERBERT

Secretary of Commerce and

"Entertainment and Amusement Have Ceased to Be Radio's Chief Purposes. The Public Are Coming to Rely On It for the Necessary Information for the Conduct of Their Daily Affairs. It is Rapidly Becoming a Necessity"—"The Basis of Regulation Must Be Finally Declared by Congress, Not Left to An Administrative Officer."

WITH around 100 wavelengths and 500 stations—rapidly increasing—we are today forced to certain duplication of wavelengths and to the division of time among stations. If there were enough wavelengths for all the matter would be much simpler. Any attempt to give preference among stations in the allotment of wavelengths on the basis of quality of programs raises the question of censorship, the implications of which I cannot at present accept.

Beyond this three major things have developed during the last twelve months. The first is the interconnection of stations by which a single voice may be broadcast from all parts of the United States. This interconnection has been most successfully carried out by the use of the wire systems between broadcasting stations but other methods of interconnection are in use and process of development. It is difficult to see as yet what the public implications of interconnection will be.

During the past year there have been discoveries in the use of higher power and therefore larger areas of broadcasting which may result in a single station being able to cover a large portion if not all of the country. This raises questions of the rights of local stations and the rights of local listeners.

Still another development has been the fact that it has been found possible by indirect advertising to turn broadcasting to highly profitable use. If this were misused we would be confronted with the fact that service more advantageous to the listener would be crowded out for advertising purposes.

Demand for Limitation

Because of this situation, there is growing up a demand for the limitation of the number of stations in a given area and that such a limitation would be based on the service needs of the community, just as public utilities are generally limited by the rule of the public convenience and necessity. Again this enters a dangerous field of recognized monopoly and implied censorship.

On the other hand, we may be in a rush of broadcasting which may in time die down and the number of stations may decrease. Alternatively improvement in the art may increase the number of available wavelengths and no priorities need then be contemplated.

These are not all of the shifts in progress and we may have to come to the conclusion that many station owners must be considered as having abandoned the field of private enterprise and entered that of public service.

Listener's Point of View

In view of these changes we may have to

T HOOVER

Chief of the United States

If Indirect Advertising Were Misused We Would Be Confronted With the Fact That Service More Advantageous to the Listeners Would Be Crowded Out for Advertising Purposes—"There Is a Growing Demand for the Limitation of the Number of Stations"—"We May Have to Reconsider the Whole Art From the Viewpoint of the Listener."

consider the regulation of the whole art from the point of view of the listener.

The public interest of radio broadcasting is rapidly widening. Entertainment and amusement have ceased to be its principal purposes. The public, especially in rural areas and in isolated communities, are coming to rely on it for the information necessary to the conduct of their daily affairs. **IT IS RAPIDLY BECOMING A NECESSITY** and they rightfully feel that since the public medium of the ether is used to reach them, that they have a direct and justifiable interest in the manner in which it is conducted.

From all of this it seems to me that there is a tendency which may require an entirely different basis in character, theory and extent of legislation than any we have contemplated in the past.

The basis of regulation and the fundamental policies to be followed must be finally declared by Congress, not left to an administrative officer. Hitherto we have conceived the problem to be one of interference, but there is now opening up before us a whole host of difficult problems. The development of the art is such that the whole situation is changing rapidly and the opinion of day on the solution for a given difficulty is worthless tomorrow. I hope that another year's experience will show what direction legislative course must be pursued. In the meantime, I feel that we would be actual benefactors by allowing the industry to progress naturally and unhampered except by the maintenance of a firm principle of Government control of the ether and the elimination of interference so far as it is possible.

I have therefore drawn up the following as a suggestion:

"Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That it is hereby declared and reaffirmed that the ether within the limits of the United States, its territories and possessions, is the inalienable possession of the people thereof, and that the authority to regulate its use in interstate or foreign commerce is conferred upon the Congress of the United States by the Federal Constitution.

"Sec. 2. That Section 1 of the act of Congress approved August 13, 1912, entitled 'An act to regulate radio communication' is hereby amended by adding at the end of said section the following:

"The wavelength of every radio transmitting station for which a license is now required by law, its power, emitted wave, the character of its apparatus, and time of transmission, shall be fixed by the Secretary of Commerce as in his judgment and discretion he shall deem expedient, and may be changed or modified from time to time in his discretion."

Family "All Set" For Programs



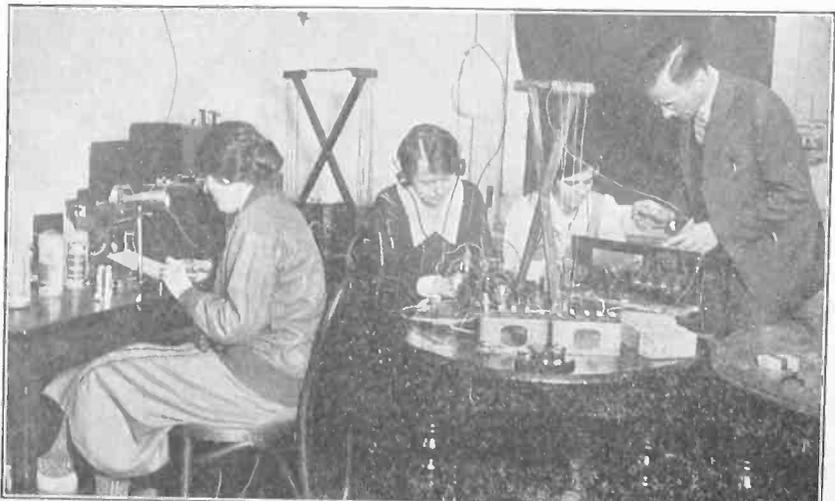
IN THIS family the Radio Bug spread rapidly. Mr. and Mrs. John A. Matoth are next to the set, at left. If all families took to radio as did this one, there'd be a shortage of headsets. (Underwood & Underwood.)



OTTO H. KAHN, banker and philanthropist, speaks at the laying of the cornerstone of the new building of the Theater Guild at 52nd St., near Broadway, New York City. (Foto Topics.)



IS THE cook-book obsolete? Why turn through countless pages when a radio outfit on the kitchen stove will bring you the best, tested recipes? Ann Stanford, left, and Lillian Kline, right, practice what they hear. (Underwood & Underwood.)



THE GIRLS at Vassar take up radio as a part of the physics course. Assistant Professor Paul A. Northrop has an enviable position teaching radio. (International Newsreel.)

Programs

"Canned Code" Used

MECHANICAL devices, the army's adaptation of the commercial dictaphone, have been used successfully at the Army Signal Corps School, Camp Alfred Vail, N. J., to take the place of instructors in Morse and radio code work. Use of the new machine will standardize instruction for the first time the whole army will have identical lessons in communication—wired and wireless—without any exacting demands on the teaching personnel. This is just one of the advantages of the mechanical tutor pointed out by Captain John P. Ferriter of the Signal Corps, who has been largely instrumental in perfecting the device.

FRIDAY, DECEMBER 26

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, 10 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 Adelphia 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 Sereaders. 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

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., kiddies 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.

market reports. 6:30, dinner concert. 7:30, Uncle Kaybee. 7:45, special feature. 8:30, concert. 9, concert by the National Carbon Co.'s Eveready entertainers. 10, concert by the Goodrich Silver-town Cord orch.

KGO, Oakland, Cal., 312 (P. S. T.)—1:30 P. M., N. Y. and S. F. reports and weather. 4, concert orch. 6:45, final reading, stock reports, weather, S. F. produce news and news items. 8, "The Cricket on the Hearth," a drama in three acts. 10, dance music program.

WWJ, Detroit, 517 (C. S. T.)—8 A. M., setting-up exercises. 9:30, "Tonight's Dinner." 9:45, Fred Shaw, pianist and popular singer. 10:25, weather. 11:55, time. 3 P. M., Detroit News orch. 3:50, weather. 3:55, market. 7, Detroit News orch.; Mrs. Claudine Secor, soprano; Jane Robinson, contralto.

KGW, Portland, Ore., 492 (P. S. T.)—11:30 A. M., weather. 12:30 P. M., concert. 5, children's program. 7:15, markets, weather, news bulletins and police reports. 8, agricultural lecture provided by Oregon Agricultural College Extension Service; R. S. Besse, "Chasing Price Advances," and Prof. J. L. Fairbanks, "Art in the Home." 8:30, concert. Mrs. Fred L. Olson, 10, Multnomah Hotel Strollers.

WEEI, Boston, 303 (E. S. T.)—2 P. M., Jack Brown and his orch. 6:30, dance selections by Dok-Eisenbourg. 7, Big Brother Club. 7:30, "A Few Minutes with Santa Claus." 7:45, John Edward Borhek, boy soprano. 8, Christmas music. 9, program from New York studio. 10, program from New York studio.

KFI, Los Angeles, 469 (P. S. T.)—5 P. M., Herald news. 5:30, Examiner news. 6:45, Aeolian organ recital. 8, children's chorus. 8:30, vocal program. 9, Examiner studio. 10, Packard ballad hour.

