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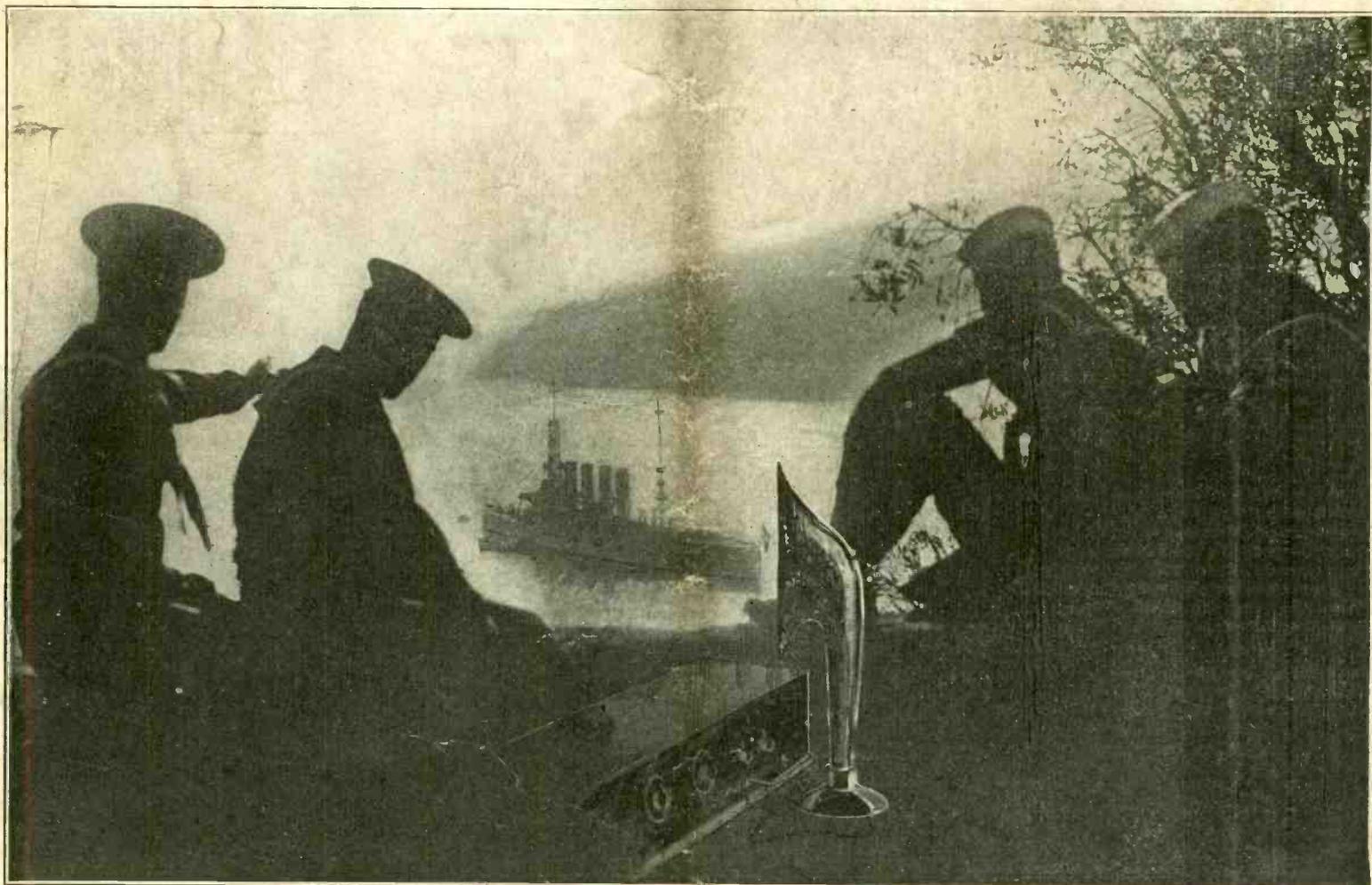
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Great Question and  
Answer Department

Vol. 6. No. 26. ILLUSTRATED. Every Week

A 4-TUBE, 3-CONTROL SET THAT  
GETS THE MOST DX

By LIEUT. PETER  
V. O'ROURKE



(Photo from Wide World)

UNITED STATES SAILORS enjoy radio as they view their ship in the Mediterranean.

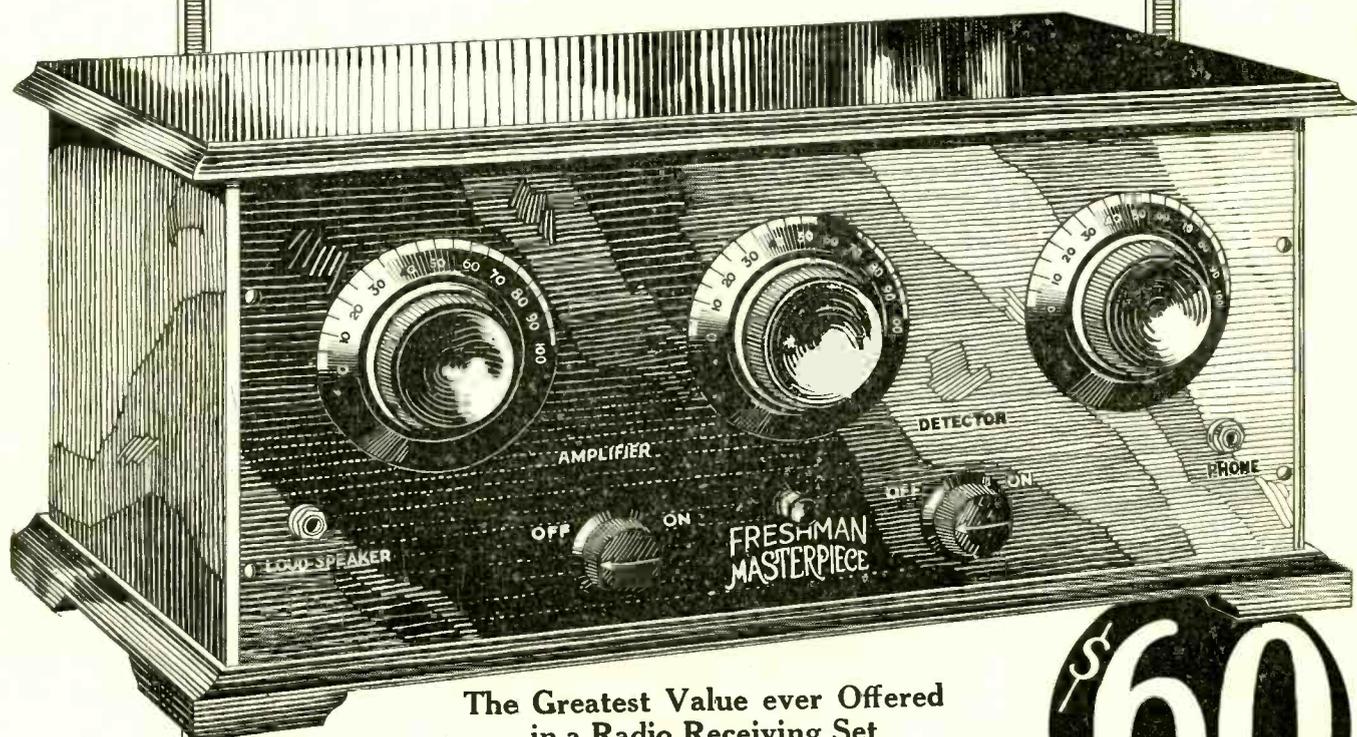
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**COILS:** Of the Low Loss type mounted so as to be out of the electrical field of the condensers.

**CONDENSERS:** Strictly Low Loss. Designed for straight line reading. No piling up of stations on the lower wave lengths.

**AUDIO - TRANSFORMERS:** This item and the variable condensers are manufactured by AIR SERVICE. We know they must be right.

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**SUB-BASE:** Mahogany in color and of a high quality of insulating material.

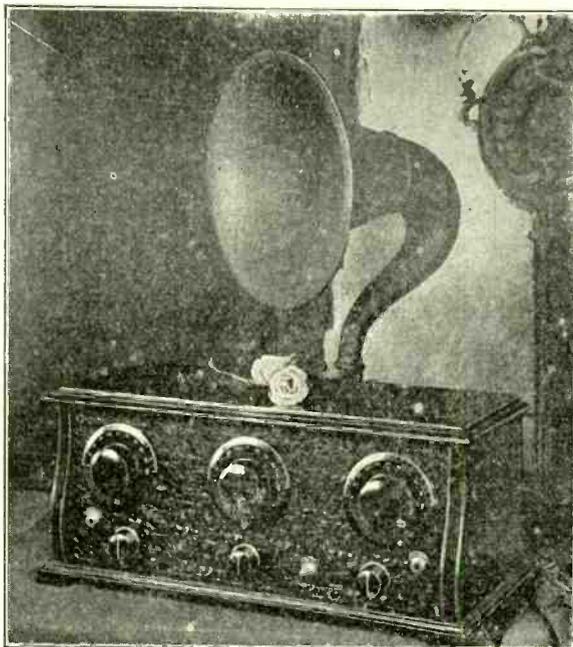
**FRONT PANEL:** Of the new frieze design. Adds to the beauty and general appearance of the receiver.

**CABINET:** Size 7 x 18 solid mahogany, of a high piano finish. Made of selected stock, 3/4 of an inch in thickness. (Note the difference between the quality of mahogany used in this cabinet and that of the type of so-called mahogany used in many cabinets of other makes.)

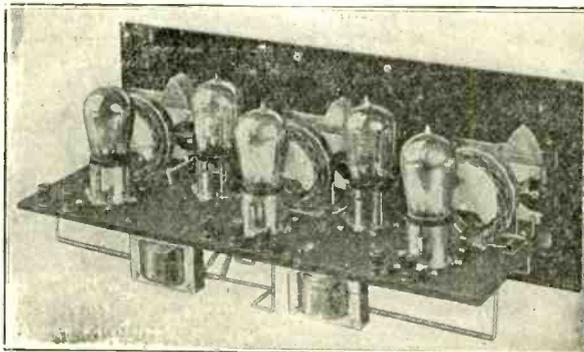
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**AMERICAN INTERSTATE RADIO SERVICE**

183-185 GREENWICH STREET

NEW YORK

# RADIO WORLD

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## The Most Efficient 4-Tube, 3-Control DX Set

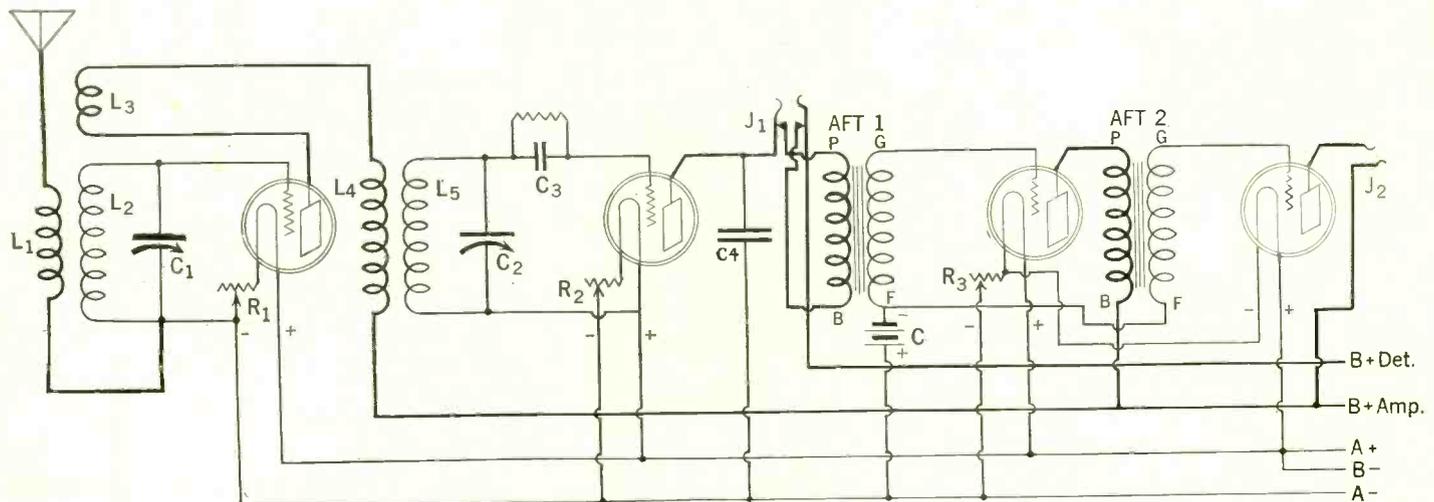


FIG. 1, schematic wiring diagram of the Great 4-Tube DX Circuit, comprising a stage of tuned radio-frequency amplification, regeneration, detector and two stages of transformer-coupled audio-frequency amplification. This set not only gets DX wonderfully but gives great volume and is wonderful in tonal quality.

By Lt. Peter V. O'Rourke

DOLLAR for dollar, tube for tube, the 3-circuit regenerative set represents a greater value than any other circuit. But after one has had this type of set for a while he longs for some added radio-frequency amplification. Thus he improves his set considerably, if he does the job right, for a stage of radio-frequency amplification will make distant signals much clearer and will bring in stations that the old set never was able to "land."



LIEUT. PETER V. O'ROURKE

There has been a lot of foolish talk in some circles about the impossibility of successfully combining radio-frequency amplification with regeneration. The fact is that the combination may be made with great success and little trouble. The resulting circuit is one which affords all the RF amplification that present-day tubes can stand. Hence if another stage of RF were added, making two in all, the results would be worse instead of better. Poorer tone, less distance, great instability and other vices ensue. Therefore when we have a stage of tuned RF and a tube detector, using the transformer coupling method, and include regeneration, we are as far as we can get without heterodyning. We at least equal the five tubes of the Neutrodyne and often come very close to the performance of the Super-Hetero-

dyne, even when the Super-Heterodyne is operated on an outdoor aerial. Moreover, on an outdoor aerial the Super-Heterodyne brings in considerable noise on some occasions. This does not happen with the 4-tube circuit presented herewith.

### Tuned RF is Better Here

Tuned RF is usually preferable to RF using peak transformers. The peak type is not tuned by a variable condenser, therefore needs no control. When several stages of RF are to be employed it is better to use the peak type (sometimes called untuned, or merely "transformers"). In the present circuit the tuned RF stage necessitates one control, the detector stage another and the tickler the third.

There seems to be little actual difference in results whether the regeneration is employed in the RF or in the detector stage. Some assert that radiation is somewhat reduced, due to the RF tube serving a blocking purpose, if the regeneration is used in the detector stage. Experience hardly bears this out. Local stations may sometimes be tuned in without either aerial or ground, hence if there is an unobstructed path for the reception of signals there would seem to be just as easy a path for the emission of the heterodyned note accompanying over-regeneration.

### Smoother Tickler Action

One condition that often exists when the tickler method of regeneration is used is that the feedback from plate to grid is controlled by a variation of the tickler dial over a very restricted range of settings. For instance, ten so-called degrees

of the dial may encompass the entire variation for the broadcast band. This is due largely to an excessive amount of wire on the tickler, that is, too much plate inductance. I believe that some commercial variocouplers have too many turns on the tickler. If you experience the trouble, short-circuit eight turns of the tickler coil, more if necessary, and see if you don't spread the regeneration control over fifty or more dial divisions. In that way critical tuning is avoided. Also the danger of flopping over or spilling, which causes squeals to go forth from the antenna into sets of listening neighbors, is minimized.

### Sodion Tube Good

For still greater facility in tickler variation the Sodion D21 tube may be used as the detector. It cannot be used as anything else. This tube requires a 20-ohm rheostat, which should be in the negative leg. Also, for this tube the grid return should be to the negative A battery, as in the case of the UV200 and C300. The Sodion uses .25 ampere, whereas the two others mentioned use a full ampere each. The Sodion is as good a detector as the others. Except for the detector tubes mentioned, the grid return should be to the positive A battery. All amplifier grid returns are to negative, either for RF or AF. The grid return is that connection of a coil whose other terminal goes to the grid.