WBZ, Springfield, Mass., 337 (E. S. T.)—11:55 A. M., time, weather, market report. 6 P. M., Leo Reisman Hotel Lenox ensemble. 6:30, Copley-Plaza orch. 7, market report. 7:05, a few minutes with Santa Claus. 7:20, world market survey. 7:30, Leo Reisman and his Hotel Brunswick orch. 8:30, Louise Neera, mezzo-soprano; Eloise Blair, reader; Miunerva Komenarski, contralto; May E. Hussey.

WLW, Cincinnati, O., 423 (C. S. T.)—10:45 A. M., weather and business reports. 12:15 P. M., program by the Delta Omicron Sorority. 1:30, business reports. 3, market reports. 4, Kentucky McDowell program. 10, entertainment from Goodwins; Senator Schultz; "Problems of Suspenses." Concert program.

WEDNESDAY, DECEMBER 24

WGBS—6:35 P. M.—Abner J. Gelula, Technical Editor, RADIO WORLD, on "Radio Hook-ups, Questions and Answers."

WFAA, Dallas, Tex., 476 (C. S. T.)—12:30 P. M., music by the Red-Head Girl.

CKAC, Montreal, Can., 425 (E. S. T.)—1:45 P. M., Mount Royal Hotel luncheon orch. 4, weather and stock market.

WCAE, Pittsburgh, Pa., 462 (E. S. T.)—12:30 P. M., news, weather. 3:30, latest news. 4:30, stock market reports. 6:30, dinner concert. 7:30, Uncle Kaybee. 7:45, special feature. 8:30, concert by artists and orch.

KGO, Oakland, Cal., 312 (P. S. T.)—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.

KTHS, Hot Springs, Ark., 375 (C. S. T.)—10 P. M., program of Christmas carols; orch. selections. 10:30, dance program.

WOO, Philadelphia, 509 (E. S. T.)—11 A. M., grand 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 orch. 8:30, Christmas address by Edward James Catell. 8:45, WOO orch.; Lewis James Howell, baritone; Margaret Eberbach, soprano; Harriette G. Ridley, accompanist. 9:55, time. 10:02, weather. 10:03, special program by the Nobis-Nobis Club.

KOB, State College, 360 (C. S. T.)—7:30 P. M., Christmas music.

KFGZ, Berrien Springs, Mich., 286 (C. S. T.)—7 P. M., bed-time story. 8:15, introductory remarks. 8:20, American Christmas songs, Mrs. Butterfield, soprano. 8:25, Italian Christmas song, Andrew Aragona. 8:30, French Christmas songs, Mrs. H. E. Edwards, contralto. 8:55, Spanish Christmas song, Ernest Hurd, tenor. 8:40, German Christmas song, H. E. Edwards, bass. 8:45, English Christmas song, Birt Summers, baritone. 7, bed-time story. 9, sacred songs and hymns. 9:15, program by Mr. D. E. Rebok and Mr. W. C. Hankins, returned missionaries from China.

KGW, Portland, Ore., 492 (P. S. T.)—11:30 A. M., weather. 12:30 P. M., Bill Darby's orch of Cottillion Hall. 5, children's program; fairy story by Aunt Nell. 7:15, markets, weather, news bulletins, and police reports. 8, string and flute quintet.

WWJ, Detroit, 517 (C. S. T.)—8 A. M., setting-up exercises. 9:30, "Tonight's Dinner." 9:45, Public Health Service bulletins. 10:25, weather. 11:55, time. 3 P. M., News orch. 3:50, weather. 3:55, market reports. 7, News orch.; Charles Coates, baritone. 10, dance music by Jean Goldkette's orch. 11, special Christmas carol service.

WEEI, Boston, 303 (E. S. T.)—2 P. M., Happy Hawkins and his orch. 6:30, Dok-Eisenbourg and his Sinfonians. 7, Big Brother Club. 7:30, "A Few Minutes with Santa Claus." 7:45, Glee Club concert. 8:15, choir of the Methodist Church. 9:30, choir. 11, Fenway Theatre organ recital. 11:30, concert by the Lyric quartet.

KFI, Los Angeles, 469 (P. S. T.)—5 P. M., news bulletins. 5:30, news bulletins. 6:45, Nick Harris detective stories. 7:30, children's Christmas program. 8, Herald studio. 9, studio. 10, Don's melody makers.

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, special Christmas story. 7:30, concert by the Orpheus Club ensemble; first tenors, William Spittal. Ernest Mielow, C. A. Lenville; second tenors, Harold Wright. Eric Graham, Malcolm Warren; first bass, Harry Colburn. F. G. Cobb, James Marchese; second bass, Howard King, J. A. Greenaway, Robert Winder; Westinghouse Philharmonic Trio. 8:30, Christmas carols. 9:55, time, weather. 11, Leo Reisman and his Hotel Brunswick orch. 11:30, popular song recital.

WLW, Cincinnati, O., 423 (C. S. T.)—10:45 A. M., weather and business reports. 12:15 P. M., program by the Mu Phi Epsilon Sorority. 1:30, business reports. 3, market reports. 4, "Good Cheer" program. 8, Chubb-Steinberg orch.; opera class of Arnold Frank Schroeder. 9, concert program. 12, Midnight Mass.

THURSDAY, DECEMBER 25

WFAA, Dallas, Tex., 476 (C. S. T.)—12:30 P. M., Edmund Boettcher, tenor; William H. McRaven, pianist; DeWitt McMurray, editor The Semi-Weekly Farm News. 8:30, The McDowell Sisters, Miss Edith and Miss Grace. 11, The Adolphus 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. 4:55, local livestock, produce and grain market reports. 5, official Central Standard time announced. 7:30-9, concert by Barney Rapp's orch.; twenty-minute specialty by Wright and Bessinger; International Sunday-school lesson; four-minute welfare talk; news; time.

WCAE, Pittsburgh, Pa., 462 (E. S. T.)—9:30 A. M., religious service. 3 P. M., special Christmas concert. 6:30, dinner concert transmitted from the William Penn Hotel. 7:30, Uncle Kaybee. 8:30, Christmas concert.

KGO, Oakland, Cal., 312 (P. S. T.)—4 P. M., concert orch. 8, Christmas program. 10, dance music program by Henry Halstead's orch.

WOO, Philadelphia, 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, organ and trumpets. 9:55, time. 10:02, weather.

KTHS, Hot Springs, Ark., 375 (C. S. T.)—8 P. M., organ recital from the Princess Theatre.

KGW, Portland, Ore., 492 (P. S. T.)—12:30 P. M., Civic Music Club. 1:30, Christmas carols, Mitylene Fraker Sites quartet. 3, organ recital from Public Auditorium. 4:30, concert. 6, program by George Olsen's Metropolitan orch.

WCBD, Zion, Ill., 345 (C. S. T.)—8 P. M., Zion Junior Choir, assisted by Messrs. Mehaffey, Rendall, Sach and McElroy, Celestial Bells; Mrs. Thomas, Mrs. LaRose, and Messrs. Barton and Thomas, mixed quartet; Mrs. Thomas and Mrs. LaRose, soprano and contralto; Mrs. J. D. Thomas, soprano; Mrs. P. M. LaRose, contralto; M. P. Barton, tenor; J. D. Thomas, baritone; Richard F. Hire, Mr. and Ms. L. J. Hire and Herman Becker, string quartet; Messrs. Newcomer, Mason, Schulz and Dunn, brass quartet; Mr. Richard F. Hire, Mr. and Mrs. L. J. Hire, trio; Messrs. Dunn and Stewart, euphonium and cornet; P. B. Newcomer, cornet; Wm. C. Dunn, euphonium; Richard F. Hire, violin; Herman Becker, cello; Mrs. L. J. Hire, piano.

WEEI, Boston, 303 (E. S. T.)—6 P. M., Jack Renard and his Mansion Inn orch. 7, Big Brother Club. 7:30, musicale. 9, Gillette Safety Razor singers. 10:30, Dok-Eisenbourg and his Sinfonians.

KFI, Los Angeles, 469 (P. S. T.)—5 P. M., Herald news. 5:30, Examiner news. 6:45, Y. M. C. A. lecture. 7, Christmas play. 7:30, instrumental trio. 8, song recital. 9, Examiner studio. 10, chorus and organ recital.

WBZ, Springfield, Mass., 337 (E. S. T.)—11:55 A. M., time, weather, market report. 6:30 P. M., Leo Reisman Hotel Lenox ensemble. 7, market report. 7:05, bedtime story. 7:15, letter from the New England Homestead, "At the Theatres." 7:45, Charles R. Hector with his St James Theatre orch. 8:15, Lina Scott Jeffcott, dramatic soprano. 8:30, organ. 8:45, choir of St. John's Congregational Church. 9, organ. 9:15, musical program.

WLW, Cincinnati, O., 423 (C. S. T.)—6 A. M., Christmas service. 10 P. M., message from the U. S. Civil Service. 10:03, Doherty Melody Boys; Cincinnati zither quartet. 10:30, vocal concert, courtesy of the Milnor Electric Co.; soprano soloist, Marian Manship.

First Broadcast Diagram Sent from WGBS

WGBS, the broadcasting station of Gimbel Brothers' Department Store, New York City, had the honor of sending out the first broadcast radio diagram. Herman Bernard, managing editor of RADIO WORLD, "dictated" the diagram in the course of a radio talk on Thanksgiving Eve. RADIO WORLD is on the air every Wednesday at 6.35 P. M. at this station,



"UNCLE ROBERT"



WILLIAM H. HENNINGSEN

which transmits on a wavelength of 316 meters.

The diagram he described in detail was that of a 2-tube Superdyne, in other words, the 4-tube Superdyne with the two audio stages omitted. This is the circuit published in last week's issue of RADIO WORLD.

Talks on New Wave Band

Mr. Bernard discussed the new band of broadcast wavelengths, which will go into effect about January 1. This band will be from 200 to 545 meters, that is, will reach 22 meters lower at the minimum and one meter lower at the maximum, than the present band of 200-546. The speaker said that most existing receivers would have to be made over to cover the new band, as most of them fall short by about 30 meters of covering the new band. He prophesied that .001 mfd. variable condensers (about 43 plates) would become the most popular, the turns reduced on the coils they tune, for in that way, with reduced inductance and greatly increased capacity range, the band could be covered. He believed that the .00075 mfd. variable condenser, which, with a fixed coil, could cover the band, would ultimately become popular. While the .001 mfd. variable condenser would be quite satisfactory, he said, it would introduce some unused capacity in the circuit.

Switches Not Popular

He pointed out that the makeshift of using a switch to cut in and out a series condenser, or to tap a coil, would not prove popular, because of the inconvenience occasioned by the use of switches and the high-frequency losses sustained by their use. He pointed out that in the Neutrodyne, for instance, three switches would have to be used, in addition to the three major tuning controls and the one, two or three rheostats, and remarked this required too much manipulation, the correct variable capacity-fixed inductance relationship being far preferable. The 13, 15, and 17 plate condensers used in Neutrodynes would be superseded, he prophesied, and said that usually even the 23-plate condenser, .0005 mfd., in conjunction with a fixed coil, would not cover the band.

In Good Company

Mr. Bernard's talk was sandwiched between a fine baritone recital by William H. Henningsen, who preceded him, and a spirited appeal by "Uncle Robert" on home topics. Uncle Robert listened with interest to Mr. Bernard's remarks and

asked him to remain in the studio to hear the fireside philosophy. Mr. Bernard gladly accepted the offer. At the conclusion of Uncle Robert's wonderful talk the two left arm in arm. Uncle Robert is devoting his life to philanthropy, crippled, blind and other afflicted children being the special beneficiaries of his unselfish efforts. In a talk from WNYC a few nights later, Uncle Robert revealed that when he was a child he was run down by a vehicle. He is wealthy and of a famous family, but hides his identity behind his cherished soubriquet of Uncle Robert.

Stations now are giving notice that their wavelengths may be changed at any moment, without notice, thus showing that the realignment is imminent. This is important not only to fans but to manufacturers, for the reasons given by Mr. Bernard.

Town Opposes Permits to Own Sets

GLENS FALLS, N. Y.

GLENS FALLS will have no ordinance to regulate the installation and operation of radio sets, it became apparent when radio enthusiasts, at a hearing before Howard J. Bursh, city attorney, protested against its adoption and declared the city did not need it. The ordinance was prepared at the direction of the State conference of Mayors for State-wide enactment.

It would regulate installation of antennas, would require a permit for each set owner with a license fee and appointment of inspectors.

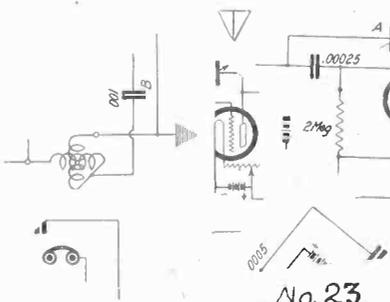
Soundhouse Takes Place of a Lighthouse

LONDON.

ON an island in the Firth of Forth there stands a queer looking structure of steel lattice work, says the "Daily Mail." It is the latest thing in lighthouses, but in appearance it is far removed from the conventional pattern.

It is a wireless lighthouse; instead of flashing out beams of light, it sends forth "flashes" of sound beams by means of a system of wireless transmission. To profit by these signals a ship must, of course, be fitted with special receivers, which will also indicate the direction from which the signals are coming.

Scrambled Diagram



SEND your pasted up solution to this puzzle to Scrambled Diagram Editor, RADIO WORLD.



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RADIO WORLD

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(Dated Saturday of same week)

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CLASSIFIED ADVERTISEMENTS

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 20, 1924

Super Power as a Popularizer of Crystal Detection

WITH Secretary Hoover well disposed toward the idea of Super Power, as an experiment though not as anything of proven value, and with the radio public willing to have this idea tested for whatever worth it possesses in widening the range of stations, it seems probable that the crystal set will be decidedly in the foreground. Today it is virtually impossible to reach out with a crystal set with any consistency, but when stations use 15,000 watts, instead of 500 or less, the crystal may be able to detect signals from far-off stations. Therefore, those who find in the crystal the most enjoyable quality of reception that radio affords and who want to see crystal detection in the foreground will take especial interest in the forthcoming Super Power tests. Now five stations have been temporarily licensed to use 5,000 watts, which is known as Increased Power. But Super Power is something far beyond this, although Increased Power will give some inkling of the value of Super Power.

An interesting sidelight on Super Power is that the Radio Corporation of America, one of its strongest advocates, is also the largest seller of tubes, the whole UV line. If Super Power reduces the sale of tubes—then what?

MR. DX HOUND *A Character Created by RADIO WORLD Artist* By HAL SINCLAIR



Why Doesn't the Number of Sets Outrank Autos and Phonographs?

RADIO WORLD Begins National Survey in Which All Readers

Are Asked to Participate to Solve This Queer Problem—

Manufacturers and Others in the Trade Invited to

Co-operate

IT is interesting to hear the reasons given by persons for not having a radio. One man answered RADIO WORLD's query as follows:

"I never heard a radio that's worth listening to. I go to friends' homes and hear radios, but I'm glad when they turn the machine off. The things you do hear don't sound natural. I'll wait until radio is perfected. It isn't much good yet."

That was at least a frank statement of fact combined with a mistaken opinion. It is undoubtedly true that you may go into many homes and hear radio sets operating a loud speaker in an imperfect manner. Distortion spoils reception, especially for anybody who has a musical training or is an ardent auditor of better-class music. But to say that "radio isn't much good yet" and that persons had better "wait until radio is perfected" is a state of mind that should engage the earnest attention of radio manufacturers, dealers, jobbers and retailers, as well as radio fans.

Just how many radio sets are in use in the United States today nobody knows, but there are many more automobiles in use than radios, although the average automobile costs ten times as much as the average set, and a radio set may be used conveniently ten times as often as an automobile. In other words, the ratio in favor of the radio set is 100 to 1, on the comparative basis of cost and pleasure-hours. Probably five times as many homes have phonographs as have radios, although a radio set costs less than a phonograph and the upkeep cost is much less, when one considers the expensive necessity of buying new records.

Just what are the underlying causes of radio's failure to achieve its true place? It is not sensible to point to the rapid growth of the radio industry and the number of radio set owners, all in four short years, because radio is the greatest scientific achievement for entertainment and education that the world has ever known. No matter how rapid the growth has been, one should not be so stagnant as to accept this self-sustained advance in lieu of the honors and emoluments to which radio is justly entitled. There should be many more radios in use than automobiles or phonographs. There are not. Why?

RADIO WORLD is undertaking a nation-wide survey to discover the reasons. As part of this undertaking readers are requested to interview friends and acquaintances who have no sets and to ascertain what reasons those persons give. Send in the name and address of the person interviewed and also accurately quote his reasons. All contributions published will be paid for at the usual editorial rates. Manufacturers and others in the trade are requested to send in their reasons, too.

This part of the undertaking is in the nature of a national referendum. RADIO WORLD's Statistical Research Bureau is making a special survey of the industrial and population features of this investigation. Out of the whole undertaking no doubt will emerge a report that will be one of radio's most important documents. It is planned to form a committee of experts who will formulate recommendations for remedying conditions as revealed in the report.

Address all communications to Survey Editor, RADIO WORLD, 1493 Broadway, New York City.

Dog's Bark Amplified

BIRMINGHAM, ENG.

Some of the dogs exhibited at the Birmingham Dog Show recently that radio amplifiers made their barks heard.

PATENT

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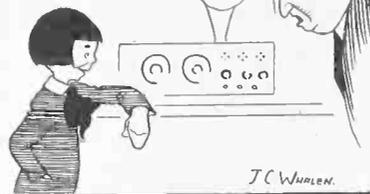
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J.C. WURLEN

Jenkins' Radiophoto Test Partly Successful

BOSTON.

FOLLOWING the successful transmission of a message in Japanese characters from Washington to Boston by radiophotography, C. Francis Jenkins, inventor of the process, cancelled further tests. It had been planned to send radiophotos of messages from Herbert C. Hoover, Secretary of Commerce; Curtis D. Wilbur, Secretary of the Navy, and Paul R. Henderson, Second Assistant Postmaster General.

Interference from code and static during the tests made Mr. Jenkins doubt the practical value of further demonstrations. He said that NOF, the old naval station at Anacostia, near Washington, which did the transmitting, was not powerful enough to overcome static and code and allow for the receipt of perfectly clear photographs.