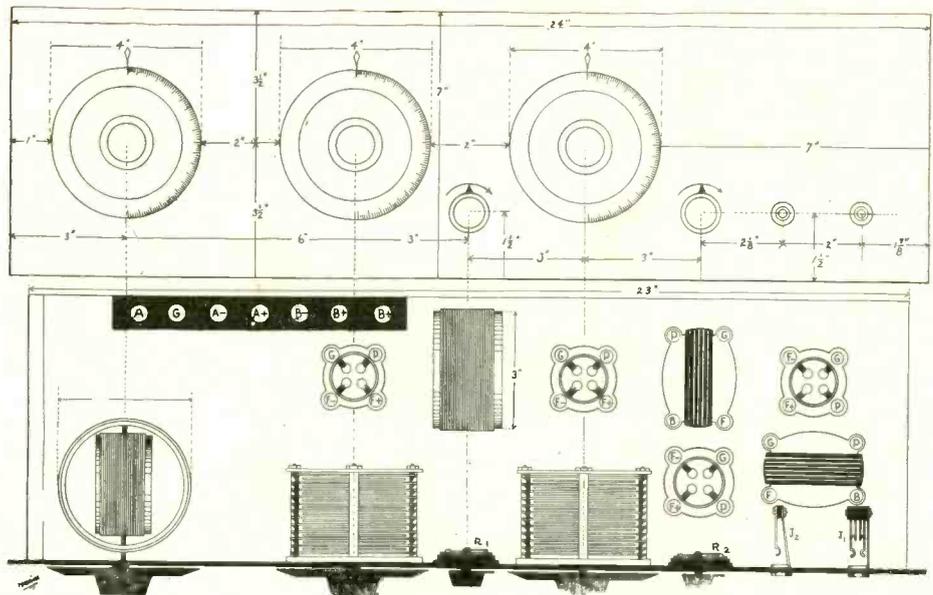
### Try 45 Volts on Detector

For greatest volume on most detector tubes, particularly the Sodion, 45 volts should be used on the plate. Always use

# Coils for the RF Regenerator

## List of Parts

- One 3-circuit variocoupler, L1L2 L3.
- One radio-frequency transformer, L4L5.
- Two .0005 mfd. variable condensers, C1, C2.
- One .00025 mfd. fixed grid condenser, C3, with clips for mounting the grid leak, 2 megohms.
- One .001 mfd. fixed condenser, C4.
- Two 15-ohm rheostats, R1, R2.
- One 6-ohm rheostat, R3.
- Two audio-frequency transformers (if different ratios are used, place the higher ratio in the first stage, AFT1).
- One 4½-volt C battery.
- Four standard tube sockets.
- Four UV201A or C301A tubes.
- One 7x24" panel.
- One 7x23" baseboard.
- One cabinet.
- One 6-volt storage A battery.
- Two 45-volt B batteries.
- One battery cable.
- One terminal block.
- Three 4" dials, one with vernier, for C2.
- Three silver dial pointers.
- One single-circuit jack (J2) and one double-circuit (J1).
- 100 ft. aerial wire, 50 ft. No. 14 insulated leadin wire, round tinned bus bar or No. 18 DCC wire for internal wiring, phones, speaker, solder, lugs, hardware.



FIGS. 2 AND 3, the panel layout and assembly plan of the Great 4-Tube DX Circuit that uses three-controls. The C battery may be placed at any convenient spot.

as high a plate voltage in any stage as is consistent with good reception. A good rule to follow is to use as little filament voltage and as great plate voltage as possible. The high plate voltage tends to prevent overloading of the tubes.

The Sodian tube, by the way, may be successfully operated without any grid leak. In two that I tried a leak seemed necessary, but in several others the results were far better, especially on stations 1,500 to 2,000 miles away, when no leak was used. These stations were heard on a speaker in New York City while the locals were transmitting. **The set is unquestionably one of the best DX sets that can be built and represents the most that can be accomplished with four tubes.**

Using two low-loss condensers of .0005 mfd. maximum capacity, normally 23 plates, and good coils, there need be no misgivings about the wonderful tone, volume and distance to be obtained from this most efficient 4-tube circuit.

### Data on the Coils

The aerial variocoupler L1L2L3 may be wound on a 3½" diameter tubing, and consist of 51 turns of No. 20 double silk covered wire, tapped at the tenth turn. The ground and filament are connected to the tap. The other RFT, L4L5, would comprise a 10-turn primary wound with the same kind of wire on the same size tubing, this being L4, the primary, while the secondary, L5, would comprise 41 turns. All windings are in the same direction, including the tickler, L3, which is wound with No. 24 single silk covered wire on a 2¾" diameter tubing, 2" high, twenty turns being put on. The other tubings are 4" high. The secondary of the transformer is wound as close as possible to the primary, which is next to it, on top of the tubing.

Spider-web coils may be used, 45 turns of No. 20 double cotton covered wire con-

stituting the secondaries and eight turns the primaries, which are wound in the center of the form, after half the secondary is completed. The primary and secondary wire are wound simultaneously, side by side. The tickler would comprise 26 turns of the same kind of wire and of course some means of varying the coupling would have to be devised. The spider web forms have a 5½" outside diameter and a 2" core diameter, with 13 or more spokes. Always the spokes or arms must be odd-numbered.

### Making Basket-weave Coils

Basketweave coils are better than spider-web. If the Lorenz or basket type is to be used, draw a circle 3" in diameter and divide into fifteen equal arcs. Each chord will subtend a 24-degree angle. The distance between points will be 5/8", hence a ruler may be used for the purpose of registering these 15 points. A 4" square wooden base is used and ¼" holes drilled at the 15 points, dowels of the same thickness being inserted. If they do not remain upright, that is, perfectly at right angles, glue the dowels in place. They should be 4" high. They are inserted at right angles to the flat surface of the wooden base. Almost any hardware store sells the long dowel sticks, several long ones for a quarter. Saw them into the lengths you desire. Using No. 18 double cotton covered wire, wind 67 turns, tapped at the fifteenth turn, this constituting L1L2, where L1 is the 15 turns and L2 the remaining 52. For L4L5 wind fifteen turns, simultaneous and side by side with as many turns of the secondary, which consists of 52 turns. Thus two wires are wound at the same time, side by side, for fifteen turns, then only one is continued on, and that until 37 more turns are put on, making a total of 15 plus 37, or 52. The close coupling is advisable, as it tends toward stability in the operation of the set, without adversely affecting selectivity. The tickler would consist of a spider-web coil, 24 turns on a 3" outside diameter form, or, if basket wound, of 20 turns. In either case for the tickler use No. 24 single silk covered wire.

Those not familiar with the making of basket-weave coils will find Herbert E. Hayden's article, illustrated with photographs, very helpful. It was published in the January 10 issue of RADIO WORLD.

Some may notice that different kinds of wire are recommended in several cases;

this is due to technical reasons affecting inductance as based on diameter-axial length ratios, where tubings or other cylindrical windings are used. As no formulas exist for spider-web coils, general experience and practice were consulted in reaching the conclusions bearing thereon. In the case of the tickler small wire is used, but no one need ever worry about the resistance of tickler wire, as there are 20,000 ohms of it in that part of the circuit (forgetting the first audio primary), and 20 or 30 ohms more make no difference in results.

### Distinguishing Terminals

In making any of these coils, where it is necessary to distinguish primary and secondary terminals, tie thread to the respective beginnings (one terminal of one coil and a corresponding terminal of the other winding), or slightly color these two. Where primary is wound with secondary at one end of a tubing or other form, the filament is to be connected to the secondary terminal at that end, and so is the ground to be connected to the corresponding terminal, or, in the case of interstage coupling, the B battery connects to that terminal. Thus, if a coil is standing on its circumference, with the secondary clearly in view, and the primary wound near the top of the form, or interwoven with the secondary or wound right over it at that end, the connections would be: top terminal of primary to ground or B plus (depending where the coil is used); other terminal of primary (lower) to aerial; top of secondary to grid, end or bottom of secondary to filament. The rule is: Where two terminals of respective coils come near or close together, the pair connect to corresponding potentialals. Ground, A battery and B plus are low potential. Aerial, plate and grid are high potential. Hence, you may select any terminal of any coil for a certain connection, but from that point on be careful to keep like potentials together. That will necessarily throw two like potentials to the extreme ends of the inductance, but it does avoid clashing low and high potentials, which means avoiding losses (e. g., plate and A battery, aerial and B battery).

### Commercial Coils to Use

Several commercial types of coils function excellently in this circuit, for instance the couplers and radio-frequency transformers made by Wallace Radio Co., Eastern Coil Co. (pickle bottle); Bruno

# A Home-Made Variable Leak

By **Herbert E. Hayden**

Illustrations by the Author



FIG. 1, the parts used. The flashlight bulb is shown at left in its porcelain socket. Both socket and bulb are used in the construction. The dial is affixed to the dowel stick, while the bushing, at extreme right, aids in obtaining security for the completed mounted instrument.



HERBERT E. HAYDEN

THE MANUFACTURE of a variable grid leak is an undertaking for skilled hands, for it is important that the resistance variation be smooth and that the resistance shall not change much due to the ageing and to atmospheric conditions. Therefore the making of a variable grid leak at home requires some care. However, it can be done, and I feel sure that fans will be satisfied with the results if they make a variable leak on the style of the one shown in its progressive stages of development in the accompanying photographs.

### Value of Variable Leak

The value of a variable grid leak, especially in regenerative sets, has long been recognized. Indeed, the tube itself determines the resistance necessary in the leak, hence it is well, for best results, to use a variable grid leak under any conditions. It isn't that a variable leak is better than a fixed one, but to determine just the right resistance requires an assortment of fixed leaks, whereas a variable leak enables a quick determination of the proper setting, and once that setting is found it remains thus for quite a while.

One qualification is that time may require a change in the setting of the leak. Do what you will you can not make a variable resistance at home that will hold a satisfactory setting for many months. But it is no trouble to change the grid leak setting every few weeks. Indeed, it is of some benefit to have the leak on the panel, so that it may be conveniently varied at any time.

### What Grid Leak Does

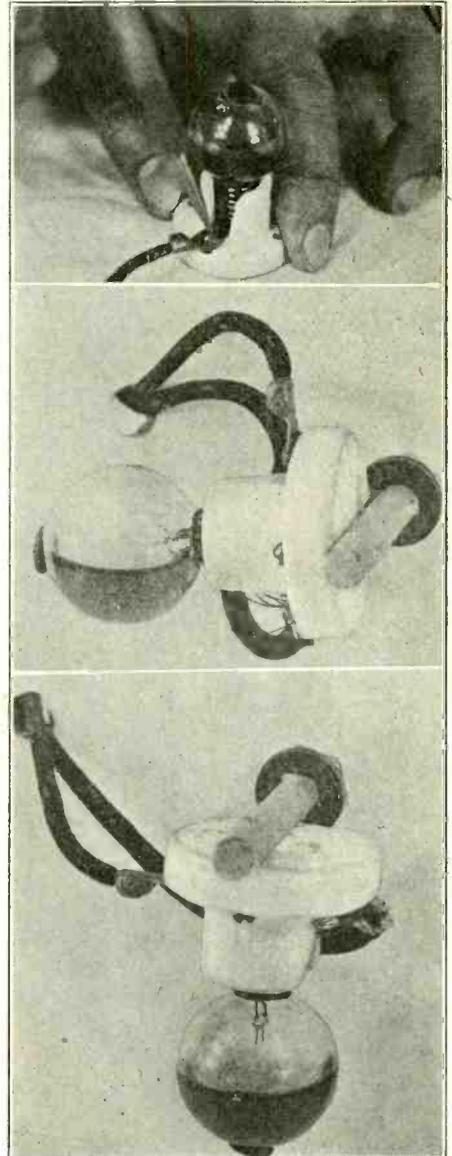
The purpose of the grid leak is to permit excessive negative charges of electricity that accumulate on the grid to leak off, so that the tube will function at the peak of its efficiency. This accumulation takes place with almost incredible rapidity and the leakage path must be sufficiently "open" to permit the excess negative charges to make room for the useful ones that at the next cycle will be trying to crowd their way to the grid of the tube. This freedom from excessive negative charge is essential to proper detection of signals, although it does not figure in radio-frequency or audio-frequency circuits. In those instances the grid usually has no leakage path, excepting of course if resistance-coupled amplification is used. However, it must be remembered that just as there are stray magnetic and capacitive couplings in circuits, so there are stray paths of leakage, as in transformer secondaries in which grid leads are connected.

### Improved DX Reception

I tried the leak shown in the photos and greatly improved reception I was enjoying in my home in Brooklyn from the Fleetwood Hotel, Miami, Fla. It is well to test out a tube for best grid leak value by using a distant station as your guide, for if the DX stations come in well you will have no trouble with the locals.

### Material Easy to Get

You don't need any extraordinary apparatus to make one of my variable grid leaks. In Fig 1 you see a dial, a rod, a



FIGS. 6, 7 and 8 (top to bottom) with a clear view of the difference angle that changes the resistance value of the leak.

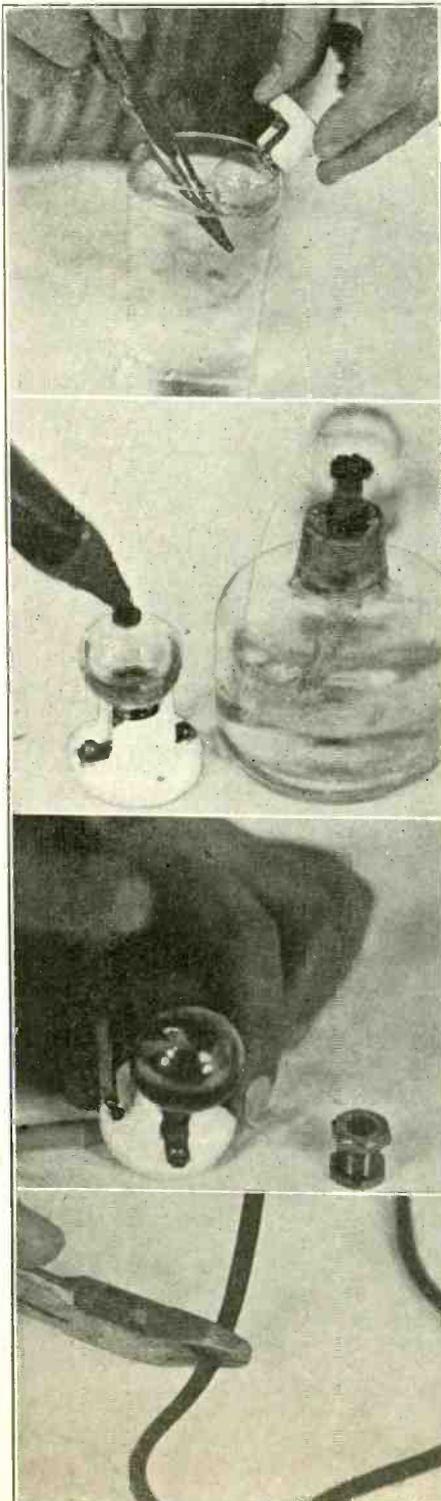
bushing, a socket and a lamp. These play their important parts in the manufacturing operation. The resistance we will use will be water. I found it efficient, even the plain water from the hydrant, although distilled water, such as is used in your storage battery, will be better, because it is free of iron impurities. Nevertheless I still insist that just everyday water will do the trick nicely. Water that is good enough for you to drink is good enough for your variable grid leak on this occasion.

### What the Bulb Is

The lamp or bulb used is such as you find in flashlights. If you have such a burnt-out bulb, press that into service. If you haven't you can purchase a new bulb in any electrical store. It is the kind fed by a 1½-volt battery. Do not use a radio tube.

### Introducing the Resistance

Get a tumbler, such being the fancy name for a drinking glass, and nearly fill it with water. Then immerse the bulb in the water, with the tip down. Be sure that the tip is at least 1" deep in the water. Then, using a pair of pliers carefully break the tip, but so as to remove as little glass as possible. As the bulb was a vacuum the breaking of the tip will destroy the vacuum and the water will rush into the lamp. This is the pres-



FIGS. 2, 3, 4 and 5 (top to bottom), showing progressive stages.

# How Hayden Grid Leak Works

sure action that must follow the destruction of the vacuum. The lamp will not completely fill up with water. Just leave as much water in the lamp as naturally is pushed into it, which will be about one-half the cubic contents of the bulb.

The operation of immersing the bulb and breaking the tip is shown in Fig. 2 while Fig. 3 depicts the next step, the resealing of the bulb. Some sealing wax is used for this purpose. It is dropped right on the tip. Be sure to cover up the tiny hole completely. After the sealing wax is applied, turn the bulb upside down and make sure that no water is escaping. If any does get out then you will have to make a fresh application of sealing wax. Unless this sealing is properly done you will not have a satisfactory variable grid leak.

In Fig. 3 the alcohol lamp used to heat the sealing wax is shown, but a match will serve the purpose just as well.

Now look at Fig. 4. You will see that connection is being made to the two points where the filament leads of the bulb are brought out. These filament leads play an important part indeed in the construction and operation of the leak. A wire is connected to each binding post. As there are two such posts (formerly connected to negative and positive filament respectively) there will be two wires. It is convenient indeed to use telephone cord. This is insulated and is very pliable, being made of tinsel. Stiff wire will not do, for the variation of the leak will necessitate some movement of the wire, and it is far better to use wire that smoothly responds to movement. As the telephone cord has two wire leads it is easy to snip the wire with a pair of cutters and bring out the leads for fastening to the binding posts of the lamp socket. The insulation is removed from the four wire terminals.

Fig. 5 shows the telephone wire being snipped. Fig. 6 depicts the careful affixing of one of the wire leads to a binding post, the lead terminal being soldered to a lug. For greater security of contact and best electrical results it is far preferable to use a soldered lug connection than to twist the bared wire around the binding post and uncertainly tighten down on the screw.

Fig. 7 shows clearly how the bulb is half full of water. The bulb is in the socket, the wire leads are fastened to the socket and the socket is bound to the 3" high dowel stick,  $\frac{1}{4}$ " thick. I used tiny screws for this purpose, first drilling two holes in the dowel stick, then passing a machine screw through each hole and securing the screw with a nut. The two screws used will be passed through the to socket apertures and through the two corresponding holes in the dowel stick. But any other good method of affixing the socket to the stick (or the stick to the socket, if you prefer to look at it that way) will do nicely.

Fig. 8 shows how the leak is dipped. Comparing Fig. 7 and Fig. 8 you have a 90-degree variation. The leak varies in resistance according to the amount of filament that is immersed in the water. The variation is from about 250,000 ohms. to 6,000,000 ohms. (.25 to 6 megohms), all that is needed.

How the leak works is shown clearly in Fig. 9. Here you see the leak mounted on the panel, with a dial to actuate it. A very small dial may be used. The dowel is supported by a bushing on which is a locknut, thus putting this leak in the famous single-mount class.