While the test was successful from a scientific viewpoint, as the Japanese message was actually transmitted and received by the radio-photographic process, it was disappointing from a practical viewpoint. All Japanese characters in the message were reproduced at the receiving end, but it was far from a perfectly clear reproduction. The prints made from the radiophoto negative were covered with dots and dashes representing static and code. Heavy black lines on the print were caused by code from especially powerful stations. So much code got on the film that Mr. Jenkins said all he needed was a code book to read it.

The message was addressed to Mr. Jenkins by Isaburo Yoshida, Japanese Counselor and Chargé d'Affaires of the Japanese Embassy in Washington. It was a message of felicitation to Mr. Jenkins on his invention.

WAVE THEORY 59 YEARS OLD

ACCORDING to the British scientist, Dr. J. A. Fleming, the first theory that electro-magnetic waves passed through insulators as wave motion was advanced by Maxwell in 1865

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What "Beats" Are

WHEN two radio-frequency currents flow in a circuit and they are of only slightly different frequency, they produce what are called "beats" or a current of a third frequency, which is audible. Similarly, when two notes are struck on a musical instrument their combination produces another tone. When a radiating receiver is operating it produces these "beats" in other receivers when it is tuned to the wavelength of the transmitting station.



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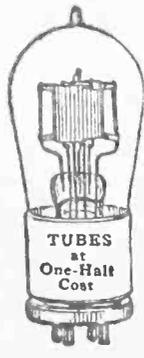
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The Radio Trade



J. L. LEWIS, radio retailer and mail order dealer, 132 West 32nd St., New York City, recently held his second annual radio exposition with an elaborate display of merchandise and a well-advertised sale on apparatus. Mr. Lewis reports excellent results and suggests other dealers follow the same course during some non-rush week.

Radio Will Rival Auto Industry, Says Kerr

CHICAGO.

THE final report of the Third Annual Chicago Radio Show reveals the total attendance for six days almost equalled that of the New York City show for seven days. The New York show drew 175,000, while the Chicago attendance was 173,200.

The DX Instrument Company, Harrisburg, Pa., won the silver cup awarded by the management to the exhibitor obtaining an order from the most distant point from Chicago. The company sold a bill of \$2,000 to the Australian Radio Corporation, Perth, West Australia. The runner-up was the Westinghouse Union Battery Company, Swissvale, Pa. P. H. Donovan sold goods to John Chambers, Ltd., Hobart, Tasmania. Another distant order was booked by H. C. Forster, of the Utah Products Company, Salt Lake City, who sold a bill of goods to a Melbourne, Australia, concern; while the J. T. Boone Corporation, Detroit, sold considerable equipment to the United Distributors, Ltd., Sydney, Australia. Orders numbering 984 were booked from European countries and close to 1,400 orders were taken from dealers in Mexico, Central and South America.

Several unusual features were introduced in the "New Inventions Section" and the "Foreign Exhibits," which, together with the famous E. T. Flewelling Short Wave Broadcasting Station 9XBG, attracted many thousands to the second floor of the south annex.

In an interview, James F. Kerr, general manager of the show, said:

"Radio is just about the most important industry of the age. Interest in radio will increase during the next decade. Radio will soon be on the same plane as the automobile industry."

RADIO INDUSTRIES SUED AS NEUTRODYNE INFRINGERS

AN action alleging infringement of the Neutrodyne radio receiving patents has been filed in the Southern District Federal Court, New York City, against Radio Industries Corporation, 131 Duane Street, by the Hazeltine Corporation, the Independent Radio Manufacturers, Inc., and thirteen associated companies sublicensees under Neutrodyne patents, listed as co-plaintiffs.

The bill of complaint drawn by Pennie, Davis, Marvin and Edmonds counsel for plaintiffs, charges the defendant "has committed and threatened to commit acts of infringement and has aided and encouraged acts of infringement" against the inventions of Professor L. A. Hazeltine covered in letters patent 1,450,080 and 1,489,228.

The plaintiffs seek a permanent injunction restraining the defendant from making or selling apparatus which infringes the Neutrodyne patents. They also ask that the court order the defendant to account for and pay to the plaintiffs "all such unlawful gains, profits and advantages had by said defendant" and further seek a sum equal to three times the damages sustained by plaintiffs.

AMEREX ACE IS A NEW TUNED RF SET
THE Amerex Electric Corp. of New York City, has added a 5-tube tuned radio-frequency set to its line. It is called the Amerex Ace. It has two stages of radio-frequency, detector and two stages of audio frequency amplification. The radio-frequency coils are low-loss and mounted scientifically on low-loss condensers, thereby giving the set the greatest amount of amplification. The sockets are mounted on a bakelite sub-panel;

socket spring contacts are phosphor bronze and adjusted to assure the user of perfect contact. This spring mounting is a special feature. The Amerex Ace will tune from 200 to 600 meters and bring in distant stations clearly on the loud-speaker. Each set is tested before installation in the cabinet and after being placed in the cabinet. The Ace is packed in a special corrugated container designed for rough usage. All parts are 100% guaranteed against defective parts and workmanship. Mahogany panels, dials and engravings finished in gold and mounted in a carefully finished solid mahogany cabinet are other features.

TWIN DRY CELL REPRESENTATIVES

RICHARD B. BLANCK and Arthur E. Carrier have formed a partnership under the name of Blanck & Carrier Co. and are the New York representatives of the Twin Cell Dry Battery Co., of Cleveland, with offices at 220 Broadway, New York City. They form an ideal combination, Mr. Blanck having been for 15 years with the National Carbon Co., and in addition to having a vast fund of battery knowledge is well known and liked among the trade. Mr. Carrier also is a battery expert, having been New York manager for National Carbon. They are handling a good product, as the Twin Cell has responded favorably to severe tests. It is reported that the Twin Cell Battery Company is to enter the B battery field.

ALL MAIN FLOOR SPACE

SOLD FOR 1925 SHOW

THE entire main floor space has been sold for the Fourth Annual National Radio Exposition to be held on three floors of Grand Central Palace, New York City, September 12 to 19. Floor plans may be obtained through Trade Editor, RADIO WORLD, 1493 Broadway, New York City.

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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.

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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.

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Name

City or town

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His Name

His Address

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Ray W. Netling, 708 W. Davenport St., Rhineland, Wis.

Jean Fontain, St. Hyacinthe, Canada.
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LATEST PATENTS

Telephone Receiver, invented by Earl P. Oswald, of Detroit, provides a simple construction and one in which the amplitude of vibration of the diaphragm is increased, producing a loud speaker.

Wireless Tie Insulator, invented by Harry A. Frederick, of Chicago, Pa. It provides an insulator which employs a non-frangible device for locking and tying the cable or current wire to the insulator.

Radio Attachment for Phonographs, invented by Edward E. Linehan, of St. Paul, Minn. It adapts the phonograph amplifier for use with the sound producing apparatus of the phonograph or as a loud speaker.

Vacuum Tube Amplifier, invented by David Grimes, of Grasmere, N. Y. One of the principal objects of this invention is to overcome the disadvantages inherent in reflex circuits and therefore to increase the efficiency of operation of amplifier tubes. Another object is the elimination of beat notes in reflex circuits employing more than one stage of radio frequency amplification.

Letters from Our Readers

EDITOR RADIO WORLD:

I HAVE been advised that you are a pretty good authority on matters pertaining to radio reception and transmission and would like to ask your advice on several matters which have puzzled me for some time.

I have a 5-KW, double barreled, 7-pas-senger, triple-valve, non-skid Westinghouse outfit, complete with U. S. safety appliances (Standard) and Timpkin rear axle, which I use in connection with a 20-volt, hammer-less, self-winding, automatic, 16-jewel, nickel-plated, Marsoni antenna with pneumatic tires. Have had a great deal of trouble with my Galena at night since I started using Lydia E. Pinkham's Vegetable Compound, but get better results by painting it with iodine. I can get undamped waves all right with my regenerative vacuum sweeper in dry weather, but on Sundays I find that my rheostat keeps interfering with the differential so that it is necessary to cut in a small .0045 mfd. washboard between the piano and the kitchen sink.

Edison's Advice

On taking the matter up with Mr. Edison he advises that if I use cylinder records instead of my present intermittent shock absorbers on C. W., my capacity will be increased about 8½ per cent Fahrenheit, but Einstein thinks my clutch is slipping and I ought to use a little more yeast and a copper boiler. This, of course, is purely a matter of taste and I am sure you will agree with me that the overload release will work just as well with a mica commutator and a 4"x4" coupler shank as long as the piston rings are well oiled and I use plenty of sand on the hills.

I get signals from SOL and MARS practically every night by tuning to C-sharp and think I can get AWOL and H20 by cutting in an interlocking relay between the honeycomb and the Washington monument.

Puzzling Questions

Do you think that I would get better wavelengths if I connected a circuit breaker in series with the tabulator key and used weatherproof conduit in the magneto? Neither do I, but it is practically impossible to get good spread rods since the country went dry and unless I use something to cut down the static and decrease the potential of my motometer, the fluctuations of the variometer will tend to synchronize with the alternations of high frequency kickback preventer and burn out the secondary windings of the eccentric bushings.