As you dip the leak, that is, turn the dial, you immerse more or less of the filament. One of the wires that you see in Fig. 9 is connected to the grid post of

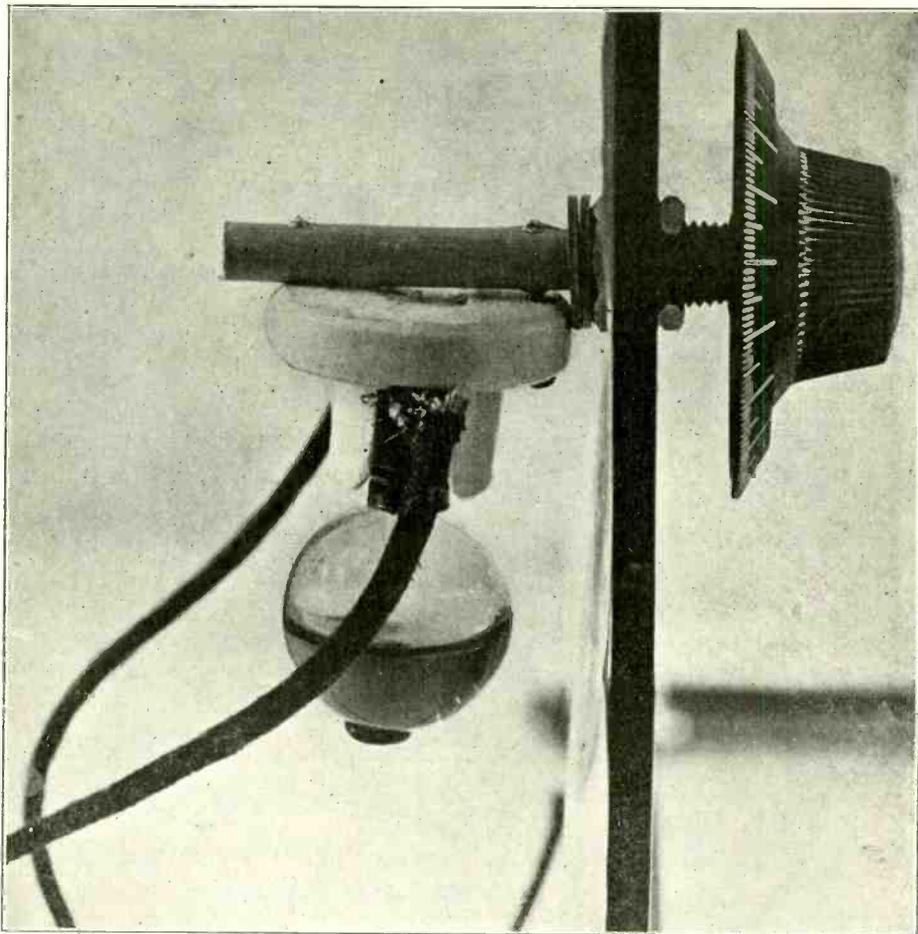


FIG. 9, Hayden's variable grid leak as it looks in completed form when mounted on the panel, with dial affixed.

the detector tube socket. Make sure that this connection is to the grid post, not to the other side of the grid condenser, for this error is common. The remaining unconnected wire goes to the positive A battery.

You will see from Fig. 9 how I used two washers to take up the space between the nut on the back of the panel and the circumference of the socket at its point

nearest the back of the panel. This makes for security. The dial is affixed right to the wooden rod in the usual manner by tightening the dial setscrew. The advisability of using flexible wire, as suggested, is apparent when one visualizes the action as depicted in Fig. 9 and realizes how these wires have to move.

The device is a handy one indeed and it worked to my satisfaction.

## Money for Extra Inspectors Denied by Committee

By Thomas Venson

WASHINGTON.

**T**HE House Appropriations Committee has rejected the recommendation of President Coolidge, Secretary Hoover and the Budget Bureau that an additional sum of \$125,000 be appropriated to increase the radio inspection force.

Martin B. Madden, Republican, Illinois, chairman of the House Appropriations Committee, objected to the additional appropriation, and enough of his colleagues joined with him to dictate the committee's refusal.

"It is not a matter of economy with us at all," Mr. Madden told me. "It is the principle. The Department of Commerce wants this money to regulate receiving sets, which would be unconstitutional."

The recommendation for the additional appropriation was sent to Congress by the Budget Bureau at the request of President Coolidge and Secretary Hoover. The proposal was taken up at a session of the

Committee at which testimony was given by Deputy Commissioner A. J. Tyrer, of the Bureau of Navigation, and Chief Radio Supervisor W. D. Terrell.

### What Polarity Is

**P**OLARITY is the name given to the terminals of a battery, and is either positive or negative. A volt-meter is also a polarity indicator, as it shows by the direction the indicating needle moves whether one or the other terminal is positive.

A simple polarity indicator can be made with a glass of salted water. When the wires are dipped in the water the negative side will give off bubbles.

### THE IDEAL COILS FOR BEST CIRCUITS

Described by J. E. Anderson, with full winding directions, in March 7 and 14 issues. Send 30c, get both. RADIO WORLD, 1493 Broadway, New York City.

# BROADCAST PROGRAMS

(Wavelengths in meters; Eastern, Central, Mountain and Pacific Standard Time specified.)

## Friday, March 20

**CKAC, Montreal, Can., 411 (E. S. T.)—1:45 P. M.**, luncheon concert from the Windsor Hotel. 4:30, No lessons.

**KOA, Denver, 323 (M. S. T.)—12:20 to 12:50 P. M.**, organ. 1:00, N. Y. stock reports (2 o'clock quotations); live stock; fruit and vegetable report and weather. 3, half hour matinee for housewives. 6, final reading, N. Y. stock reports; live stock; vegetables and late news bulletins. 6:40, Book of Knowledge program (questions and answers). 8, ten minutes of music by Fred Schmitt and his Rialto theatre orch., Denver. 8:10, studio program, piano numbers by pupils, mixed quartet; address: "Music in the Life of the Child," by Mrs. Frederika H. Wadley, and KOA orch. selections.

**WEEL, Boston, 303 (E. S. T.)—12:15 P. M.**, Lenten service direct from B. F. Keith's Theatre under the auspices of the Greater Boston Federation of Churches, People's Baptist Church Choir. 2, Happy Hawkins and his orchestra. 6:30, Big Brother Club. 7:30, program courtesy Whiting Milk Company. 8, program courtesy Neapolitan Ice Cream Company, Neapolitan Male Quartet. 8:30, Sadrian Trio. 9, Broderick's Orchestra of Lowell. 10, organ recital from the Boston Chamber of Commerce; Louis Weir, director.

**WFAA, Dallas, Tex., 476 (C. S. T.)—12:30-1 P. M.**, address, Dr. Robert Stewart Hyer, president emeritus of Southern Methodist University, on the Sunday school lesson. 4:30-5, woman's hour, with music, reading and talk. 6:30-7:30, Vesper recital by Jack A. Davis, pianist. 8:30-9:30, Municipal Band from Plano, Texas; Dr. C. J. Hicks, manager.

**WWJ, Detroit, 352.7 (E. 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" and a special talk by the Woman's Editor. 9:45, Public Health Service bulletin and talks on subjects of general interest. 10:25, official weather forecast. 11:55, Arlington time relayed by the Western Union. 12:05 P. M., Jules Klein's Hotel Statler orch. 3, Detroit News orch. 3:50, weather. 3:55, market reports. 6, dinner concert. 8, Detroit News orch. 9, Jean Goldkette's Victor Recording orch.

**KPO, San Francisco, 423 (P. S. T.)—7 A. M.**, "Daily Dozen" by Bernard Drury, piano accompaniment by Mel Lyons. 10, chat for the housewives on "Home Making" by "Prudence Penny" of the San Francisco Examiner. 10:30, "Ye Towne Cryer" News bulletins. 10:40, "What is playing at the Local Theatres." 11:50, market report on eggs, butter, cheese and poultry. 12 noon, time signals from the Naval Observatory; reading of the scripture. 1 to 2 P. M., Seiger's orch. 12:45, Commonwealth Club luncheon speech, broadcast from the Palace Hotel. 4:30 to 5:30, Seiger's orch. 8 to 10, orch., presented by the direction of Wilt Gunzendorfer.

**WLW, Cincinnati, O., 423 (C. S. T.)—10:45 A. M.**, weather forecast and business reports. 11:55, correct time. 12, physical exercises from the Central Y. M. C. A.; William Stradtman, instructor. 12:15 P. M., dance program by the Ahaus Brunswick Shop orch.; William Cook, director. 1:30, business reports and stock quotations.

**KTHS, Hot Springs, Ark., 374.8 (C. S. T.)—8:30 to 9 P. M.**, selections by Fischer orch. trio. 9 to 10, program by the Meyer Davis-New Arlington Ensemble. Jacques Renard, director.

**WEMC, Berrien Springs, Mich., 286 (C. S. T.)—9 P. M.**, Radio Choir in "Famous Reformation Hymns"; Miss Opal Hoover, saxophonist; Bible chat, Fred Mote.

**KNX, Los Angeles, Cal., 337 (P. S. T.)—11:30 A. M.**, Estelle Lawton Lindsay's talk to women. 1 P. M., N. D. Garver, chief testing engineer of KNX. 6:30-7:30, dinner hour program. 8:10, College Frats program. 11-12, Lyman's Coconut Grove orch.

**KGW, Portland, Ore., 491.5 (P. S. T.)—11:30 A. M.**, U. S. weather forecast. 12:30 P. M., concert by Rose City Trio by courtesy Pacific States Electric Company. 5, children's program. 6, dinner concert. 7:15, market, weather, and news bulletins, and police reports. 8, lecture sponsored by University of Oregon Extension division. 10:30, Hoyt Owls.

**KFAE, Pullman, Wash., 348.6 (P. S. T.)—Soprano solos, Vera Bohke, Grandview; violin solos, Marguerite MacLachlan, Dayton; Keeping rabbits, Charles Stone; what is worth seeing in Paris, Prof. Carl M. Brewster; controlling disease helps marketing, George L. Zundel; planning spring pageants, Prof. M. L. Daggy. book chat, Alice Lindsay Webb.**

**WBAP, Forth Worth, Texas, 476 (C. S. T.)—12:05 to 12:30 P. M.**, Ward's "Trail Blazers," playing in their studio. (W. E. B.) 4, educational lecture; weekly book review by Peter Molyneaux. 7:30 to 8:30, Wagner's Old Time Fiddlers. (C. B. L.) 9:30 to 10:45, program presenting artists of Texas Woman's College. (W. E. B.)

**WEAR, Cleveland, Ohio, 390 (E. S. T.)—7 to 8 P. M.**, program by Alumni of Akron University. 8 to 10, program from the studio; International

## Torrence on Air



**ERNEST TORRENCE**, whose great work in "The Covered Wagon," notable movie, was appreciated throughout the land, was featured at WNYC when the Rialto Theatre program was on the air at the New York Municipal station.

Quartet; Florence Wasson, soprano; James Blair, bass; Marie Simmelink, contralto; Sam Roberts, tenor; Mrs. J. Powell Jones, accompanist; Rudolph Ringwall, violinist; Budd Cross, pianist.

**KGO, Oakland, Cal., 361 (P. S. T.)—11:30 A. M.**, to 1 P. M., luncheon concert, courtesy Pacific States Electric Company. 1:30, N. Y. and S. F. stock reports and weather. 3, studio musical program and speaker. 4 to 5:30, concert orch. of the Hotel St. Francis, San Francisco, Vinton La Ferrera conducting. 6:45, final reading, stock reports, weather, S. F. produce news, and news items. Silent night.

**WOS, Jefferson City, Mo., 440.9 (C. S. T.)—8 P. M.**, address: "Sowing Alfalfa in Springtime," by Samuel M. Jordan of the Missouri State Board of Agriculture; original poems by LeRoy H. Kelsey, secretary to Governor Sam A. Baker, called the "Edgar A. Guest of Missouri"; St. Pat's Ball, Missouri University, Columbia.

**WCAL, Northfield, Minn., 336.9 (C. S. T.)—9:45 A. M.**, St. Olaf College chapel services. 8:30 P. M., book talk, by Dr. George Weida Spohn, head of the department of English at St. Olaf College.

**WGN, Chicago, 370 (C. S. T.)—9:31 A. M.**, time. 9:35, stock and farm quotations. 10, wheat. 10:30, wheat and cable reports. 11, wheat, weather, dairy reports. 11:30, wheat, grain and livestock receipts. 11:56, time. 12, wheat, board of trade. 12:10 P. M., board of trade quotations; hog sales. 12:35, Tea Room orch. 1, wheat. 1:05, Tea Room orch. 1:35, readings. 1:40, Drake concert ensemble and Blackstone string quintet. 2:30, musical recital. 3, miscellaneous entertainment. 5, stock exchange and market. 5:30, Skeeex time for children. 5:57, time.

**WGR, Buffalo, N. Y., 319 (E. S. T.)—10:45 A. M.**, Gold Medal home service talk by Betty Crocker. 6:30-7:30 P. M., Buffalo Trust hour. 8-9, "Madame Butterfly," educational opera entertainment by the Radio Opera Educational Booklet. 9-10, University of Buffalo Musical Organization. 10-11, Larkin string orch.

**KYW, Chicago, Ill., 536 (C. S. T.)—6:30 A. M.**, exercises. 9:30, news markets. 11:35, table talk by Mrs. Anna J. Peterson. 6 P. M., markets. 6:35, bedtime story, "Uncle Bob." 7, Joska DeBabery's orch. 7:10, Coon-Sanders Original Nighthawks. 7:20, Joska DeBabery's orch. 9, midnight revue.

**KDKA, East Pittsburgh, Pa., 309 (E. S. T.)—7 A. M.**, exercises. 8, exercises. 9:45, markets. 11:55, time. 12 M., weather; markets. 12:20 P. M., Sunday school lesson. 3:30, quotations. 7:15, markets. 7:30, The Radio Rhymster. 7:45, "How Costs Control Prices" by Marcus Rauh. 8:15, "Brittania Rules the Novel," Mr. Frederick P. Mayer. 8:30, special program. 9, Reick-McJunkin program. 9:55, time; weather.

**WNYC, New York City, 529 (E. S. T.)—7 P. M.**, Collegiate Ramblers. 7:30, police alarms. 7:35, resume of meeting of Board of Estimate. 7:55, Collegiate Ramblers. 8:15, Colonel James Churchward, "Coal." 8:30, Joseph M. White, tenor. 9, Max Bendix, violin; Francesca Marni, soprano; Carl Hahn, cello; Carl Bruchhausen, piano. 10:10, Professor J. G. Carter Troop, "The Biglow Papers." 10:30, police alarms; weather.

**WHN, New York City, 360 (E. S. T.)—2:15 P. M.**, Frank Bacon, bass baritone. 2:30, Chicago orch. 3, Sholl and Spaulding, songs. 3:45, Blanche Vincent and Jack Fagan, singers. 3:55, Bernard

Seaman, pianist. 4:05, Ray Raymond, songs. 4:15, the poets by NTG. 4:20, Judith Roth, songs. 4:30, Uncle Robert, with Norman Sternberg, child singer. 5, Phil Cole's Nebraskans. 6:30, violin solos by Olcott Vail. 7, Harry Richman and his entertainers, Eddie Elkins and his orch. 7:30, health talk by Dr. Landis. 7:35, Geo. Olson and his music. 8:05, fashion, by Mme. Belle. 8:15, Antonio Augenti, tenor. 8:25, Samuel Shankman, pianist. 8:35, Bernie Grossman and Nat Osborne, songs. 8:50, Ruth Gallen, contralto. 9, "The Lure of Maine," by Dr. C. C. Little. 9:10, Venita Pomfert, soprano. 9:20, Jimmy Flynn, tenor. 9:30, Crystal Palace orch. 10, White Way entertainers. 10:25, "Storage Batteries," by H. B. Shontz. 10:30, Roseland dance orch. 11, Everglades revue. 11:30, Club Alabam orch. 12, Parody Club orch.

**WBZ, Springfield, Mass., 333 (E. S. T.)—11:55 A. M.**, time; weather; market. 7 P. M., market. 7:05, bedtime story.

**WOC, Davenport, Ia., 484 (C. S. T.)—12:57 P. M.**, time. 1, weather. 2, quotations. 3, "Home Management" schedule, by "Aunt Jane." 4, Dart's Troubadours. 5:45, chimes. 6, police reports and bulletins. 6:30, bedtime stories by Val McLaughlin. 6:50, "The Care of Farm Machinery," by Carl H. Gamble. 8 (1 hour), Davenport zither club; weather after 9.

**KHJ, Los Angeles, Cal., 405.2 (P. S. T.)—12:30 to 1:30 P. M.**, news and music. 2:30 to 3:30, program of Electric Co. 6 to 6:30, Hickman's orch. 6:30 to 7:30, children's program. 7:30, Gladys DeWitt, "The Romance of the Santa Fe Trail." 8 to 10, program of Auto Supply Co. 10 to 11, Hickman's dance orch.

**WIP, Philadelphia, Pa., 509 (E. S. T.)—10 A. M.**, menu and intimate talk to housewives. 1 P. M., Gimbel Tea Room orch. 1:30, weather. 3, Margaret Anders, contralto; Robert Herzog, violinist; Elizabeth Broadbelt, pianist, and Flora Ripka, accompanist. 4, "An Unfrequented Corner of Wales," Dr. Emory R. Johnson. 6, weather. 6:05, popular numbers. 6:15, Harvey Marburger vaudeville orch. 6:45, market report. 7, bedtime story.