Pershing Told Him How

Until recently I used a 5-string tenor, hardwood amplifier with 240 turns of No. 4¼ barb wire around the front sight cover, but I found that with this arrangement, the follicles of the heating element had a tendency to become impregnated with the pigment from the valve stem, so on advice from General John Pershing, I removed the drift slide and substituted a duplex automatic stoker, which allows the left dorsal ulna bone to oscillate between the hydrometer and the upper sling swivel and prevent the choke coils from short circuiting the permanent wave length.

I was wondering if by placing the blow-off jack in juxtaposition to the universal joint on the loop aerial and using an emergency application of air on the primary windings, would the cubic capacity of the variable condenser in any way affect the centrifugal dirt collector on the three-way switch of the microphone, and, if so, would this be a reversible reaction? Also, do you think that by

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using more chalk and a little high English on the cue ball, would the pilot beam interfere with the insulation on the superheater pipes?

Any suggestion you have to make in regard to the above matters will be greatly appreciated by,

H. C. MERIR.
Box 15, Cove, Ore.

Boy Wins Bugling Contest

A BUGLING contest held by Bronx Boy Scouts to decide the champion of that New York City borough, in which the radio audience acted as judges, was won by Scout Isidor Solotar, of No. 1004 Clay avenue, and a member of Troop 218, The Bronx.

So far as is known this is the first time such a contest has ever been held in the United States. It was put on the air through WFBH. No sooner had the last note of the last contestant died away than the radio studio was deluged with 'phone calls from persons wishing to register a vote.

Practice Tuning So You'll Learn How to Get DX

EXPERIENCE and a little study of the art of tuning are necessary for the successful operation of any radio receiver. This knowledge is gained by actual practice. If you have not learned the art of tuning, but manage to hear one or two distant stations don't condemn the receiver because you can't hear them all. The receiver that will tune in any and all stations has never been built, but the fact that you have heard one or more DX stations shows that your set is all right. All you need is practice and patience.

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Coils for Bernard Superdyne

(Continued from page 6)

2 for the panel. The drill holes for mounting the condensers are not shown, unless single-mount condensers are used. The other type, which requires drilling three additional holes, should be mounted from template dimensions given by the manufacturer. The single-mount condensers require a larger drillhole than 1/4" and are secured with a nut.

The parts will be disposed on the baseboard as shown in Fig. 3. The coupler, con-

densers C1 and C2, the rheostat and the jack should be mounted on the panel first. Then the terminal strip, socket and plate coil may be fastened to the baseboard. Hold the panel against the bottom of the baseboard to make sure that there is sufficient clearance between the panel-mounted parts and the others. If dimensions are followed as given there will be ample. The grid condenser should be mounted right on the G post of the socket, if possible. Due to sockets and grid condenser varieties this is not always feasible. At least, do not mount the grid condenser so that it touches the baseboard.

The Coils

There are four coils in the circuit. L1-L2L3 comprise the variocoupler. L1 is the primary, L2 the secondary, and both are wound on a cylindrical form, 4" outside diameter and 2" high. This may be hard rubber or bakelite. L2 consists of 30 turns. As the primary L1 is to be on the outside, L2 is wound first and the wire terminals anchored in the tubing. L1 is wound on top of it. L3 is the rotor or tickler, and may be wound on a tubing of 3 1/2" outside diameter, 2" high. A formed rotor, that is, one that is rounded at the sides like a ship, may be used. All the windings are in the same direction and all the wire is No. 22 double silk covered. The plate coil consists of 36 turns, half the turns being put on one side and the other half on the other side of the rotor, to permit the shaft to connect to the rotor.

The primary, instead of being wound like the other coils, one turn right next to another, is wound so that the four turns that comprise it are wound for the entire height of the stator form. The plate coil L4, on a tubing 4" outside diameter, 2" high, consists of 32 turns of the same wire, wound in either direction. This is because a solenoid may be used as inverse or reverse coil, as desired, simply by the method of connection to the set, because it is not in inductive relationship to any other coil.

If desired, about 38-strand copper wire may be used for the primary.

The dimensions and windings as given are the same as those in the Wallace Superdyne coupler. The same company's plate coil corresponds to the one described. The commercial plate coil has a hole in the tubing to designate what may be considered the beginning of the coil. If this is regarded as the beginning, then the commercial plate coil is wound in a direction opposite to that of

the windings on the coupler. Place the coupler on a table, the rotor end stops of the coupler on top. Place the plate coil above
(Continued on next page)

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Wiring the 1-Tube DX Superdyne

the coupler, with the beginning of the plate coil, which has the side with the hole in the tubing, on top. It will be noticed that

the windings on the coupler go in one direction while those of the plate coil go in the opposite direction. If the plate coil is turned around, so that the former top is now the bottom, all windings will be in the same direction. It is therefore obvious that the direction in which the plate coil is wound is of no importance, but that by connecting to the set in one way you get positive direction by reversing the leads you get a negative direction. This is taken up practically in the wiring directions.

On the Wallace coupler the beginning of the primary of L1 is on top, the end on bottom. The beginning of L2 has a stranded wire connection which can be traced to the beginning, which corresponds to the beginning of the primary. Likewise the end of L2 can be traced. The tickler leads are brought out through the shaft, these being stranded wire, too, the beginning of the tickler being identified by a small piece of white rubber insulated tubing. Those who make their own coupler should knot a small piece of string at the beginning of the secondary and the beginning of the tickler, so they will be more readily able to identify them, and, placing the plate coil on top the coupler, as explained, determine which is the beginning of the plate coil, considering the plate coil wound in the opposite direction to the coupler windings. In other words, follow the commercial model.

(lower) of L1, the aperiodic primary on the coupler, and the end of L1 (lower) to the ground.

2. Connect the beginning of L2 (upper) (a) to the stator of the variable condenser, C1, which has a maximum capacity of .001 mfd., normally 43 plates, and is equipped with vernier; (b) to one side of the grid condenser C2. The other side of the grid condenser goes to the grid, that is, the G post of the socket. A grid leak is mounted across the grid condenser. This leak preferably should be variable, but if a fixed leak, as of the cartridge type, is used with the 12 type tube employed in the original

(Continued on next page)

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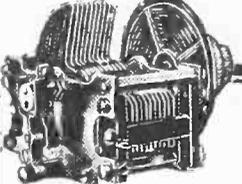
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Reverse Feedback Connections

(Continued from preceding page)
set; its resistance should be 3 megohms. The end of L2 (lower) goes (a) to the rotor plates of C1 and to (b) to A+ and (c)

to the F+ post on the socket. This is the filament post always on the right-hand side of the socket, unless a 199 type or 299 type tube is used. Connect A+ and B—.

3. Connect the plate of the tube to the END of I4, the plate coil. In the Wallace coil this would be the connection to the terminal OTHER THAN the one where the hole is punched. This lead also goes to the stator of C3 a .001 mfd. variable condenser equipped with vernier. The beginning of L4 goes to the remaining unconnected side of C3 and to the END of the tickler. In the commercial model this is the lead OTHER THAN the one that has the white rubber insulation identifying mark. The reason for these connections being made as outlined is that the current is passed through the plate coil in a POSITIVE direction, the same as it is passed through the coupler, but the feedback obtained through the tickler is in a NEGATIVE direction, because the tickler connections alone are reversed. The reversal of the reverse wound plate coil connections made them inverse, i.e., positive. The beginning of L3 goes to one side of the jack J, preferably to the spring, the other side or frame of the jack going to B+ 22½ volts.

4. The wiring is completed by connecting the A—, the post on the circumference or outside of a 1½-volt dry cell, to one side of the rheostat R1, the other side of the rheostat going to the F— post on the socket. In wiring diagrams the filament wiring is usually shown so that the grid return is to the left, be it plus or minus, and that makes for simplicity, but actually the minus post is at left.

If you find that the set does not tune down low enough when the new band of wave lengths goes into effect, you may remove turns from the secondary of the coupler, one at a time, until 200 meters comes in at a dial setting of about 5 to 10 on C1. Then do the same with the plate coil. You will still bring in the highest wave stations, but if 23-plate condensers were used this could not be done.

If the set works fairly well, do not alter the wiring, but remember that tuning is something to be mastered, and give the set a two weeks' trial. You will find that it is great in bringing in extreme DX, if your connections are right. If you do not get DX after you are satisfied that you have mastered the tuning, then reverse the connections of both the plate coil and the tickler. That will send the current reversely through the plate coil, instead of that way through the tickler, and occasionally that works better than the other way.

To tune in, set the tickler setting at about

30 on the dial, then turn C1 dial slowly. When a signal is heard, clear it up by rotating the C2 dial. The dial settings for both condensers will be nearly alike. Often a signal may be heard over several degrees of C2 dial, but the C1 dial will tune very
(Concluded on next page)



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Halcyon Insulator Co., 168 Front St., N. Y. C.

THOUSANDS OF BARGAINS
FACTORY GUARANTEED MDS. BY MAIL
Genuine New Radiotron or Cunningham Tubes
UV-199—200—201A—VD-11—12 \$3.39
C299—300—301A—C11—12
Fresh Burgess or Eveready Batteries
22½ Volt large size \$1.68—45 Volt \$3.90 size \$3.38
Write for Free new Complete Catalog on Sets and Parts.
STONE ELECTRIC CO., 714 Pine St., St. Louis, Mo.
All Mdse. F.O.B. St. Louis, Mo. Dept. W.

WANTED

Factory Distributors. Tremendous profits in distributing newly invented, much needed Radio device. Patented. Sells for only 50 cents retail. Market several million yearly. Big repeats. Nationally advertised. Write at once for new sales plan.
RADIO EQUIPMENT COMPANY
20-W Stuart St. Boston, Mass.

"Can't Lose 'Em"

Bakelite, Engraved, Nickel-plated with lugs
Panels Cut, Drilled, Engraved
Dealers, Write for Terms!
CORTLANDT PANEL ENGRAVING CO.
81 Cortlandt Street New York City

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Radio Batteries
—they last longer

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,
Professions, Business Firms.
99% Guaranteed 5¢ each
by refund of 5¢ each
ROSS-Gould Co., 323 N. 10th St. St. Louis

Radio and Other Technical Books You Need

- Radio Telegraph and Telephone Receivers for Beginners \$6.75
 - Design Data for Radio Transmitters and Receivers—M. B. Sleeper75
 - Wireless in the Home—Do Forest15
 - Commercial Type Radio Apparatus—M. B. Sleeper75
 - A B C of Vacuum Tubes—Lewis 1.00
 - Operation of Wireless Telegraph Apparatus35
 - Lessons in Wireless Telegraphy35
 - Radio Hookups—M. B. Sleeper75
 - Construction of New Type Trans-Atlantic Receiving Sets—M. B. Sleeper75
 - 1922 Consolidated Call Book50
 - How to Make a Standard C. W. Set35
- Any book sent on receipt of price, postpaid. 20% discount on any two books of same title. The whole list of 14 books sent for

\$6.45

THE COLUMBIA PRINT
1493 Broadway, New York City

Holland Goes in for Radio; 6 Stations Under Way

AMSTERDAM. RADIO fans in Holland prefer to build their own sets, and consequently few purchasers of complete sets are to be found in the Netherlands. Dutch fans prefer the three honeycomb coil set, few using

variometers or variocouplers. European wave-lengths jump from 220 meters used by Brussels, to 2,600 meters, by Paris. England uses from 360 to 420, Dutch stations 1,050 to 1,100, and Paris, 1,700 to 2,600 meters, a terribly wide range in wave bands, for a single set to pick up.

The use of honeycomb coils is necessary so the proper values of inductance may be readily obtained, which would not be possible over this broad band in sets constructed as most of the broadcast receivers are in the United States.

The Dutch have licensed six broadcasters, a tax of 100 florins a year being levied for an hour a week of broadcasting. The Government itself, however, plans to erect a station, but listeners-in of the Netherlands still have the privilege of listening to radio concerts from British, German, French, Belgian and Swiss stations. The recent formation of a dealers' association is expected to aid in popularizing radio in Holland.

Until recently amateurs and operators not connected with the Government were forbidden to use radio apparatus of any kind. French dealers in the local market are now demonstrating receiving sets bringing in Parisian concerts, as well as broadcasts from the distant cities.

FAHNESTOCK CLIPS

"Popular Wherever Radio Is Used"

14 Sizes in Beautiful Display Case

Dealers write for big money-making proposition.

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



Bracket mounting type, complete, \$4.50.

One Pull stantly 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

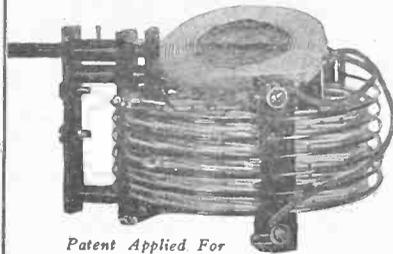
Howard-Workrite-Zenith-Mu-Rad

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

HOWARD B. JONES

618 S. Canal St. Chicago

LOW-LOSS TUNERS



Patent Applied For

The Globe Low-Loss Tuner is designed to give maximum efficiency. All metal parts entirely eliminated. Less than 1½ oz. of insulating material. Anti-capacity windings. Suitable for use in all standard hook-ups. Special unit for the SUPERDYNE circuit.

PRICES:

Standard Tuner (Broadcast Range).....\$7.00
Short Wave (70-250 Meters).....\$7.00
For Superdyne Circuit.....\$8.50

Circular on request. Dealers and jobbers write.

Globe Radio Equipment Co.
217 WEST 125th STREET
NEW YORK CITY

S. HAMMER RADIO CO.
303 Atkins Ave., Brooklyn, N. Y.
Please send me FREE Your NEW RADIO CATALOG

Name
Address
City State

FILL OUT AND MAIL

BERNARD'S SET

(Concluded from preceding page)

sharply. This latitude in C2 is not necessarily a shortcoming in your set, for the real test is whether the set tunes sharply, not C2. Also in some sets the tickler will function best at some other setting. Only slight variation will be needed over the entire broadcast range. The critical tuning is lessened in part by C2 on low waves, say under 350 meters, sometimes indeed over the whole range. The thing to remember about C2 is that it produces resonance and there is only one dial setting that achieves that resonance, though signals may be heard if C2 is varied while C1 remains set.

LIST OF PARTS

- One Superdyne plate coil.
- One Superdyne coupler as described.
- One socket.
- One single-circuit Frost jack.
- One 6-ohm Amsco rheostat.
- One Eby terminal strip.
- One 7x18 in. Radion panel.
- One pair earphones.
- Two .001 mfd. low-loss variable condensers, with vernier (C1-C2).
- One 1½-volt dry cell.
- One 22½-volt B battery.
- One 12 type tube.
- One Bradley leak.
- One .00025 mfd. fixed condenser.
- 100 feet, 7-strand aerial wire, 50 feet No. 14 insulated lead-in wire; one window lead-in strip, two porcelain aerial insulators.

FREE! Complete FREE!

RADIO CATALOG

Just send your name. No postage. Let us surprise you with our amazing values of all the up-to-date radio apparatus.

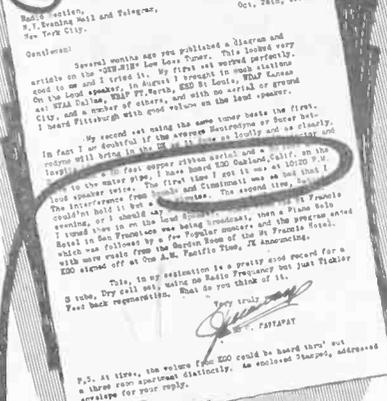
GET DISTANCE while the locals are on with the latest Cockaday 4-Circuit Tuner 5-Tube Set. Complete specified parts for building this set, including \$52.50 drilled and engraved panel.....

Positively no Substitutes.

Complete Parts for RADIO WORLD'S SUPERDYNE CIRCUITS

Wholesale Radio Service Co.
9 Church St. Dept. R.W. New York City

GEN-WIN gets DX



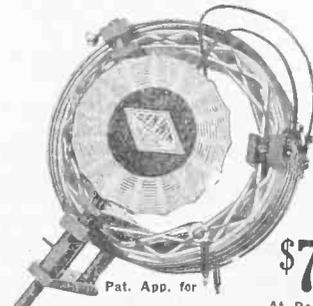
-with the Silver Plated Primary

U. S. Bureau of Standards Bulletin proves that silver has lower series resistance than any other metal. Another known fact is that radio frequency currents travel on the surface of wire. Therefore, if surface conductivity is increased, the set employing the wire will be made more efficient.

GEN-WIN Low Loss Tuner

employs an aperiodic primary of special silver plated copper wire. Condenser tuned secondary and self supporting spiderweb tickler are also of latest low loss design. A GEN-WIN Low Loss Tuner will enable you to build the most efficient regenerative set ever designed, both for DX and local reception. They are unconditionally guaranteed.

With each tuner you get a complete set of detailed blue prints (full size panel pattern, instrument layout and picture wiring diagram) for latest Gen-Win Low Loss Set. Separately 50c. Write for descriptive circular, Dept. RW-1220.



\$7.00

Pat. App. for

At Dealers or sent postpaid.

"—using 3UV-199 tubes (detector and 2 step)—I have heard KGO, Oakland, Calif., on the loud speaker twice. At times—KGO could be heard throughout a three-room apartment distinctly."

GENERAL RADIO WINDING CO.
315 Fulton St. New York

Thunder of Electrons Heard by Scientists

SCIENTISTS, who have recently succeeded in listening to the electron, now believe that all matter is composed of electrons and that different substances

result from the different properties possessed by the atoms according to the number and arrangements of the electrons they contain.