**WGBS, New York, 316 (E. S. T.)—10 A. M.**, timely talks with Terese. 10:10, Hattie Strauss, mezzo soprano. 10:20, dressmaking lessons, Mabel A. Burgess. 10:30, Hattie Strauss, mezzo soprano. 10:40, Lillian Regan, fashion talk. 10:50, Hattie Strauss, mezzo soprano. 1:30 P. M., Scripture reading. 1:35, orch. 3, interview with Adele Klier, actress, and David Robinson. 3:10, Lillian Price, mezzo soprano. 3:20, Dr. A. H. Appelman. 3:30, Lillian Price, mezzo soprano. 3:40, Dr. Alfred G. Robyn, harmony and composition. 3:50, Lillian Price, mezzo soprano. 6, Uncle Geebee. 6:30, Herman Bernard, managing editor, RADIO WORLD, discusses "Radio Hookups." Mr. Bernard is on the air at this station every Friday at 6:30 P. M. 6:40, Larry Funk orch.

**WJZ, New York, N. Y., 455 (E. S. T.)—12 M.**, Brick Church. 1 P. M., Hotel Ambassador trio. 4:30, Hotel Ambassador tea music. 5:30, agricultural reports; market reports; closing quotations. 7, Hotel Commodore dinner concert. 8, "Wall Street Journal" review. 8:10, "Psychology," Dean James E. Lough. 8:40, Harry J. Coffey, tenor. 9, Looseleaf Current Topics. 9:15, U. S. Navy night. 10:30, Beaux Arts orch.

**KOB, State College, N. M., 348.6 (M. S. T.)—7:30 P. M.**, popular science course, "The Datil and Gila National Forests," Mr. John D. Jones; musical numbers.

**WQJ, Chicago, Ill., 448 (C. S. T.)—11 A. M.**, Sunday dinner menu. 3 P. M., "Lenten Menus"; Wynn Ferguson, "Bride Lessons"; Mrs. Harry T. Sanger, "Travelogue," "Alaska." 7, Rainbo Garden orch. Herman J. Techantine, baritone; Edith Phillips Heller, piano; Henrietta Nolan, violinist. 10, Rainbo Skylarks; The Rogers Boys; West Brothers, guitar duets; Lauretta Giles, soprano; Nate Caldwell, pianologues; Zeigler Sisters—Pauline and Sarah. 1 to 2 A. M., The Hotsy Totsy Hour.

**KFNH, Shenandoah, Iowa, 266 (C. S. T.)—6:30 P. M.**, band concert. 8:30, Plano revelers.

**WAAM, Newark, N. J., 263 (E. S. T.)—11 A. M.**, Radio Cooking School. 11:30, happy hour. 7 P. M., sports, Major Tate. 7:15, Jolly Bill Steinke's "Scotch Night." 8, home and heart problems, Ledger Lady. 8:15, Dick Finch and Ben Friedman. 8:30, Hilda White Kiernan, a radio trick. 9, memories, the Voice of the Music Box. 9:15, Egyptian Six orch. 10, Victor Wilbur, tenor; Jack Broderick, piano. 10:15, Egyptian Six orch. 10:30, Elizabeth Town Players.

**WEAF, New York, 492 (E. S. T.)—11 A. M.**, musical, "Care of the Lawn," Leonard Barron; Health Speakers' Service; market and weather. 4 P. M., Moonlight Instrumental trio; wrinkles, by Elizabeth Arden; C. Grace Little, baritone; talk for children, by Bryce Ramsay. 6, music; Hotel Waldorf-Astoria; health talk, by Dr. Geo. David Stewart; Premier Male quartette; "Sir Hobgoblin Takes a Ride," by Blanche Elizabeth Wade; Estelle Burns Rowe, dramatic soprano; "The Happiness Candy Boys"; Rutgers's College Musical clubs, from Hotel Waldorf-Astoria; Frank Adams, organ recital; Meyer Davis' Lido-Venice orch.

**WFBH, New York, 273 (E. S. T.)—2 P. M.**, lives of great men, Jack Niles. 2:30, Alvin E. Hauser, piano. 3, psychology of personality, Mrs. Owen Kildare. 3:30, Mrs. Theresa Burns, soprano. 4, Air forum. 4:30, J. Scully's orch. 5:30, Gertrude Polesky, piano. 6, Hotel Majestic String ensemble. 6:25, health talk. 6:30, Hotel Majestic String ensemble. 12:30, Cotton Club revue.

**WPG, Atlantic City, N. J., 299.8 (E. S. T.)—7 P. M.**, music. 9, Chalfonte-Haddon Hall, instrumental music. 10, Atlantic City High School orch. 11, Paul Whiteman's dinner music.

**WRC, Washington, D. C., 469 (E. S. T.)—4 P. M.**, fashion, Eleanor Glynn. 4:10, piano,

**FRIDAY, MARCH 20 (Continued)**

Eleanor Glynn. 4:20, "Beauty and Personality," Elsie Pierce. 4:30, New Willard Hotel trio. 6, children's hour.  
**KYW, Chicago, Ill., 536 (C. S. T.)**—6:30 A. M., exercises. 9:30, markets. 11:35, table talk, Mrs. Anna J. Peterson. 6 P. M., markets. 6:35, bed-story, "Uncle Bob." 7, Joska DeBabary's orch. 7:10, Coon-Sanders Original Nighthawks. 7:20, Joska DeBabary's orch. 9, midnight revue. 1 A. M., "Insomnia Club," Sanders Original Nighthawks.  
**WBZ, Springfield, Mass., 333.3 (E. S. T.)**—11:55 A. M., time, weather, market. 7 P. M., market. 7:05, bedtime story.  
**WAHG, Long Island, N. Y., 316 (E. S. T.)**—8 P. M., Anthony Pesci, tenor. 8:15, Emery Deutsch, violinist. 8:30, Martha Brauning, soprano. 8:45, Bessie Liebowitz, pianist. 9, Michael Lamberti, cellist. 9:30, Anthony Pesci, tenor. 9:45, Emery Deutsch, violinist. 10, Wm. F. Diehl, radio engineer Radio Question Box. 10:15, Martha Brauning, soprano. 10:30, Nassau Club orch.  
**WCCO, St. Paul, Minn., 417 (C. S. T.)**—10:45 Betty Crocker, "What Shall We Have For Dinner?" 2 P. M., woman's hour. 4, magazine hour. 5:30, children's hour. 6, sport talk. 6:15, Minn. Athletic Club orch. 7:30, lecture. 7:45, lecture. 8, St. Cloud Night. 9, "The F. & R. Family." Nicollet Hotel orch.  
**WOR, Newark, N. J., 405 (E. S. T.)**—2:30 P. M., Jersey City Police quartet. 3, Louella O. Parsons, moving picture editor. 3:15, Bluebird dance orch. 6:15, Hotel Lorraine orch. 6:30, "Man in Moon," by Josephine Lawrence and William F. B. McNary. 7, Hotel Lorraine orch.

**Saturday, March 21**

**CKAC, Montreal, Can., 411 (E. S. T.)**—7 P. M., kiddies stories. 7:30, Harry Salter's trio from the Windsor. 8:30, variety program. 10:30, Harold Leonard's red jackets from the Windsor grill.  
**WFAA, Dallas, Tex., 476 (C. S. T.)**—12:30-1 P. M., address, Epps G. Knight. 6-7, Vesper recital by Honey Boys orch. 11-12 (midnight), Adolphus Hotel orch., playing in the junior ballroom.  
**KTHS, Hot Springs, Ark., 374.8 (C. S. T.)**—8:30 to 9:45 P. M., concert by the Charles L. Fischer orch., with tenor solo specialties. 9:45 to 10:45, dance concert by the Meyer Davis-New Arlington Hotel orch., Jacques Renard, director.  
**WLW, Cincinnati, O., 423.3 (C. S. T.)**—10:45 A. M., weather forecast and business reports. 11:55, correct time. 12, setting-up exercises from the Central Y. M. C. A.; William Stradman, instructor. 1:30 P. M., business reports; stock quotations. 3, dance program and other features. 6, dinner hour concert. 8:15, popular music presented symphonically by Henry Lange and his Hotel Sinton orch.  
**KPO, San Francisco, 423 (P. S. T.)**—7 A. M., "Daily Dozen" by Bernard Drury, piano accompaniment by Mel Lyons. 10:30, news bulletins. 10:40, "What is playing at the Local Theatres." 11:50, market report on eggs, butter, cheese and poultry. 12 noon, time signals from the Naval Observatory; reading of the scripture. 1 to 2 P. M., Seiger's orch. 2:30 to 3:30, musical matinee. 3:30 to 5:30, tea dansant; Gene James' Rose Room Bowl orch., by wire telephony, from the Palace Hotel. 6:20, garden hints. 6:30, what is playing at the Local Theatres. 8 to 12, Weidner dance orch.  
**KGW, Portland, Ore., 491.5 (P. S. T.)**—11:30 A. M., weather. 12:30 P. M., concert by Rose City Trio by courtesy Pacific States Electric Company. 10, Colburn's Melody Men of the Hotel Portland, and intermission solos.  
**PWX, Havana, Cuba, 400 (E. S. T.)**—Concert at the studio of Station PWX, by the tenor, Fausto Alvarez; soprano, Julie P. Villate and others.  
**WWJ, Detroit, 352.7 (E. 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" and a special talk by the Woman's Editor. 9:45, Public Health Service bulletin and talks on subjects of general interest. 10:25, weather. 11:55, time. 12:05 P. M., Jules Klein's Hotel Statler orch. 3, The Detroit News orch. 3:50, weather. 3:55, markets.  
**KOA, Denver, 323 (M. S. T.)**—12:20 to 12:50 P. M., Rialto (theatre) organ recital. 1, final reading N. Y. stock reports; live stock and weather. 9 to midnight, dance music program by Joe Mann and his Rainbow-Lane orch., Shirley Savoy Hotel, Denver.  
**WBAP, Fort Worth, Texas, 476 (C. S. T.)**—1 P. M., Bradstreet's financial reviews and R. G. Dun's business report. 7, review of the inter-denominational Sunday school lesson by Mrs. W. F. Barnum.  
**WCAL, Northfield, Minn., 336.9 (C. S. T.)**—9:45 A. M., St. Olaf College chapel services. 12, midnight musicale.  
**WGN, Chicago, 370 (C. S. T.)**—9:31 A. M., time. 9:35, stock and farm quotations. 10, wheat. 10:30, wheat and cable reports. 11, wheat, weather, dairy reports. 11:30, wheat, grain and livestock receipts. 11:56, time. 12, wheat, board of trade. 12:10 P. M., board of trade quotations; hog sales. 12:35, Tea Room orch. 1, wheat. 1:05, Tea Room orch. 1:35, readings. 1:40, Drake concert ensemble and Blackstone string quintet. 2:30, musical recital. 3, miscellaneous entertainment. 5, stock exchange and market. 5:30, Skeezeix time for children. 5:57, time.  
**KGO, Oakland, Cal., 361 (P. S. T.)**—11:30 A. M. to 1 P. M., luncheon concert, courtesy Pacific States Electric Company. 12:30 noon, final reading stock reports and weather. 4 to 5:30 P. M., concert orchestra of the Hotel St. Francis, San Francisco, Vinton La Ferrera conducting. 8 Part One: presented by the Amphion Club; J.

**The Raging Fad**



**CLOG DANCING** and soft shoe dancing before the microphone, so that radio fans at least may hear what's going on, is the raging fad at broadcasting stations. Drusilla Taggart, talented young dancer, is shown broadcasting her military clog at Station WHAR, Seaside Hotel, Atlantic City. Miss Taggart, who starred on Broadway in Ziegfeld and Leon Errol revues, expects to repeat her American triumphs abroad. She sailed March 14 on a professional tour. (Atlantic Foto).

Winston Petty, cellist; Dean Donaldson, violinist and speaker; Austin Armer, flutist; Evelyn Hahn, flutist; Beatrice Colton, pianist; French songs by Helen Bacigalupi; Margaret Fish, pianist; Mary Aelia Chamberlain, violinist; Scott Elder, violinist; Beatrice Colton, pianist; Charles S. Douglas, tenor; Frank Denke, pianist; California String Quartet. Part Two: address, "The Philippines," John W. Dunlop. 10 P. M. to 1 A. M., dance music program by Henry Halstead's orch. and soloists, Hotel St. Francis, San Francisco.  
**WGR, Buffalo, N. Y., 319 (E. S. T.)**—6:7:30 P. M., Hallpryd string trio, dinner music.  
**WGY, Schenectady, N. Y., 379.5 (E. S. T.)**—9:30 P. M., dance music by Phil Romano's orch., New Kenmore Hotel, Albany; popular songs.  
**WGBS, New York, 316 (E. S. T.)**—10 A. M., timely talks, Terese. 10:10, Eleanor Schorer, Kiddie Klub program. 10:40, Rosario Duprez, perfumes and personalities. 10:50, Mrs. Maybelle A. Burbridge. 1:30 P. M., Scripture reading. 1:35, Blue Horse instrumental quartet. 3, Harpers. 6.

**NEXT WEEK**—Bernard's 5-Tube DX Wonder, including 3 resistance-coupled audio stages. Also next week, Hayden's great 2-Tube DX Set, like his famous Dandy. Issue of March 28.

Uncle Geebee. 6:30, Cameo Collegians. 7:30, Armand Vecsey orch. 9, Fred Schaefer, zither. 9:30, Sam Comly "Inside Movie Chats." 9:45, Muscovite ensemble. 11, Vanderbilt Hotel orch.  
**WMH, Cincinnati, Ohio, 325.9 (C. S. T.)**—10 P. M., violin solos, piano solos, Hotel Alm's orch. 10:45, piano solos, popular songs. 11:15, Hotel Alm's orch.  
**WIP, Philadelphia, Pa., 509 (E. S. T.)**—10 A. M., daily menu and intimate talks to housewives. 1 P. M., organ, Karl Bonawitz. 1:30, weather. 3, Ray Frank's Collegians. 4:15, "Women's Legislative Interests," Miss Marion Riley. 6, weather. 6:05, popular numbers. 6:15, Hotel St. James orch. 6:45, market. 7, bedtime story. 8, "What Shall We Eat," Dr. Horatio C. Wood. 8:15, Mayflower orch. 9, Lenten meditations, E. A. E. Palmquist. 9:10, Bristol M. E. Choir and orch. 10:05, Howard Lanin's orch. 11:05, organ, Karl Bonawitz.  
**WJZ, New York, N. Y., 455 (E. S. T.)**—11 A. M., American orch., Aeolian Hall; children's concert. 1 P. M., Erdoly's Park Lane orch. 4:30, Sherry's tea orch. 5:30, agricultural reports; quotations Exchange. 7, Hotel Astor orch. 8, "Art for Laymen." Walter M. Grant. 8:15, Charlotte Lund, soprano; Keith McLeod, accompanist. 8:45, "Revenue Act of 1924," Treasury Department. New York. 9:15, Club Mirador orch. 10:30, Waldorf-Astoria dance orch.  
**KFNF, Shenandoah, Iowa, 266 (C. S. T.)**—6:30 P. M., concert. 8:30, music.  
**WOC, Davenport, Ia., 484 (C. S. T.)**—12:57 P. M., time. 1, weather, quotations. 5:45, chimes. 6, police reports, bulletins. 6:30, bedtime stories by Val McLaughlin. 6:50, international Sunday school lesson, Rev. M. A. Getzendaner. 9, musical program (1 hour), the Beethoven octet, of Clinton, Iowa; weather forecasts for Iowa and Illinois broadcast during evening program after 9 o'clock. 11, orchestra program (1 hour), Lonis Connor orch.; Peter MacArthur, baritone.  
**KHJ, Los Angeles, Cal., 405.2 (P. S. T.)**—10 to 12 A. M., class in broadcasting. 12:30 to 1:30 P. M., All-San Fernando program. 2:30, Saturday afternoon frolic. 6 to 6:30, Hickman's orch. 6:30 to 7:30, children's program, Dolly Wright, 7-year-old reader; bedtime story by Uncle John. 8 to 10, program by Soap Co. 10 to 11, Hickman's dance orch. 11 P. M. to 2 A. M., The Lost Angels of Los Angeles.  
**KNX, Los Angeles, Cal., 337 (P. S. T.)**—5:45 P. M., organ recital from Wurlitzer studio and Sid Ziff sport talk. 6:15, dinner hour program. 7:30, organ recital. 8, features. 10, Coconut Grove orch. 11, Hollywood Nite. Ruth Roland.  
**WPC, Atlantic City, N. J., 299.8 (E. S. T.)**—9 P. M., Ambassador Hotel Concert orch. 10, recital. 11, Paul Whiteman's dance orch.  
**WRC, Washington, D. C., 469 (E. S. T.)**—6:45 P. M., children's hour. 7, Hotel Washington-Irving orch. 8, Bible talk. 10, Vincent Lopez orch. 11:15, organ, Otto F. Beck.  
**KYW, Chicago, Ill., 536 (C. S. T.)**—6:30 A. M., exercises. 9:30, markets. 10:30, farm and home service. 11:35, table talk, Mrs. Anna J. Peterson. 6:18 P. M., markets. 6:35, bedtime story, "Uncle Bob." 7, Joska DeBabary's orch. 7:10, Coon-Sanders Original Nighthawks. 7:20, Joska DeBabary's orch. 8, musical; Lucille Comfort Oren, soprano; William Benson, tenor; Joel Lay, baritone; Thomas B. Stephenson. 9:05, health, Dr. John M. Doddsno. 9:15, Youth's Companion. 9:35, "Congress Classic." 12, "Congress Carnival." 1 A. M., "Insomnia Club," Coon-Sanders Original Nighthawks.  
**KDKA, Pittsburgh, Pa., 366 (E. S. T.)**—9:45 A. M., markets. 11:55, time, weather, markets. 12 M., weather, markets. 12:20 P. M., Lenten service. 1:30, Daugherty's orch. 6, Westinghouse band. 7:30, Wimple, the Wanderer. 7:45, "The Bible School Teacher," Carman Cover Johnson. 8, Sphinx Club. 8:15, "Florida From the Inside," F. L. Wood. 8:30, Westinghouse band and Davis Male quartette. 9:55, time, weather.  
**KSD, St. Louis, Mo., 545.1 (C. S. T.)**—7 P. M., Missouri theatre. 9, Grand Central theatre.  
**WBZ, Springfield, Mass., 333.3 (E. S. T.)**—11:55 A. M., time, weather. 6 P. M., Hotel Lenox ensemble. 7, market. 7:05, bedtime story. 7:15, U. S. Naval History by E. S. R. Brandt, Lieut. Commander U. S. N. 7:30, Hotel Kimball trio. 8, Robt. Scott, bass-baritone. 8:15, Edna Pierce, xylophone. 8:30, May Gorman, pianist. 9, Edna Pierce, xylophonist, Springfield. 9:15, Toreador Club. 9:55, time, weather.  
**WFBH, New York, 273 (E. S. T.)**—2 P. M., Katherine Gauggel, soprano. 2:15, Montana Ramblers. 3, Paul Eppes' Revelers. 4, Essie Slinger, soprano; Sally Gartner, piano. 4:30, Gothamite orch. 5, Muriel Anderson trio. 5:30, Katherine Connelly and Irene DeFries; Judith Roth and Peter DeRose. 6, Sara Turits, soprano; Elmore Fassenberg, piano. 6:25, health talk. 6:30, Xavier Cugat, violin; Eva Stern, piano. 7, Parody Club. 7:30, Peter Pan Contest. 7:45, Frances Kirsch, Howard Kirsch, piano, violin and soprano. 11:30, Nest Club. 12, Club Kentucky.  
**WEAF, New York, 492 (E. S. T.)**—4 P. M., Bud Fisher's Happy Players; 6, Nemo Male quartette; Waldorf-Astoria Concert orch.; Lyric Club of New York; Rudolph Joskowitz, violinist; Vincent Lopez orch.  
**KSD, St. Louis, Mo., 545.1 (C. S. T.)**—7 P. M., Missouri theatre. 9, Grand Central theatre.  
**WAHG, Long Island, N. Y., 316 (E. S. T.)**—12 A. M., Glen C. Smith's Paramount orch.  
**WGY, Schenectady, N. Y., 379.5 (E. S. T.)**—11:55 A. M., time. 12:30 P. M., market. 12:40, market. 9:30, Phil Romano's orch.  
**WNYC, New York City, 529 (E. S. T.)**—6:30 P. M., Club Alabam orch. 7:30, police alarms. 7:35, Chateau Four. 8, Thomas P. Smith, Jr., "The New Municipal Assembly." 8:15, Chateau Four. 8:45, Police quartet. 9:15, "Faith in Food," by W. R. M. Wharton. 9:30, Alice and Rita

**SATURDAY, MARCH 21 (Continued)**

Coakley, duets. 9:45, Harold Gottlieb, accordion. 10:10, "Traveling in the Near East," by Florence Duryea. 10:30, police alarms; weather.

WCCO, Saint Paul, Minn., 417 (C. S. T.)—10:45 A. M., Betty Crocker, Gold Medal Girls' Club. 2:30 P. M., musical. 6, Minn. Athletic Club orch. 8, "Fireside Philosophies," Rev. Roy L. Smith. 8:30, minstrel show. 10, St. Paul Athletic Club orch.

WHN, New York City, 360 (E. S. T.)—2:15 P. M., Jack Spiegel, tenor. 2:25, Harriett Merber, pianist. 2:35, Ray Klages with Stephen Levitz, songs. 2:45, Ritz orch. 3:45, Cross concert Co. 4:05, Chas. Sonn, tenor. 4:15, Burton Levy, pianist. 4:25, the poets by NTG. 4:30, Bernard Share, violinist. 4:45, Jeanette Christine, soprano, and David Owen Jones, tenor. 5, Broadway Melody Boys. 6:30, violin, Olcott Vail; Stephen Balogh, piano. 7:30, health talk by Dr. Landis. 7:35, Hotel Carlton Terrace orch. 8:05, Cantor Isidor Doppelt; Ohab Zedek with Miss Arlenson, pianist, and Cantor Greenwald, accompanist. 8:30, Strand Roof orch. 9, Northminster service.

WBZ, Springfield, Mass., 333 (E. S. T.)—11:55 A. M., time; weather. 6 P. M., Hotel Lenox ensemble. 7, market. 7:05, bedtime story. 7:15, naval history by E. S. R. Brandt. 7:30, Hotel Kimball trio. 8, Robert Scott, bass-baritone, accompanied by Miss Wales. 8:15, Mrs. Edna Morrison, xylophonist. 8:30, Mae German, pianist; Ruel F. LeClair, baritone; Nicholas T. Casasanta, violinist; Harriet G. Moran, soprano; accompanist, Mae Gorman. 9, Mrs. Edna Morrison, xylophonist. 9:15, Toreador Club of Gloucester. 9:55, time; weather.

WOR, Newark, N. J., 405 (E. S. T.)—2:30 P. M., Helen Eastman, soprano. 2:45, George Watson Little, D.V.M., "Superstitions Regarding Animals." 3, Helen Eastman, soprano. 3:15, Criterion orch. 6:15, Mabelle Cowan orch. 7:30, "The Commanders." 8, Albert Tappaport, tenor. 8:15, Helen O'Shea, soprano; Joseph M. Barnett, baritone, and Mme. Florence Wessell, pianist. 8:45, Dr. Frank Crane. 9, John Regan, "Notables on Shipboard." 9:15, Helen O'Shea, soprano; Joseph M. Barnett, baritone, and Mme. Florence Wessell, pianist. 9:45, Albert Rappaport, tenor. 10, Ohio program. 11, Ciro orch.

**Sunday, March 22**

CKAC, Montreal, Can., 411 (E. S. T.)—4:30 P. M., band concert.

WFAA, Dallas, Tex., 475.9 (C. S. T.)—6-7 P. M., Radio Bible class, Dr. William M. Anderson, pastor of the First Presbyterian Church, teacher; Bible study and Gospel song. 7:30-8:30 service at Central Congregational Church, Dr. Thomas H. Harper, pastor. 8:30-9:30, musical recital by the Baylor College Choral Club of Belton, Texas. 9:30-11, the Foxtrotters orch., Lee J. Brollier, manager.

KPO, San Francisco, 423 (P. S. T.)—10:30 A. M., "What is playing at the Local Theatres." 11 to 12 noon, undenominational and non-sectarian church services; the soloist is Miss Minnie Neulen, contralto; organ selections by Theodore J. Irwin. 6:30 P. M., "What is playing at the Local Theatres." 8:30 to 10, Rudy orch.

WWJ, Detroit, 352.7 (E. S. T.)—11 A. M., services at St. Paul's Episcopal Cathedral, broadcast from the cathedral. 2 P. M., The Detroit News orch. 7:20, "Roxo and His Gang," broadcast from the Capitol theatre, New York, N. Y.

WEEI, Boston, 303 (E. S. T.)—3:45-5:30 P. M., Men's Conference Y. M. C. A., Brooklyn, N. Y. 7:20-9:15, "Roxo and His Gang," New York Capitol Theatre. 9:15-10:15, organ recital, Columbia University Chapel, N. Y.

WCBD, Zion, Ill., 344.6 (C. S. T.)—8 P. M., Male Chorus and the Brass Quartet, assisted by Ralph Bull, Dorothy Bull, Luke Ball, Mark Whiteside, L. J. Hire, P. B. Newcomer.

WBAP, Fort Worth, Texas, 476 (C. S. T.)—11 A. M., complete services of St. Paul's M. E. Church, Rev. C. D. Meade, pastor; Mrs. F. L. Jaccard, organist. 4 P. M., concert from the Rialto theatre. 11, midnight frolic by Kerner's Crazy Hotel orch., broadcast from the lobby of the Crazy Wells Hotel, Mineral Wells, Texas, by remote control. (C. B. L.)

WHO, Des Moines, 526 (C. S. T.)—11:15 A. M., church service, sermon by Dr. Chas. S. Medbury at the University Church of Christ. 4 P. M., program, under direction of Dean Holmes Cowper of Drake University. 7:30, Reese-Hughes orch.

WOS, Jefferson City, Mo., 440.9 (C. S. T.)—7:30 P. M., religious service of the Central Evangelical Church, Rev. E. W. Berlekamp, pastor.

WCAL, Northfield, Minn., 336.9 (C. S. T.)—8:30 P. M., sacred program; sermon by Dr. Martin Hegland, head of the department of Religion at St. Olaf College.

WCN, Chicago, 370 (C. S. T.)—11 A. M., Uncle Walt reads the funnies to the children. 11:45, concert from theatre. 2 P. M., Edwin S. Seder, organ. 2:30, artists concert. 3:30, recital Musical College. 9, concert directed by Charles H. Gabriel, Jr., with WGN singers and by Drake concert ensemble.

KFI, Los Angeles, Cal., 467 (P. S. T.)—10 A. M., services by Church Federation of Los Angeles, "The Game of Life"; musical program. 4 P. M., Vesper services given by male quartet and instrumental trio. 6:45, music chat. 7, Metropolitan Theatre orch. 8, violinist and pianist, light opera numbers. 9, Examiner program. 10, orch.

WHAS, Louisville, Ky., 399.8 (C. S. T.)—9:57 A. M., organ. 10, church service. 4:30 P. M., choral evensong service at Christ Church Cathedral; men and boys' choir of sixty voices.

WLW, Cincinnati, Ohio, 423 (C. S. T.)—9:30 A. M., Methodist Book program. 11, services

**Jump in Programs  
Pleases One Fan,  
Peeves Another**

PROGRAM EDITOR:

**T**HAT was a great showing in the March 14 issue! More than five full pages of advance programs! Wonderful! Keep it up. Give us six pages, seven!

JOS. MULVANEY,  
636 Eleventh St.,  
Brooklyn, N. Y.

PROGRAM EDITOR:

**Y**OU took up too great a percentage of your March 14 issue with programs, I think. I'm peeved over it.

JACK RIELLEY,  
405 Hawthorne Ave.,  
Newark, N. J.

[Readers with opinions on this subject should write to Program Editor, RADIO WORLD, 1493 Broadway, New York City.]

from the Church of the Covenant, Rev. Frank Stevenson. 7:30 P. M., services from First Presbyterian Church of Walnut Hills, Rev. Frederick McMillan. 8:30, Western and Southern orch.

KOA, Denver, Col., 323 (M. S. T.)—11 A. M., solemn pontifical mass and sermon. 4 P. M., organ recital from Immaculate Conception Cathedral, Malcolm C. Marks, organist. 7:30, service of the Immaculate Conception Cathedral, Denver; sermon by the Rev. Francis Walsh.

WMH, Cincinnati, Ohio, 325.9 (C. S. T.)—6:45 P. M., Walnut Hills Christian Church. 10, instrumental trio. 10:15, soprano and contralto solos. 11, Instrumental trio.

KTHS, Hot Springs, 374.8 (E. S. T.)—11 A. M., Central Methodist Church. 8:30 P. M., Meyer Davis-New Arlington Hotel orch. 10, frolic.

WIP, Philadelphia, Pa., 509 (E. S. T.)—10:45 A. M., Trinity Church. 3:15 P. M., Civic Junior symphony orch.

KFNF, Shenandoah, Iowa, 266 (C. S. T.)—10:45 A. M., First M. E. Church. 3 P. M., gospel theme. 6:30, Golden Rule circle. 8, Christian Church.

WPG, Atlantic City, N. J., 299.8 (E. S. T.)—3:15 P. M., Arthur Scott Brook, organist, assisted by Mrs. Esther Kelly, soprano. 4:15, Community service, St. James Episcopal church. 10, jubilee songs by Asbury A. M. E. church choir, organist, Arthur Scott Brook and Alice Warren Sachse, pianist.

WHAS, Louisville, Ky., 399.8 (C. S. T.)—9:57 A. M., organ. 10, service of the Methodist Temple. 4:30 P. M., service at Christ Church Cathedral.

WEMC, Berrien Springs, Mich., 286 (E. S. T.)—11 A. M., choir. 11:45, sermon, pastor, W. R. French. 8:15 P. M., Fanny Crosby Memorial program. 9, memorial address by Pastor W. R. French.

WBBR, Staten Island, N. Y., 272.6 (E. S. T.)—10 A. M., Watchtower orch. 10:10, Mr. Fred Twarosch, tenor. 10:20, Watchtower orch. 10:35, Bible lecture. 11, Watchtower orch. 11:10, Mr. Fred Twarosch. 11:20, Watchtower orch. 9 P. M., Instrumental trio. 9:20 Choral singers. 9:35, Bible lecture. 10:05, Choral singers. 10:20, Instrumental trio.

WMAK, Lockport, N. Y., 265.5 (E. S. T.)—10:30 A. M., First Methodist Episcopal church.

WEMC, Berrien Springs, Mich., 286 (E. S. T.)—11 A. M., choir. 11:45, sermon, Pastor W. R. French. 8:15 P. M., choir. 8:50, sermon.

KNX, Los Angeles, Cal., 337 (P. S. T.)—10 A. M., First Presbyterian church. 5 P. M., Sunset service. 6:15, Bible Students' Assoc. music. 7, First Presbyterian church. 8, Ambassador Concert orch. 9, Globe Ice Cream Co.

WDAF, Kansas City, Kans., 365.6 (C. S. T.)—4 P. M., program from St. Joseph, Mo. 5, Sunday school lesson, radio quartet.

WCAE, Pittsburgh, Pa., 462 (E. S. T.)—10:45 A. M., Rodef Shalom temple. 3 P. M., church services. 4, piano, Prof. Otto Kaites. 6:30, dinner concert from William Penn hotel.

KYW, Chicago, Ill., 536 (C. S. T.)—11 A. M., Central Church service. 4 P. M., classical concert. 7, Chicago Sunday Evening Club, Dr. Alfred E. Stearns, Phillips Academy.

WGY, Schenectady, N. Y., 379.5 (E. S. T.)—10:30 A. M., service of First Reformed Church. 2:45 P. M., Symphony orch.; Elizabeth Reohr, soprano, soloist. 4, oratorio, "The Seven Last Words." 7:30, service of First Reformed Church. 8:45, Waldorf-Astoria orch.

WGR, Buffalo, N. Y., 319 (E. S. T.)—3 P. M., Vesper services, Baptist Church. 4, organ recital. 7:15, pre-service organ recital. 7:30, evening service.

WEAR, Cleveland, Ohio, 390 (E. S. T.)—1 P. M., Allen Theatre orch. 3:30, Hotel Cleveland orch. 9, musicale.

**Monday, March 23**

WCBD, Zion, Ill., 344.6 (C. S. T.)—Zion Band assisted by mixed quartet.

KPO, San Francisco, 423 (P. S. T.)—10:30 A. M., "Ye Towne Cryer" News bulletins. 10:40, "What is playing at the Local Theatres." 12 noon, time signals from the Naval Observatory; reading of the scripture. 1 to 2 P. M., Rudy Seiger's Fairmont Hotel orch., by wire telephony. 4:30 to 5:30, Rudy Seiger's Fairmont Hotel orch., by wire telephony. 5:30 to 6:30, children's hour stories by Big Brother of KPO, taken from the Book of Knowledge. 7 to 7:30, Rudy Seiger's Fairmont Hotel orch., by wire telephony. 8 to 9, organ recital by Theodore J. Irwin, official organist, at the Wurlitzer; soloist, Mrs. Mark T. H. Shwayder, contralto. 9 to 10, program under the auspices of the J. Allec Cleaning Co., 10 to 11, Gene James's Rose Room Bowl orch., playing at the Palace Hotel.

CKAC, Montreal, Can., 411 (E. S. T.)—1:45 P. M., Windsor Hotel luncheon concert. 4, weather and stock reports. 4:30, 10 lessons.

KFAE, Pullman, Wash., 348.6 (P. S. T.)—8 P. M., contralto solos, Vay Kerna, Garfield; piano solos, Neva Lois Thompson, age 12; Modern Youth and Parental Control, Dean of Women, Annie M. Fertig; Money Values of Housework, Dean of Home Economics, Florence Harrison; Home Demonstration Clubs, Miss Maud Wilson; Agriculture in Washington, Talk 1, W. W. Underwood.

WBAP, Fort Worth, Texas, 476 (C. S. T.)—12:05 to 12:30 P. M., musical program. 7:30 to 8:30, special program arranged by Mrs. Edith Casey for hospital patients. (C. B. L.) 9:30 to 10:45, Ward's "Trail Blazers," playing popular music, broadcast from the Montgomery-Ward studio. (The Hired Hand.)

WHO, Des Moines, 526 (C. S. T.)—7:30-8 P. M., Stewart Watson, American baritone; Helen Birmingham, accompanist; Sciota Mac Adow Herndon, soprano. 8-9, program, under direction of Dean Holmes Cowper of Drake University. 11:15-12, organ recital by L. Carlos Meier at the Capitol Theatre, Des Moines, Iowa.