The vacuum tube amplifier in which the amplification is carried a hundred-thousand fold, and with which a million fold can be reached, makes this possible. The sound produced by the electrons is caused by bombardment of the plate by electrons, released from the hot filament. It is these electrons, the smallest known particles of matter, which carry the current and which make the operation of the tube possible. The noise is, therefore, a fundamental property of electron emission. These facts were brought out in a

The "Goode" Two - o - One

A

Le Ton d'argent

Guaranteed



BY
MAIL
ONLY

\$2.39

Postpaid

QUARTER AMPERE AMPLIFIER-DETECTOR RADIO TUBE

GUARANTEED SATISFACTORY

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

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

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

(All Postage Prepaid)

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

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

The Goode Tube Corporation
Incorporated Dept. B.
OWENSBORO KENTUCKY



Write Today
For Descriptive
Folder of the

NEW HOWARD 5-TUBE NEUTRODYNE

This Remarkable Set Has Created a
Sensation Among Radio Enthusiasts.

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



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

paper read by Dr. A. W. Hull, a research laboratory engineer, at the annual meeting of the American Physical Society at Ann Arbor, Mich., describing experiments conducted by Dr. N. H. Williams of the University of Michigan and himself, in which they listened to electrons.



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—3 V. .06 Amp.—Det.
and Amp.
- 402—Transmitter.

At all good dealers
Every ROYALTRON
must give satisfaction.

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

The Daddy of Them All!

*Great DX, Wonderful Volume,
Beautiful Signals!*

A very inexpensive circuit, based on the Radiola III.

"A DANDY 1-TUBE DX SET"

By Herbert E. Hayden

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

RADIO WORLD, 1493 Broadway
New York City



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*On the Beach and the Boardwalk. In the very center
of things. Hospitable, homelike.*

Every season of the year is enjoyable at Chalfonte-Haddon Hall. Winter recreations outdoors include Golf, Riding on the Beach, Aviation, Boardwalk Activities. Mild weather. Invigorating sea air.

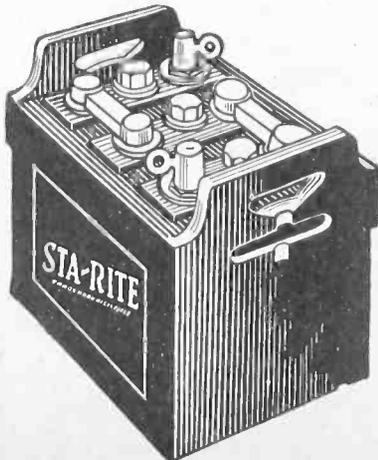
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Illustrated folder and rates on request.*

LEEDS and LIPPINCOTT COMPANY



CRYSTALS successfully used as Oscillators and Amplifiers for the First Time. A two-part article, with diagrams of six hook-ups in Radio World, issues of Aug. 9 and 16. Send 30 cents. Radio World, 1493 Broadway, New York City.

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**

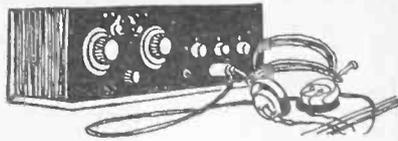
140 " " **10.55**

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



**The
RADIO PRIMER**
*Information and Instruction
for the Beginner*

**Untuned Primary Falls
In Step with Tuned
Current of Set**

THE advantages of the untuned primary over the tuned primary are many, the most prominent being the elimination of one or two sets of antenna tuning taps, and also the aerial tuning condenser, and the fact that by the loose form of coupling employed the resulting variation throughout a circuit using an untuned primary is kept at a minimum, thereby partly preventing

squeals and whistles in neighboring sets when the set is oscillating.

The untuned or aperiodic primary has a natural period of vibration below the lowest broadcast wave. When inductively coupled with a tuned circuit this primary is capable of falling into resonance at the frequency to which the tuned circuit is adjusted.

**How to Prove Capacity
Effect of Any Metal**

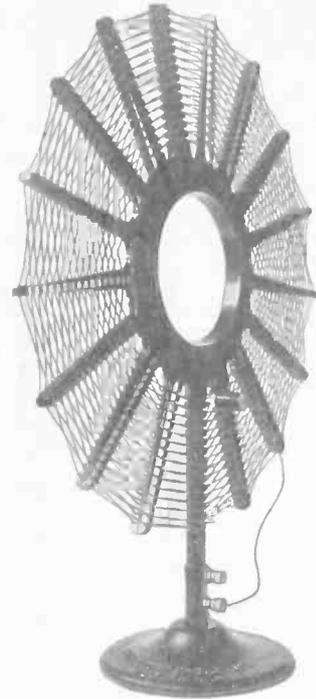
EVERY piece of metal in a set contributes something to the electrical characteristics of the receiver. Even the screws in the cabinet and panel add to the distributed capacity. To demonstrate this effect it is only necessary to disconnect the aerial from the binding post and touch it to some metal part of the set not actually in the circuit. It will be observed that the metal acts as a miniature condenser plate coupling the aerial to the apparatus.

**Shunted Fixed Condenser
May Cut Interference**

INTERFERENCE from local stations can be decreased in many cases by shunting a fixed condenser across the aerial and ground binding posts. This type of condenser may be made with two sheets of tin foil, three inches square, separated by a sheet of paper. If this experiment proves successful a permanent

unit of the mica dielectric-type condenser type, having a capacity of .00025 mfd. should be installed.

**LATEST
Radio Marvel
THE
PARAMOUNT LOOP**



LIST PRICE **\$12** Patent Pending

A Master Product

Spider-Web wound with silk over phosphor-bronze wire, mounted on a genuine bakelite frame, the PARAMOUNT LOOP, by virtue of its unique, scientific construction, gathers and sends direct to the receiver, without customary absorption, every electron of current.

This marvelous new invention produces to a surprising extent

**Greater Volume! Greater Clarity!
Greater Receptibility!**

and
Greater Directional Effect!

Inquire at your nearest radio shop. If you cannot obtain the PARAMOUNT LOOP there, send to us direct. Upon receipt of money order covering regular retail price, \$12.00, we will fill your order immediately.

"A Loop Eventually—Why Not the Best?"

Watch For
Newest Radio
Sensation—

Another Master
Product.
**Paramount
Super
Heterodyne
Kit**

**"B" Battery
Eliminator**

About to be
Marketed.
Inquiries Solicited.

Far superior to any-
thing on the market.
Now Ready

Paramount Radio Corp.

23 Central Avenue, Newark, N. J.
Jobbers and Dealers Write Today

EUROPE ON 3 TUBES

in recent tests reported by many who built Herman Bernard's "3-Circuit Tuner You Can Log." Send 15c for Nov. 8 issue of RADIO WORLD.

**NONE NB BETTER
RADIO
SOCKET SETS**

**A Wrench Set
That Is Right**

This compact socket wrench set consists of a strong screw driver type handle with hex shank and six high grade steel, machined sockets, five to fit the hex nuts and one taper milled socket for battery nuts. All packed in a durable, hinged box with a place for each socket and the handle.

Radio Fans—"This set will set the nut" quickly and easily and is as handy as your right hand.

Send in the coupon and your dollar today for the set that's worth much more.



Price **\$1**
Postage Prepaid



The New Britain Machine Co.
New Britain, Conn.

I need this set. Enclosed find \$1.00

Name _____
Street _____
City _____ State _____

**Your Set Is
Worthless**

With a Run-Down Battery

The only way you can accurately gauge the strength of your battery is with the

**Perfection
HYDROMETER**

(Scientifically Perfect)

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



Depended upon for years by a *ut automobilists* for instant, accurate, battery testing. Expertly made. Heavy one-piece hydrometer barrel—soft acid proof rubber connections—heavy ribbed bulb—designed to prevent leakage.

\$1.00 At All Radio Stores

**Bemco
Manufacturing
Company**

243 W. 55 St.
N. Y. City



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 Reinartz Coll. \$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, \$5.00 each, 2 for \$5.01
- Kel-Coll—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 1/2" Dials 1 for 23c, 2 for \$2.50
- 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.
Postage EXTRA.
FEDERAL RADIO PRODUCTS CO.
712 Broadway Schenectady, N. Y.

Famous for Quality and Service

Amplitron Tubes

Banded to Give Service—List Price \$4.

Send in your old and burnt out Tubes—We will send you new AMPLITRON—any model—at \$2.50
Dealers and Jobbers—Write for Discounts.

Pennant Radio Laboratories
Dept. RW, 23 Central Ave., Newark, N.J.



GETS THE STATION MICROTOR

Intellectual Control of Condensers and Retors
1 Division of MICROTOR Knob turns Retor
1-5400 Revolutions.
Controls standard dials to and including 4 1/2" dia.
Easy, Universal application.
50c Postpaid, on receipt of cash.
MANUFACTURERS & INVENTORS' ELECTRIC COMPANY
Distributors write for terms.
29-31 Gold Street Dept. RW New York City

FILE-KO-LEAK SCIENTIFICALLY CORRECT VARIABLE; HAND CALIBRATED IN MEGOHMS

Eliminates distortion; increases volume. Can be read through panel peep-hole and logged. Ask your dealer or write Dept. RW 1220.
DX INSTRUMENT COMPANY
HARRISBURG, PA.

THE 4-TUBE SUPERDYNE

One of the Most Popular Circuits in the World
By J. E. ANDERSON

One RF stage, Detector and Two Transformer-Coupled Audio Stages in RADIO WORLD, issues of Nov. 22 and 29. Trouble-shooting for this circuit described in Dec. 6 issue. 15 cents a copy. Send 45 cents, get all three.
RADIO WORLD
1493 Broadway New York City

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 that number. Radio World, 1493 Broadway, N. Y.