WOS, Jefferson City, Mo., 440.9 (C. S. T.)—8 P. M., addresses: "The Show-Me Spirit," by John Boyd, state supervisor of agricultural education; J. T. Williams, Morgan Co.; musical program by Al Moore's orch. of Central and Howard-Payne Colleges of Fayette.

WCAL, Northfield, Minn., 336.9 (C. S. T.)—9:45 A. M., St. Olaf College chapel services. 11 P. M., organ recital by Elnor Overland from the Grand theatre. Tuesday, March 24, 9:45 A. M., St. Olaf College chapel services.

WGN, Chicago, 370 (C. S. T.)—9:31 A. M., time. 9:35, stock and farm quotations. 10, wheat. 10:30, wheat and cable reports. 11, wheat, weather, dairy reports. 11:30, wheat, grain and livestock receipts. 11:56, time. 12, wheat, board of trade. 12:10 P. M., board of trade quotations; hog sales. 12:35, Tea Room orch. 1, wheat. 1:05, Tea Room orch. 1:35, readings. 1:40, Drake concert ensemble and Blackstone string quintet. 2:30, musical recital. 3, miscellaneous entertainment. 5, stock exchange and market. 5:30, Skeezix time for children. 5:57, time.

KFI, Los Angeles, Cal., 467 (P. S. T.)—5 P. M., news. 5:30, news. 6:45, radiatorial period. 7, Evening Herald program. 8, musical trip around the world featuring the Hollywood string quartet. 9, classical hour. 10, Examiner program.

WHAS, Louisville, Ky., 399.8 (C. S. T.)—4 to 5 P. M., Louisville conservatory of music; songs; police bulletins; weather; readings; news. 4:55, livestock, produce and grain market reports. 5, time. 7:30 to 9, WHAS is silent on Monday nights.

KTHS, Hot Springs, 374.8 (E. S. T.)—8:30 P. M., male and mixed quartets of Glenwood, Arkansas. 9:10, Meyer Davis-New Arlington orch. 10, Eastman Hotel orch. 12:15, late frolic.

KFNF, Shenandoah, Iowa, 266 (C. S. T.)—6:30 P. M., concert. 8:30, open.

WOL, Ames, Iowa, 270 (C. S. T.)—9:30 A. M., weather. 12:30 P. M., chimes, weather, markets, dairy production. 9:30, weather. 10, music.

WLW, Cincinnati, Ohio, 423 (C. S. T.)—8 A. M., setting-up exercises. 10:45, weather, business. 11:55 time. 12:15 P. M., Lenten services conducted by Rev. G. H. Case. 1:30, business reports. 3, market reports. 4, Babson reports; recitals by pupils of Helen Abecherle. 6, concert. 8, Times-Star orch.

KOB, State College, N. M., 348.6 (M. S. T.)—7:30 P. M., "First Aid, Medical and Surgical," by Dr. Troy C. Sexton; "Flower Gardens in the Southwest," by Francis E. Lester.

KOA, Denver, Col., 323 (M. S. T.)—12:20 to 12:50 P. M., organ. 1, N. Y. stock reports; live stock; fruit and vegetable report and weather. 6, final reading, N. Y. stock reports; live stock; vegetables and late news bulletins. 8, Schmitt orch. 8:10, Intercollegiate night, Robert L. Chambers, director; Colorado School of Mines, Colorado Agricultural college and the University of Denver; college yell; band selections; orchestra numbers; saxophone quartet; vocal solos and duets; choral selections and talks.

WEMC, Berrien Springs, Mich., 286 (E. S. T.)—8:15 P. M., program Commercial Club of Dowagias, Michigan.

WBBR, Staten Island, N. Y., 272.6 (E. S. T.)—8 P. M., Syrian Oriental music. 8:10, Miss Ruth de Boer, contralto. 8:20, World News Digest. 8:40, Miss Ruth de Boer. 8:50, Syrian Oriental music.

WMAK, Lockport, N. Y., 265.5 (E. S. T.)—8 P. M., musical, Mrs. David Meahl. 9, Rialto theatre.

WFAA, Dallas, Texas, 475.9 (C. S. T.)—12:30 P. M., Prof. J. D. Boon. 6:30, Buddy's Blue Melody Boys Orch. 8:30, musical from Bonham.

KFOA, Seattle, Wash., 455 (P. T.)—12:45 P. M.,

**MONDAY, MARCH 23 (Continued)**

Lions' Club luncheon. 4, Times "Afternoon at Home." 6:45, Sherman, Clay & Co.; weather. 8:30, Times program.

**KNX, Los Angeles, Cal., 337 (P. S. T.)**—6:15 P. M., features. 7, West Coast Theatres. 8, features. 10, Silvertown orch.; Lillian May Challenger, soloist. 11, Coconut Grove orch.

**WFBH, New York, 273 (E. S. T.)**—2 P. M., Grace Strassberger, contralto. 2:15, Banjo Eddie's Entertainers. 3, Frances Kirsch, soprano; Howard Kirsch, violin. 3:45, Frederick Cromweed, piano classics. 4:15, Peggy Sutherland, soprano. 4:30, humor of the day, Geo. Bogner. 4:45, Dr. Milda H. Gates, speaker for Knickerbocker hospital. 5, Muriel Anderson, contralto; Florence R. Brown, piano. 5:15, Ray Walker, radiolians. 6, Bella Walzer, soprano; Rose Maurer, piano. 6:15, Hotel Majestic String ensemble. 6:25, health talk. 6:30, Hotel Majestic String ensemble. 11:30, Parody Club. 12:30, Cotton Club.

**WEEL, Boston, Mass., 303 (E. S. T.)**—12:15 P. M., Lenten service. 2, musicale. 6:30, Big Brother Club. 7:15, Pathe News Flashes. 7:30, Sinfonians. 8, Fabyan Concert. 8:40, Maria Kowalewska, soprano. 9, A. & P. Gypsies. 10, organ.

**WWJ, Detroit, Mich., 352.7 (E. S. T.)**—8 A. M., exercises. 9:30, tonight's dinner, Woman's Editor. 9:45, Public Health Service bulletins. 10:25, weather. 11:55, time. 12:05 P. M., Hotel Statler orch. 3, Detroit News orch. 3:50, weather. 3:55, market. 6, concert. 8, Detroit News orch. 9, concert.

**WHAAS, Louisville, Ky., 399.8 (C. S. T.)**—4 P. M., Louisville Conservatory of Music; police bulletins; weather; readings; bulletins. 4:55, market. 5, time.

**WDAF, Kansas City, Kans., 365.6 (C. S. T.)**—3:30 P. M., Newman and Royal theatres. 5, Boy Scout program. 5:50, market, weather, time. 6, School of the Air; reading, Miss Cecile Burton; Tell-Me-a-Story Lady; Trianon ensemble. 8, "Around the Town With WDAF." 11:45, Nighthawk Frolic—Plantation Players.

**WMAQ, Chicago, Ill., 477.5 (C. S. T.)**—4 P. M., Mothers in Council, by Mrs. Frances M. Ford. 4:30, high school teachers' council. 6, organ recital. 6:25, Hotel LaSalle orch. 6:50, Family Altar league.

**WCAE, Pittsburgh, Pa., 462 (E. S. T.)**—12:30 P. M., news; weather. 4:30, market; The Sunshine Girl. 6:30, dinner concert from William Penn hotel. 7:30, Uncle Kaybee. 7:45, police report. 8:30, Mrs. Louise MacMaster, soprano; Mr. MacMaster, baritone. 9, A. & P. Gypsy string ensemble. 11, The Press-Kaybee, Blackstone Theatre orch.

**WGY, Schenectady, N. Y., 379.5 (E. S. T.)**—2 P. M., music; "The Selection of Hats," by Charlotte Weiss. 6:20, sport talk by Harold Anson Bruce. 6:40, Ten Eyck trio. 7:30, WGY orch. and Virginia Zimmer, reader.

**WGR, Buffalo, N. Y., 319 (E. S. T.)**—10:45 A. M., home service talk by Betty Crocker. 8 P. M., recital by George Albert Bouchard. 9, concert by Robertson-Cataact Elec. Co. 10, Bill Wilson, Scotch comedian.

**WEAR, Cleveland, Ohio, 390 (E. S. T.)**—7 P. M., music from Loew's State Theatre.

**Tuesday, March 24**

**CKAC, Montreal, Can., 411 (E. S. T.)**—4 P. M., weather and stock reports. 7, kiddies stories. 7:30, Windsor Hotel dinner concert. 8:30, studio concert. 10:30, Windsor Hotel dance program.

**KPO, San Francisco, 423 (P. S. T.)**—7 A. M., "Daily Dozens" by Bernard Drury, piano accompaniment by Mel Lyons. 10:30, "Ye Towne Cryer" news bulletins. 10:40, "What is playing at the Local Theatres." 10, chat for the housewives on "Home Making" by "Prudence Penny" of the San Francisco Examiner. 11:50, market report on eggs, butter, cheese and poultry, under the auspices of the California Poultry Producers' Assn. 12 noon, time signals from the Naval Observatory; reading of the scripture. 1 to 2 P. M., Rudy Seiger's Fairmont Hotel orch., by wire telephony. 4:30 to 5:30, Rudy Seiger's Fairmont Hotel orch., by wire telephony. 5:30 to 6:30, children's hour stories by Big Brother of KPO, taken from the Book of Knowledge. 6:20, garden hints. 6:30, "What is playing at the Local Theatres." 7 to 7:30 orch. 8 to 10, program under the management of Jack Thomas, tenor. 10 to 11, Gene James' Rose Room Bowl orch., by wire telephony.

**WBAP, Fort Worth, Texas, 476 (C. S. T.)**—12:05 to 12:30 P. M., Ward's "Trail Blazers," playing in their studio. (W. S. B.) 7:30 to 8:30, musical program arranged by the Harmony Club of Fort Worth. (C. B. L.) 9:30 to 10:45, musical program presenting artists from the College of Industrial Arts, Denton, Texas. (W. E. B.)

**WGN, Chicago, 370 (C. S. T.)**—9:31 A. M., time. 9:35, stock and farm quotations. 10, wheat. 10:30, wheat and cable reports. 11, wheat, weather, dairy reports. 11:30, wheat, grain and livestock receipts. 11:55, time. 12, wheat, board of trade. 12:10 P. M., board of trade quotations; hog sales. 12:35, Tea Room orch. 1, wheat. 1:05, Tea Room orch. 1:35, readings. 1:40, Drake concert ensemble and Blackstone string quintet. 2:30, musical recital. 3, miscellaneous entertainment. 5, stock exchange and market. 5:30, Skeesix time for children. 5:57, time.

**KFI, Los Angeles, Cal., 467 (P. S. T.)**—5 P. M., news. 5:30, news. 6:45, radiatorial period. 7, pipe organ studio. 8, Examiner program. 9, dance orchestra. 10, Melody Girls.

**WDAF, Kansas City, Kans., 365.6 (C. S. T.)**—3:30 P. M., Star's radio trio. 5, child program. 5:50, market, weather, time. 6, School of the Air, Tell-Me-a-Story Lady, radio piano lessons,

**Boy Makes a Hit**



AT THE FIRST radio benefit show given by the directors, announcers and staff artists of the Chicago radio stations, the hit of the performance was Luke Hill, seven, (above), representing the 1,200 boys and girls being trained at Mooseheart, Ill., maintained by the 600,000 members of the Loyal Order of Moose to care for the dependent children. Luke is singing with Jack Nelson, the director of WJD, of the Garod Studio, Palmer House, Chicago.

Trianon ensemble. 11:45 P. M. to 1 A. M., Nighthawk Frolic.

**WKAQ, Porto Rico, 340.7 (P. R. T.)**—9 P. M., "Euterpe Jazz Band." 2, poems by Mr. Luis Elcrens Torres; translated by Mr. Penneck. 3, news. 4, "Euterpe Jazz Band."

**WPG, Atlantic City, N. J., 299.8 (E. S. T.)**—7 P. M., Hotel Ambassador music. 9, Double Trio, Chalfonte-Haddon Hall; instrumental music. 10, studio program; Ruby Cordery Warke, pianist. 11, Paul Whiteman's dance music.

**WFAA, Dallas, Texas, 475.9 (C. S. T.)**—12:30 P. M., Charles E. Osborne on health. 6:30, Hauulea School of Hawaiian music. 8:30, music, Tyler Street Methodist church. 11, organ, Dwight Brown.

**WEEL, Boston, Mass., 303 (E. S. T.)**—12:15 P. M., Lenten service. 1, Civitan Club. 2, Napoli Four. 4, Shawmut Juvenile Syncopators. 6:30, Big Brother Club. 7:15, Alice Sampson, contralto. 7:30, Sinfonians. 8, musicale. 8:30, Gold Dust Twins. 9, Eveready hour. 10, Goodrich orch.

**WFBH, New York, 273 (E. S. T.)**—2 P. M., Gill and Paris. 3, Strand Danceland orch. 4, Jean Gordon, mezzo soprano. 4:30, Dick and Flo Bernard songs. 4:45, James Eagan, Irish songs. 5, Rita Minton, soprano; Stephana Worthing, piano. 5:30, John R. Thomas, tenor. 5:45, Doris Sheldon, contralto; Cameron Emslie, piano. 6, Arthur J. Hand, baritone; Herbert Frick, piano. 6:15, Bill Schudt, Jr., radio talk. 6:25, health talk. 6:30, Bossert Lumber Jacks.

**KFPY, Spokane, Wash., 265.3 (P. C. T.)**—9 P. M., violin obligato, Francis Dibley; song, Florence Pebles; Cunningham Studio Ladies' Quartette. 10, Garden Dance orch.

**KFOA, Seattle, Wash., 455 (P. T.)**—12:30 P. M., Kiwanis Club luncheon. 4, Olympic Hotel Concert orch. 6:45, Rhodes Department Store. 8:15, weather. 8:30, Times program. 10, Eddie Harkness orch.

**KNX, Los Angeles, Cal., 337 (P. S. T.)**—6:15 P. M., R. C. Durant program. 7:30, style, Myer Siegel, Jr. 8, Elite Catering Co. 9, features. 10, Coconut Grove orch.

**WWJ, Detroit, Mich., 352.7 (E. S. T.)**—8 A. M., exercises. 9:30, tonight's dinner, woman's editor. 10:25, weather. 11:55, time. 12:05 P. M., Hotel Statler orch. 3, Detroit News orch. 3:50, weather. 3:55, market. 6, concert. 8, concert.

**WHAS, Louisville, Ky., 399.8 (C. S. T.)**—4 P. M., Louisville Conservatory of Music; bulletins, weather, readings, bulletins. 4:55, market. 5, time. 7:30, Rosson orch.; "Billy and Jane" stories; James Speed; bulletins; time.

**WCAE, Pittsburgh, Pa., 462 (E. S. T.)**—12:30 P. M., news; weather. 4:30, market; The Sunshine Girl. 6:30, concert from William Penn hotel. 7:30, Uncle Kaybee. 7:45, police reports. 8, program from New York. 8:30, The "Gold Dust Twins." 9, "The Eveready Hour." 10, Silvertown Cord orch.

**WMAQ, Chicago, Ill., 477.5 (C. S. T.)**—12 M.,

program, Illinois Manufacturers' association. 4 P. M., pupils of Mrs. Louise Crum. 4:15, American Red Cross talk by Dr. H. W. Gentles. 4:30, pupils of Gunn School of Music. 6, organ. 6:25, Hotel LaSalle orch. 6:50, "Daddy." 8, Harry Hansen, literary editor. 8:20, Clara E. Laughlin, travel talk. 8:30, lecture. 8:50, talk, Association of Commerce. 9:15, program by Sigurd Sjobery.

**WGY, Schenectady, N. Y., 379.5 (E. S. T.)**—2 P. M., music; "Sealing Wax in Decoration," by Marjorie E. Dayton. 2:30, organ, Stephen E. Boisclair. 6:30, New Kenmore Hotel orch. 7:30, "Ancient Athletic Sports," by Dr. Harrison C. Coffin. 7:40, piano, Edna Mereness; Emeline Bates, soprano. 9, Brunswick Hour of Music, National Music Memory Contest. 10:30, Meyer-Davis orch. 11:30, organ, Stephen E. Boisclair.

**KTHS, Hot Springs, 374.8 (E. S. T.)**—8:30 P. M., Charles L. Fischer's Eastman Hotel orch. 9, address. 9:20, Meyer Davis-New Arlington orch.

**NWMM, Cincinnati, Ohio, 325.9 (C. S. T.)**—10 P. M., Original Rainbow orch.; vocal solos and duets; baritone solos. 11, Rainbow orch.

**WOI, Ames, Iowa, 270 (C. S. T.)**—9:30 A. M., weather. 12:30 P. M., chimes; weather; markets; dairy production. 9:30, weather.

**WHAS, Louisville, Ky., 399.8 (C. S. T.)**—4 to 5 P. M., Louisville conservatory of music; police bulletins; weather; songs; readings; news. 4:55, local livestock, produce and grain market reports. 5, time. 7:50 to 9, Eddie Rosson orch. of Jeffersonville, Ind.; "Billy and Jane," read by James Speed; news; time at 9 o'clock.

**WLW, Cincinnati, Ohio, 423 (C. S. T.)**—8 A. M., setting-up exercises. 10:45, weather, business reports. 11:55, time. 12:15 P. M., Delta Omicron Sorority, Clifford Lang, pianist. 1:30, business reports. 3, market reports. 4, piano recital; program under the auspices of the Federation of Mother Clubs; Irene and Ruth Kelemen, eight and seven years old, piano. 6, concert. 8, Coffee Company program; George Maier, flute; quartet of brass; Mildred Bartlett, songs; Electric Instrumental trio; W. A. Phelon, sports. 9, Esberger's instrumental quintet and Lyric male quartet.

**KOA, Denver, Col., 323 (M. S. T.)**—12:20 to 12:50 P. M., organ. 1, N. Y. stock reports (2 o'clock quotations); live stock; fruit and vegetable report and weather. 3, half-hour matinee for housewives. 6 to 6:30, music. 6:30, N. Y. stock reports; live stock; vegetables; news; silent night.

**WGR, Buffalo, N. Y., 319 (E. S. T.)**—11 A. M., Mrs. Katherine Norton Britton. 6 P. M., Hallpryd string trio. 9, Eveready hour.

**WEAR, Cleveland, Ohio, 390 (E. S. T.)**—7 P. M., organ, Vincent H. Percy.

**Wednesday, March 25**

**CKAC, Montreal, Can., 411 (E. S. T.)**—1:45 P. M., luncheon concert. 4, weather and stock market reports.

**KPO, San Francisco, 423 (P. S. T.)**—7 A. M., "Daily Dozen" by Bernard Drury, piano accompaniment by Mel Lyons. 10:30, "Ye Towne Cryer" News bulletins. 10:40, "What is playing at the Local Theatres." 11:50, market report on eggs, butter, cheese and poultry. 12, time signals from the Naval Observatory; reading of the scripture. 1 to 2 P. M., Rudy Seiger's Fairmont Hotel orch., by wire telephony. 5:30 to 6:30, children's hour stories by Big Brother of KPO, taken from the Book of Knowledge. 7 to 7:30, Rudy Seiger's Fairmont Hotel orch., by wire telephony. 7 to 8, program by the Conn Band Instrument Co., Reg Code, director. 8 to 10, piano solos by Ruth Ludwigson; soprano solos by Athea Burns Flenn, accompanied by Bernice Deardory; baritone solos by A. C. Clellan.

**PWX, Havana, Cuba, 400 (E. S. T.)**—Concert band, General Staff Band of the Cuban Army; Cuban and foreign music; Captain Jose Torres, band leader.

**KFAE, Pullman, Wash., 348.6 (P. S. T.)**—8 P. M., Kappa Delta sorority program; Pointers on Dairy Farming, talk 12, Prof. E. V. Ellington; The Vacuum Tube, radio talk, Dean H. V. Carpenter; Economics of Hay Production, R. N. Miller.

**WBAP, Fort Worth, Texas, 476 (C. S. T.)**—12:05 to 12:30 P. M., musical program. 7:30 to 8:30, East Broadway string band, under the direction of W. J. Crucy. (C. B. L.) 9:30 to 10:45, dance program by Johnny Jackson's Texas Hotel orch. (The Hired Hand.) Midnight to 1 A. M., dance music by Frensey Moore's Black and Gold Serenaders. (W. E. B.)

**WHO, Des Moines, 526 (C. S. T.)**—2:15 P. M., lecture by Charles A. Payne on "America's Glory Land." 6:30, Reese-Hughes orch. from the main dining room of the Hotel Fort Des Moines. 7:30, Mrs. Clyde Yountz, soprano; Miss Kathryn Mason, pianist; talent from the American Academy of Fine Arts, under direction of D. Dwight Harned. 9, Des Moines Theatre Symphonic orch., under direction of Prof. Leon A. Dashoff. 9:45, Bankers' Life Radio orch., under direction of Wm. L. Marsh.

**WOS, Jefferson City, Mo., 440.9 (C. S. T.)**—8 P. M., addresses: "Spraying Fruits," by A. P. Boles, extension asst. professor of horticulture, College of Agriculture, Columbia; "alue of Poultry in Missouri," by V. O. Hobbs, Kansas City; "Let Us Help You Plan a Vacation Trip," by George A. Pickens, general secretary of The Missouri Association; "More and Better Sheep and Wool for Missouri," by D. C. Rogers, of the Missouri State Marketing Bureau; program of classical and operatic music by the Biehet-Botz Sisters assisted by Mrs. Homer Talbott, pianist, and Mrs. Genevieve Bratton, violinist.

**WCAL, Northfield, Minn., 336.9 (C. S. T.)**—9:45 A. M., St. Olaf College chapel services.

**WGN, Chicago, 370 (C. S. T.)**—9:31 A. M., time. 9:35, stock and farm quotations. 10, wheat. 10:30, wheat and cable reports. 11, wheat, weather,

## WEDNESDAY, MARCH 25 (Continued)

dairy reports. 11:30, wheat, grain and livestock receipts. 11:56, time. 12, wheat, board of trade. 12:35, Tea Room orch. 1, wheat. 1:05, Tea Room. 12:10 P. M., board of trade quotations; hog sales orch. 1:35, readings. 1:40, Drake concert ensemble and Blackstone string quintet. 2:30, musical recital. 3, miscellaneous entertainment. 5, stock exchange and market. 5:30, Skeezix time for children. 5:57, time.

KFI, Los Angeles, Cal., 467 (P. S. T.)—5 P. M., news. 5:30, news. 6:45, radiatorial period. 7, Nick Harris detective story, "The Cause of Divorce"; Southland string quintette (Hawaiian); chat by Detective Nick Harris. 7:30, program by insurance company. 8, Herald program. 9, Examiner program. 10, Patrick Marsh orch.

KNX, Los Angeles, Cal., 337 (P. S. T.)—6:15 P. M., dinner hour program. 7, Ambassador concert orch. 8, string quartet. 9, features. 10, Hollywoodland Dance orch.

WFBA, New York, 273 (E. S. T.)—2 P. M., Meyers' orch. 3, Theo Alban, tenor. 3:30, Florence Duryea, violin; Gladys Shailer, piano. 4, songs. 4:30, Harold Davis' String trio. 5, Edward Dies, piano classics. 5:15, Mina Reeves, soprano. 5:30, Joel Stern, violin; Sidney Teicholz, piano. 6, Sara Turits, soprano. 6:15, Hotel Majestic String ensemble. 6:25, health talk. 6:30, Hotel Majestic String ensemble. 7, Parody club. 7:30, Peter Pan contest. 7:45, Judith Roth and Peter DeRose.

WKAQ, Porto Rico, 340.7 (P. R. T.)—8 P. M., Municipal Band of San Juan.

WEMC, Berrien Springs, Mich., 286 (E. S. T.)—8:15 P. M., Miss Clotilde James, pianist. 8:30, "Radio Lighthouse," Mr. Fred Green. 8:35, Collegian String trio. 8:50, talk, Berrien. 9, Dr. Birt Summers, pianist. 9:15, talk, Berrien. 9:20, Mr. Thomas Johnson, baritone. 9:30, "The College of Opportunity," President Frederick Griggs.

KFOA, Seattle, Wash., 455 (P. T.)—12:30 P. M., Rotary Club luncheon. 4, Olympic Hotel Concert orch. 6:45, Hopper Kelly Co. 8:15, weather. 8:30, Times program.

WEEL, Boston, Mass., 303 (E. S. T.)—12:15 P. M., Lenten service. 3, Avalon orch. 6:30, Big Brother Club. 7:15, Alice C. VanSchagen, soprano. 7:30, James A. Watts, tenor. 7:45, Harry Einstein. 8, Traveler Shoe orch. 8:30, musicale. 9, Gillette dance orch. 10, Sinfonians.

WWJ, Detroit, Mich., 352.7 (E. S. T.)—8 A. M., exercises. 9:30, tonight's dinner, woman's editor. 9:45, Public Health Service bulletins. 10:25, weather. 11:55, time. 12:05 P. M., Hotel Statler orch. 3, Detroit News orch. 3:50, weather. 3:55, market. 6, concert. 8, Detroit News orch.; Anne Campbell, Detroit News poet. 10, Victor Recording orch.

WEAO, Columbus, Ohio, 293.9 (C. S. T.)—8 P. M., faculty lecture, May Furniture Company orch.

WDAF, Kansas City, Kans., 365.6 (C. S. T.)—3:30 P. M., Star's radio trio. 6:50, market, weather, time. 6, School of the Air, Tell-Me-a-Story Lady, Trianon ensemble, Star's Radio orch. and soloists. 11:45 P. M. to 1 A. M., nighthawk frolic, Plantation Players; Kansas City Club orch.

WHAS, Louisville, Ky., 399.8 (C. S. T.)—4 P. M., Louisville Conservatory of Music, bulletins, weather, readings, bulletins. 4:55, market. 5, time. 7:30, K. & I. Terminal Railroad orch., string orch., "Billy and Jane" stories, James Speed; bulletins, time.

WCAE, Pittsburgh, Pa., 462 (E. S. T.)—12:30 P. M., news; weather. 4:30, market; Uncle Kaybee. 6:30, concert from William Penn hotel. 7:30, The Sunshine Girl. 7:45, police reports. 8, concert. 9, concert. 10:30, Nixon's Restaurant orch.

WGY, Schenectady, N. Y., 379.5 (E. S. T.)—6:30 P. M., program for children. 6:45, Youth's Companion. 7, Albany Strand Theatre orch.

WHAS, Louisville, Ky., 399.8 (C. S. T.)—4 to 5 P. M., Louisville conservatory of music; police bulletins; weather; readings; news. 4:55, livestock, produce and grain market reports. 5, time. 7:30 to 9, concert by the K. & I. Terminal Railroad orch.; "Billy and Jane" read by the author; news; time at 9 o'clock.

WLW, Cincinnati, Ohio, 423 (C. S. T.)—8 A. M., setting-up exercises. 10:45, weather, business reports. 11:55, time. 12:15, Mu Phi Epsilon Sorority from College of Music. Irene Downing and Marjory Hebestreit, piano. 1:30, business reports. 3, market reports. 4, program for the Shut-Ins by the Duning Benevolent and Musical Service. 6, concert. 8, Springtime program by Henry Fillmore and the Syrian Shrine band.

KOB, State College, N. M., 348.6 (M. S. T.)—7:30 P. M., International code course, lesson No. 12, by Dean R. W. Goddard.

KOA, Denver, Col., 323 (M. S. T.)—12:20 to 12:50 P. M., Rialto organ. 1, N. Y. stock reports (2 o'clock quotations); live stock; fruit and vegetable report and weather. 6, final reading, N. Y. stock reports; live stock; vegetables; news. 8, Schmitt orch. 8:10, one-act fantasy, "The maker of Dreams," by the KOA players, minstrel show with incidental music by members of the Blue Bell trio. 10 to midnight, dance by Mann orch.

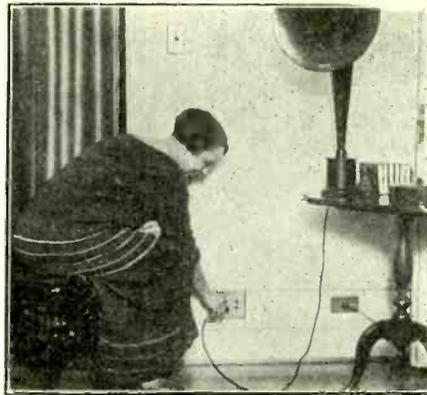
KTHS, Hot Springs, 374.8 (E. S. T.)—8:30 P. M., organ, Lawson Reid. 9:10, Meyer Davis-New Arlington Hotel orch. 10, Eastman Hotel orch.

WMH, Cincinnati, Ohio, 325.9 (C. S. T.)—8 P. M., Ohio military band. 9, Ranger Five male quartet. 9:15, George W. Platt, soprano solos; hand saw solos; piano solos. 9:45, Ranger Five male quartet.

WOI, Ames, Iowa, 270 (C. S. T.)—9:30 A. M., weather. 12:30 P. M., chimes; weather; markets. 9:30, weather.

WGR, Buffalo, N. Y., 319 (E. S. T.)—10:45 A. M., service talk by Betty Crocker. 7:55 P. M., program by Adam, Meldrum & Anderson Co. 9,

## One Set for 'Gang'



IN several New York City apartment houses, like the Riverview, on Riverside Drive, the landlord has the janitor run a master radio set. Tenants tune in by plugging a speaker into a wall socket. The janitor chooses the station. Tyrant!

Atwater-Kent program. 10, program by Buffalo State Normal school.

KFNH, Shenandoah, Iowa, 266 (C. S. T.)—6:30 P. M., concert. 8:30, Kiwanis Club, Hamburg, Iowa.

WFA, Dallas, Texas, 475.9 (C. S. T.)—12:30 P. M., Alex. Hughes, pianist; Station WFAA will be silent for the remainder of the day.

WEAR, Cleveland, Ohio, 390 (E. S. T.)—7 P. M., Hotel Cleveland orch. 8, concert.

WMAQ, Chicago, Ill., 477.8 (C. S. T.)—1 P. M., luncheon of the Association of Commerce. 4, beauty talk, Mme. Grace Earl. 4:30, Cosmopolitan School of Music. 6, organ. 6:30, stories by Miss Georgene Faulkner. 8, Sir Charles F. Higham. 8:15, Columbia School of Music.

## Thursday, March 26

WCBD, Zion, Ill., 344.6 (C. S. T.)—Zion orch., assisted by Daniel Mason, J. D. Thomas, Hulda Klammer.

KPO, San Francisco, 423 (P. S. T.)—7 A. M., "Daily Dozen" by Bernard Drury, piano accompaniment by Mel Lyons. 10:30, "Ye Towne Cryer" News bulletins. 10:40, "What is playing at the Local Theatres." 11:50, market reports on eggs, butter, cheese and poultry. 12 noon, time signals from the Naval Observatory; reading of the scripture. 1 to 2 P. M., Seiger's orch. 4:30 to 5:30, Seiger's orch. 5:30 to 6:30, children's hour stories by Big Brother of KPO, taken from the Book of Knowledge. 6:30, "What is playing at the Local Theatres." 7 to 7:30, Rudy Seiger's Fairmont Hotel orch., by wire telephony. 8 to 9, organ recital by Theodore J. Irwin, official organist, at the Wurkitzer. 9 to 10, program under the management of May Clarke Burns, soprano. 10 to 11, Gene James' Rose Room Bowl orch., by wire telephony.

CKAC, Montreal, Can., 411 (E. S. T.)—4 P. M., weather and stock market reports. 4:45, dance programs from the Windsor Grill. 8:30, special concert by Frontenac Breweries.

WBAP, Fort Worth, Texas, 476 (C. S. T.)—12:05 to 12:30 P. M., musical program. 7:30 to 8:30, the Mansfield Municipal Band of Mansfield, Texas. (C. B. L.) 9:30 to 10:45, popular music by "The Troubadours" of Brownwood, Texas. (W. E. B.)

WHO, Des Moines, 526 (C. S. T.)—7:30-9 P. M., The Hawkeye orch., under direction of Mr. I. U. Dreyfus. 11-12, Gail Fitch and his dance orch.

KFI, Los Angeles, Cal., 467 (P. S. T.)—5 P. M., news. 5:30, news. 6:45, radiatorial period, Dr. Arthur Stern, of Y. M. C. A., "Handball and Health." 7, Novelty four (Hawaiian quartet). 7:30, saxophone quartet and sextette. 8, musical program. 9, Aeolian trio (violin, cello and piano) playing. 10, Examiner program.

WPG, Atlantic City, N. J., 299.8 (E. S. T.)—10 P. M., Jean Weiner, organist; Howard Clemmons, tenor; Paul Whiteman's Dance orch.

KFOA, Seattle, Wash., 455 (P. T.)—12:30 P. M., Young Men's Business Club Luncheon. 4, Olympic Hotel Concert orch. 6, Moran School.

WKAQ, Porto Rico, 340.7 (E. S. T.)—8:30 P. M., music from La Cafetera.

WLW, Cincinnati, Ohio, 423 (C. S. T.)—8 A. M., exercises. 10:45, weather and business reports. 11:55, time. 12:15, concert. 1:30, business reports. 3, market. 4, French lessons, Madame Ida Teimpidis; piano, Adelaide Apfel. 6, concert. 10, Civil Service Department. 10:03, program of the Cooper Corporation.

WEEL, Boston, Mass., 303 (E. S. T.)—12:15 P. M., Lenten service. 3:15, Noah's Arkadians. 6:30, Big Brother Club. 7:25, program, Greater Boston Federation of Churches. 7:55, News flashes. 8, musicale. 9, Victor concert. 10, Goodrich orch.

KNX, Los Angeles, Cal., 337 (P. S. T.)—4 P. M., Estelle Lindsay's Travel Talk. 6:15, Ziegler orch. 8, B. H. Dyas Corp. program. 9:10, features. 10, Coconut Grove orch.

WWJ, Detroit, Mich., 352.7 (E. S. T.)—8 A. M., exercises. 9:30, tonight's dinner, woman's editor. 9:45, Public Health Service bulletins. 10:25,

weather. 11:55, time. 12:05, Hotel Statler orch. 3, Detroit News orch. 3:50, weather. 3:55, market. 6, concert. 8, concert.

WCBD, Zion, Ill., (C. S. T.)—8 P. M., male quartet; mixed quartet and soloists.

WMAK, Lockport, N. Y., 265.5 (E. S. T.)—12 M., Murray Whiteman's Midnight Serenaders.

WBBR, Staten Island, N. Y., 272.6 (E. S. T.)—8 P. M., Hawaiian Quintette. 8:10, Miss Kay Macrae, coloratura soprano. 8:20, International Sunday school lesson, Van Sipma. 8:40, Miss Kay Macrae. 8:50, Hawaiian Quintette.