New Broadcasters

THREE class A and one class B broadcasting stations were licensed by the Department of Commerce, while three stations were transferred from class C to A.

NEW STATIONS

Call	Station	Meters
WCEE	—Charles E. Erbstein, Elgin, Ill.	536
KFRW	—United Churches of Olympia, Olympia, Wash.	220
WBBN	—H. Leslie Atlass, Chicago, Ill.	226
WCBC	—First Baptist Church, Memphis, Tenn.	266

CLASS C TO CLASS A

WEAP	—Mobile Radio Co., Inc., Mobile, Ala.	263
WRAO	—St. Louis Radio Service Co., St. Louis, Mo.	227
WRK	—Dorou Bros. Elec. Co., Hamilton, Ohio.	270

Here is a list of British broadcasting stations:

Call	Station	Meters
GED	—Croydon	900
ZBD	—Aberdeen	495
ZLO	—London	365
ZLS	—Leeds Bradford	346
ZSC	—Glasgow	415
ZZY	—Manchester	375
SIT	—Birmingham	475
SNO	—Newcastle	400
SSC	—Glasgow	420
SWA	—Cardiff	350
SXX	—Chelmsford	1600
6BM	—Bournemouth	385

All of the twelve stations above are operated by the British Broadcasting Company, which holds exclusive concessions in Great Britain.

2,500 Radio Patents; 10,000 Rejected

WASHINGTON.

IN recognition of the great progress being made in radio, the Patent Office has created a new division to handle applications for patents on inventions dealing with it. The new division, known as the Radiant Energy Division, is headed by C. D. Backus, who for fourteen years has been in the Electrical Energy Division. Dr. William A. Kinnan, first assistant commissioner of patents, will supervise the new division. The new radio division has twelve examiners and is the farthest in arrears of any division in the Patent Office. It is hoped that with the change the Patent Office can catch up on radio inventions.

There are pending around 2,000 applications for patents on radio apparatus. To date, about 2,500 patents have been granted dealing with radio, while in the neighborhood of 10,000 applications have been turned down. There has been a tremendous increase in applications for radio patents during the last year.

For Maximum Amplification Without Distortion and Tube Noise

use the well known

Como Duplex Transformers

Push-Pull

Send for Literature.

COMO APPARATUS COMPANY

448 Tremont St. Boston, Mass.

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.

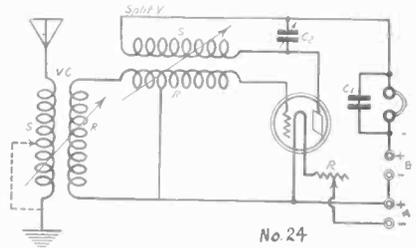
Radio Cross-Word Puzzle



ANSWER to last week's puzzle.

WHAT'S WRONG HERE?

THE wiring in the accompanying diagram is wrong. If you find what you think is the error, write to Wrong Diagram



Editor, RADIO WORLD, 1493 Broadway, New York City. Mention Wrong Diagram No. 24.

The names of those sending in the correct answers will be published.

- Wm. A. Mundhenk, 545 Terrace Ace., Cincinnati, Ohio.
- Evelyn Reynolds, Crook, Colo.
- S. C. Vasalli, 134 E. 17th St., New York City.
- F. W. McKenney, Box 79, Haverhill, Mass.
- Graham Jones, 222 So. Penna, Webb City, Mo.
- Ed. Harrison, 513 Madison Ave., Covington, Ky.

Amateurs to Meet in Paris Next April

WINNIPEG.

AN international congress of radio amateurs will be held in Paris next Easter, it was announced here at a convention of district managers of the Canadian branch of the American Radio Relay League. A resolution was adopted declaring that all amateurs should operate on a 125-meter wavelength for inter-station messages across Canada.

RADIO WORLD'S QUICK-ACTION CLASSIFIED ADS.

10 CENTS A WORD. 10 WORDS MINIMUM

LOW LOSS COIL WINDER—Wind your own Low Loss Basket Weaved Coils. For the Superdyne, Cockaday, Harkness, Neutrodyne, Tuned Radio Frequency Transformers, Oscillator, Wave-Traps, and all types of inductances. With full instructions, \$1.50. R. E. Lukatis, 2959 Webster Avenue, Bronx, New York City.

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.

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

RECEIVERS WITH TWO TUBES, batteries and phones, \$25.00. Lombardo, 143 Windsor St., Hartford, Conn.

KEEP YOUR KNIVES SHARP!—Use a genuine electric furnace abrasive oil whetting stone, fast cutting, self-cleaning. Send \$1.00 for Sharpening Stone No. 125, size 6x2x3/4 inches, sent postpaid. Howard Jones Distributors, 1328 Gladys Avenue, Cleveland, O.

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

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:

GROVER C. STONE
Architect

714 Union Street, New Orleans, La.

IT gives me pleasure to report that, having constructed the "Dandy 1-tube DX Set" as described by Herbert E. Hayden in the October 4 issue of RADIO WORLD, I have found the set to be all that Mr. Hayden claims for it and then some. My aerial consists of a wire in the attic of a two-story house, the wire not quite forty feet long. I am using a 199 tube. The only change I have made from Mr. Hayden's specification is to eliminate the shield and place the coil further back from the panel, using extension shafts for the dials. I find that hand capacity effects are not troublesome. I might add that my knowledge of radio is practically confined to looking at the diagrams and hooking up accordingly.

On Saturday, Nov. 1, 12 P. M. to 1 A. M., I got WSAI, WTAS, WLS, WQJ, WEBB, WJAX, WTAM, WCAL, WDAF. On Tuesday night, Nov. 4, 11 to 12, I got WBZ, KFKX, WOAW, WEBH, WLW, WTAM, WTAS. All of these stations came in with great clearance and most of them with fine volume. The Northfield, Minn., station came in very clear, as also did Springfield, Mass., which is stepping out a little on 1-tube with short aerial.

GROVER C. STONE.

U. S. Is Seeking Ways to Forecast Static

WASHINGTON.

FORECASTS of static, fading and other sources of natural interference loom as a possibility. Almost since the advent of radio, experts have believed that there is some relation between static and the weather. How definite the relation is remains to be determined. When it is fully known, it may be possible for the Weather Bureau or some independent agency to forecast static along the general lines of weather reports.

At the present time the connection between weather and static is so intangible that the only prediction authorities will make is along the general lines of this one by Dr. L. W. Austin, of the Radio Physical Laboratory, of the Bureau of Standards:

"We may be able sometime to forecast in a general way what radio reception conditions will be each day."

The possibilities for the improvement of radio reception through such a method are very great. If it can be worked out, radio fans may have before them, when they turn to their sets for entertainment, a chart or bulletin showing from which stations the best reception can be obtained.

A THOUGHT FOR THE WEEK

RADIO is great as far as it goes. Fortunately it takes in almost everything except Mars—and scientists are hoping.

INDEX TO VOL. 5, RADIO WORLD

A complete index covering all the articles that appeared in Radio World from Jan. 5 to Sept. 20, appeared in Radio World dated Oct. 18, mailed on receipt of 15c., or start subscription with that number. RADIO WORLD, 1493 Broadway, New York City.

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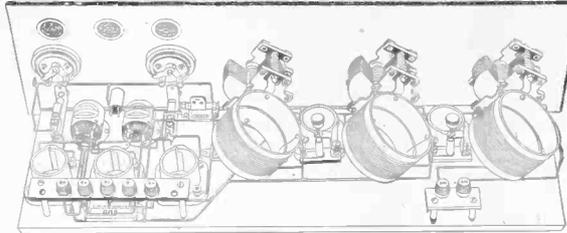
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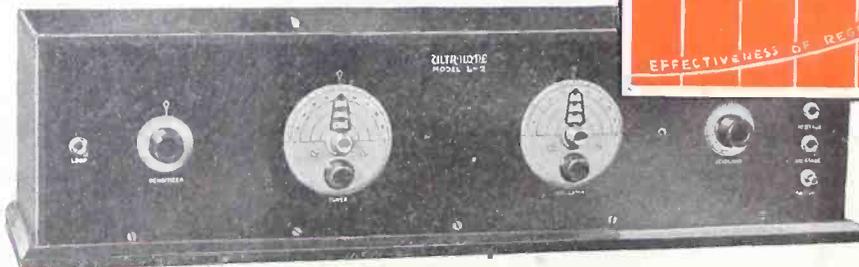
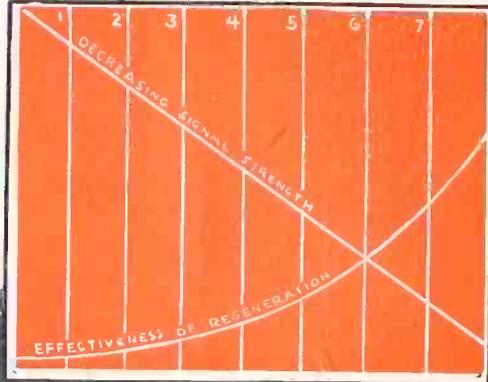
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