WDAF, Kansas City, Kans., 365.6 (C. S. T.)—3:30 P. M., Star's radio trio. 5:50, market, weather, time. 6, School of the Air, Louis Mecker, literary talk; Tell-Me-a-Story Lady; Trianon ensemble. 11:45 P. M. to 1 A. M., Nighthawk frolic, Plantation Players, Kansas City Athletic Club orch.

WHAS, Louisville, Ky., 399.8 (C. S. T.)—4 P. M., Louisville Conservatory of Music; police bulletins; weather; readings; bulletins. 4:55, market. 5, time. 7:30, concert; digest of Sunday school lesson; four-minute welfare talk; time.

WCAE, Pittsburgh, Pa., 462 (E. S. T.)—12:30 P. M., news; weather. 4:30, market; The Sunshine Girl. 6:30, dinner concert from William Penn hotel. 7:30, Uncle Kaybee. 7:45, police reports. 8, concert. 9, Victor artists. 10, concert by the Goodrich Silvertown Cord orch.

WGY, Schenectady, N. Y., 379.5 (E. S. T.)—2 P. M., music; "The Refurbishing of Hats," Charlotte Weiss. 2:30, organ, Stephen E. Boisclair. 6:30, Hotel Ten Eyck trio. 7:30, new books, by L. L. Hopkins. 7:45, WGY orch. 8:15, program from Wanamaker Auditorium. 9:15, comedy, "Caste." 11:30, organ, Stephen E. Boisclair.

WGN, Chicago, Ill., 370 (C. S. T.)—9:31 A. M., time. 9:35, stock and farm quotations. 10, wheat. 10:30, wheat and cable reports. 11, wheat, weather, dairy reports. 11:30, wheat, grain and livestock receipts. 11:56, time. 12, wheat, board of trade. 12:10 P. M., board of trade quotations; hog sales. 12:35, Tea Room orch. 1, wheat. 1:05, Tea Room orch. 1:35, readings. 1:40, Drake concert ensemble and Blackstone string quintet. 2:30, musical recital. 3, miscellaneous entertainment. 5, stock exchange and market. 5:30, Skeezix time for children. 5:57, time.

WHAS, Louisville, Ky., 399.8 (C. S. T.)—4 to 5 P. M., Louisville Conservatory of Music; weather; readings; news. 4:55, livestock, produce and grain market reports. 5, time. 7:30 to 9, concert, Liberty Insurance Bank of Louisville; International Sunday School lesson; welfare talk; time at 9 o'clock.

KOA, Denver, Col., 323 (Mt. T.)—12:20 to 12:50 P. M., organ. 1, N. Y. stock reports; livestock; fruit and vegetable report and weather. 3, half hour for housewives. 6, N. Y. stock reports; livestock; vegetables and late news bulletins. Silent night.

KFNH, Shenandoah, Iowa, 266 (C. S. T.)—6:30 P. M., Humboldt, Nebr., direction Frank J. Rist.

WFAA, Dallas, Texas, 475.9 (C. S. T.)—12:30 P. M., DeWitt McMurray; music. 6:30, Lone Star Five's orch. 8:30, faculty recital. 11, Pete Pate and Bud Morgan.

KFDY, Brookings, S. D., 273 (C. S. T.)—8 P. M., piano, Florence Brown. 8:10, "Hog Cholera," Dr. Gilbert Weaver. 8:20, "Potato Situation for 1925," G. H. Valentine. 8:30, Muriel Spooner, mezzo soprano. 8:40, "Hay and Pasture Crops," R. E. Johnston. 8:50, piano, Florence Brown and vocal solo, Muriel Spooner.

KTHS, Hot Springs (374.8 (E. S. T.)—8:30 P. M., Eastman Hotel orch. 9:30, Meyer Davis-New Arlington Hotel orch. 12:15, Owl frolic.

WOI, Ames, Iowa, 270 (C. S. T.)—9:30 A. M., weather. 12:30 P. M., chimes; weather; markets; dairy production. 8:15, music. 9:30, weather.

WGR, Buffalo, N. Y., 319 (E. S. T.)—6 P. M., Hallpryd string trio. 8, variety program. 9, Victor hour. 10, Silvertown Cord Co. orch.

WEAR, Cleveland, Ohio, 390 (E. S. T.)—7 P. M., organ, Vincent H. Percy. 8, concert. 9, Victor artists.

WMAQ, Chicago, Ill., 477.8 (C. S. T.)—4 P. M., household hour, Mrs. Elizabeth O. Hiller. 4:30, Federation of Women's Clubs. 6:25, Hote LaSalle orch. 6:50, "Daddy." 8, garden talk, James H. Burdett. 8:15, financial talk. 8:30, Edward Graening; violinist. 8:50, University of Chicago lecture. 9:15, Orpheus Choral society.

## Friday, March 27

CKAC, Montreal, Can., 411 (E. S. T.)—1:45 P. M., Windsor Hotel luncheon trio. 4, weather and stock reports. 4:30, 110 lessons.

KPO, San Francisco, 423 (P. S. T.)—7 A. M., "Daily Dozen" by Bernard Drury, piano accompaniment by Mel Lyons. 10, chat for the housewives on "Home Making" by "Prudence Penny" of the San Francisco Examiner. 10:30, "Ye Towne Cryer" News bulletins. 10:40, "What is playing at the Local Theatres." 11:50, market report on eggs, butter, cheese and poultry. 12 noon, time signals from the Naval Observatory; reading of the scripture. 12:45 P. M., talks broadcast from the Commonwealth Club luncheon at the Palace Hotel. 1 to 2, Seiger's orch. 4:30 to 5:30, Seiger's orch. 8 to 10, orch., Wilt Gunzendorfer, director.

KFAE, Pullman, Wash., 348.6 (P. S. T.)—8 P. M., Founder's Day, (all W. S. C. Alumni will be listening in), music by Men's and Women's Glee Clubs; string trio, violin, cello and piano. addresses by the four men of longest service on the faculty: Ex-President E. A. Bryan of the economics department, Vice-President O. L. Waller of the college of engineering, Dr. Solon Shedd of the geology department, and Dr. Sofus B. Nelson of the agricultural extension division.

FRIDAY, MARCH 27 (Continued)

**WBAP, Fort Worth, Texas, 476 (C. S. T.)**—12:05 to 12:30 P. M., Ward's "Trail Blazers," playing in their studio. (W. E. B.) 4, educational lecture; weekly book review by Peter Molyneux. 7:30 to 8:30, Hood County Male Quartet of Granbury, Texas. (C. B. L.) 9:30 to 10:45, dance program by Fred Cahoon's orchestra. (The Hired Hand.)

**WOS, Jefferson City, Mo., 440.9 (C. S. T.)**—8 P. M., addresses: "Missouri's Road Program," by B. H. Piepmeier, state highway engineer; "The Peculiarities of Handling Stock Hogs in Missouri," by Dr. Homer A. Wilson, state veterinarian; original poems by LeRoy H. Kelsey, secretary to Governor Sam A. Baker, called the "Edgar A. Guest of Missouri"; varied musical program by talent from Hannibal, Missouri.

**WHO, Des Moines, 526 (C. S. T.)**—7:30 P. M., Stewart Watson, American baritone, accomp. by Helen Birmingham; Sara Helen Eaton, violinist; Grace Haffner, accompanist; Emma Keller May, soprano; Dorothy Dyer Everett, accompanist; Williamson Brothers, mandolin, guitar and banjo artists.

**KFI, Los Angeles, Cal., 467 (P. S. T.)**—5 P. M., news. 5:30, news, 6:45, radiatorial period. 7, Examiner program. 8, pipe organ. 9, Herald program. 10, Myra Belle Vickers and her artist pupils.

**WGBS, N. Y. C., 316 (E. S. T.)**—6:30 P. M., Herman Bernard, managing editor of RADIO WORLD, "Radio Hookups and Problems." Mr. Bernard is on the air at this station every Friday at 6:30 P. M.

**WCAE, Pittsburgh, Pa., 462 (E. S. T.)**—12:30 P. M., weather; news. 4:30, Sunshine Girl; markets. 6:30, dinner concert from William Penn hotel. 7:30, Uncle Kaybee. 8, police reports. 8:30, concert.

**WGY, Schenectady, N. Y., 379.5 (E. S. T.)**—2 P. M., "Health Hints," by Dr. C. W. Woodall. 6:30, Sunday school lesson. 7, Albany Strand Theatre orch. 7:30, health talk. 7:40, Remington band; Elizabeth M. Daniels, soprano, soloist. 10:30, Remington band.

**WEEL, Boston, Mass., 303 (E. S. T.)**—12:15 P. M., Lenten service. 2, society orch. 6:30, Big Brother Club. 7:15, Eliot Daniel, pianist. 7:30, program Whiting Milk Co.; 8, Neapolitan musicale. 8:30, All Saints choir. 9:30, musicale.

**WDAF, Kansas City, Kans., 365.6 (C. S. T.)**—3:30 P. M., Star's radio trio. 5:50, market, weather, time. 6, School of the Air; Tell-Me-a-Story Lady; Trianon Ensemble, Hotel Muehlebach. 11:45, nighthawk frolic, Plantation Players, Kansas City Club orch.

**KFOA, Seattle, Wash., 455 (P. T.)**—12:30 P. M., Seattle Chamber of Commerce. 4, Olympic Hotel Concert orch. 6:45, Sherman, Clay and Co. 8:15, weather. 8:30, Times program. 10, Eddie Harkness orch.

**WLW, Cincinnati, Ohio, 423 (C. S. T.)**—10:45 A. M., weather and business reports. 11:55, time. 12:15 P. M., Ahaus Brunswick orch. 1:30, quotations.

**WPG, Atlantic City, N. J., 299.8 (E. S. T.)**—9 P. M., testimonial banquet to Samuel P. Leeds; speaker, Hon. George S. Silzer, governor of New Jersey. 11, Paul Whiteman's dance orch.

**WEMC, Berrien Springs, Mich., 286 (E. S. T.)**—9 P. M., Book talk by Mr. T. E. Unruh.

**WWJ, Detroit, Mich., 352.7 (E. S. T.)**—8 A. M., exercises. 9:30, tonight's dinner, woman's editor. 9:45, Public Health Service bulletin. 10:25, weather. 11:55, time. 12:05 P. M., Hotel Statler orch. 3, Detroit News orch. 3:50, weather. 3:55, market. 6, concert. 8, Detroit News orch. 9, Victor Recording orch.

**KNX, Los Angeles, Cal., 337 (P. S. T.)**—11:30 A. M., Estelle Lindsay's talk. 6:15 P. M., dinner hour program. 7:30, Eastern Outfitting Co. program. 8, West Coast Theatres. 9, KNX features. 11, Cocoanut Grove orch. 12, Wuritzer organ concert.

**WHAS, Louisville, Ky., 399.8 (C. S. T.)**—4 P. M., Louisville Conservatory of Music; police bulletins; weather; readings; bulletins. 4:55, market. 5, time. 7:30, concert, Southern Baptist Theological Seminary and Training School; bulletins; time.

**WGN, Chicago, Ill., 370 (C. S. T.)**—9:31 A. M., time. 9:35, stock and farm quotations. 10, wheat. 10:30, wheat and cable reports. 11, wheat, weather, dairy reports. 11:30, wheat, grain and livestock receipts. 11:56, time. 12, wheat, board of trade. 12:10 P. M., board of trade quotations; hog sales. 12:35, Tea Room orch. 1, wheat. 1:05, Tea Room orch. 1:35, readings. 1:40, Drake concert ensemble and Blackstone string quintet. 2:30, musical recital. 3, miscellaneous entertainment. 5, stock exchange and market. 5:30, Skeeex time for children. 5:57, time.

**KTHS, Hot Springs, 374.8 (E. S. T.)**—8:30 P. M., Little Rock artists. 9, Meyer Davis-New Arlington ensemble. 9:30, Little Rock artists.

**WGBS, New York City, 376 (E. S. T.)**—6:35 P. M., Herman Bernard, managing editor, RADIO WORLD, "Radio Hookups." Mr. Bernard is on the air every Friday at this station at 6:35 P. M.

**WHAS, Louisville, Ky., 399.8 (C. S. T.)**—4 to 5 P. M., Louisville Conservatory of Music; police bulletins; weather; readings; news. 4:55, livestock, produce and grain market reports. 5, time. 7:30 to 9, concert, Southern Baptist Theological Seminary and Training School; news; time at 9 o'clock.

**KOB, State College, N. M., 348.6 (S. Mt. T.)**—7:30 P. M., Popular Science Course, lesson No. 12, by Dr. D. S. Robbins; "Lincoln and Manzano National Forests," by Geo. H. Cook, Forest Service, U. S. D. A.; old time songs; music by children.

**KOA, Denver, Col., 323 (Mt. T.)**—12:20 to 12:50 P. M., organ. 1, stock reports (2 o'clock quota-

# Who is this Man?



THE original drawing of a RADIO WORLD front cover illustration in colors will be sent to the first person to identify this radio performer. He may be a WGY player.

tions); livestock; fruit and vegetable report and weather. 3, matinee for housewives. 6, N. Y. stock reports; livestock; vegetables; news. 6:40, Book of Knowledge program. 8, Schmitt Rialto orch. 8:10, studio concert, piano and violin solos; soprano and tenor solos; harp solos; a vocal duet and KOA orch. selections; Laddie Wood, 8 years old.

**WFAA, Dallas, Texas, 475.9 (C. S. T.)**—12:30 P. M., Dr. Robert Stewart Hyer; Sunday school lesson. 4:30, woman's hour. 6:30, Paul Cretien and his banjo quartet.

**KFNF, Shenandoah, Iowa, 266 (C. S. T.)**—6:30 P. M., Radio & Electric Co., Blockton, Iowa. 8:30, High School and Community Club, Elliott, Ia.

**WOL, Ames, Iowa, 270 (C. S. T.)**—9:30 A. M., weather. 12:30 P. M., chimes; weather; markets; dairy production. 9:30, weather.

**WGR, Buffalo, N. Y., 319 (E. S. T.)**—10:45 A. M., home service talk, Betty Crocker. 6:30, Buffalo Trust hour. 8, "Physical Education of the Child," by Carl Burkhardt. 8:15, recital by Minnie Clemons Stem. 10, Larkin string orch.

**WEAR, Cleveland, Ohio, 390 (E. S. T.)**—7 P. M., Golden Pheasant orch. 8, Tadmor Shrine band; Mme. Yolanda Suarez, soloist; Tadmor male quartet.

**WMAQ, Chicago, Ill., 477.8 (C. S. T.)**—12:25 P. M., Y. M. C. A. forum. 4, fashion, Jean Mowat. 4:30, Bush conservatory. 6, organ. 6:30, Hotel LaSalle orch. 8, Wide-Awake club. 8:30, musical geography. 9:15, musical program by Roy Long.

## Saturday, March 28

**CKAC, Montreal, Can., 411 (E. S. T.)**—7 P. M., kiddies stories. 7:30, Windsor Hotel dinner concert. 8:30, variety program. 10:30, Windsor Hotel dance program.

**KPO, San Francisco, 423 (P. S. T.)**—7 A. M., "Daily Dozen" by Bernard Drury, piano accompaniment by Mel Lyons. 10:30, "Ye Towne Cryer" News bulletins. 10:40, "What is Playing at the Local Theatres." 11:50, market report on eggs, butter, cheese and poultry. 12 noon, time, scripture. 1 to 2 P. M., Seiger's orch. 2:30 to 3:30, musical matinee. 3:30 to 5:30, Gene James' Rose Room Bowl orch., playing at the Palace Hotel. 6:20, garden hints. 6:30, "What is playing at the Local Theatres." 8 to 12, Weidner's dance orch.

**PWX, Havana, Cuba, 400 (E. S. T.)**—8 P. M., concert, Prof. Juan Gonzalez.

**KFI, Los Angeles, Cal., 467 (P. S. T.)**—5 P. M., news. 5:30, news. 6:45, radiatorial period. 7, Lake Arrowhead orch. direction of Mel Lemon, banjoist. 7:45, book shelf chat. 8, Examiner program. 9, male quartet singing "A Night on the Plantation." 10, Radio Club songs.

**WHAS, Louisville, Ky., 399.8 (C. S. T.)**—4 P. M., Louisville Conservatory of Music; police bulletins. weather; readings; bulletins. 4:55, market. 5, time. 7:30, concert; bulletins; time.

**WDAF, Kansas City, Kans., 365.6 (C. S. T.)**—3:30 P. M., Star's radio orch. 5:50, market, weather, time. 6, School of the Air. 11:45, nighthawk frolic.

**WBBR, Staten Island, N. Y., 272 (E. S. T.)**—

8 P. M., Dr. Hans Haag, violinist. 8:15, Bible questions and answers. 8:45, Dr. Hans Haag. **WWJ, Detroit, Mich., 352.7 (E. S. T.)**—8 A. M., exercises. 9:30, tonight's dinner, woman's editor. 9:45, Public Health Service bulletin. 10:25, weather. 11:55, time. 12:05, Hotel Statler orch. 3, Detroit News orch. 3:50, weather. 3:55, markets.

**WPG, Atlantic City, N. J., 299.8 (E. S. T.)**—9 P. M., Hotel Traymore orch. 10, Paul Whiteman's Dance orch.

**WLW, Cincinnati, Ohio, 423 (C. S. T.)**—8 A. M., exercises. 10:45, weather and business reports. 11:55, time. 1:30 P. M., market quotations. 3, Marco Melody Boys. 6, concert.

**KFOA, Seattle, Washington, 455 (P. T.)**—4 P. M., Olympic Hotel Concert orch. 6:45, Moran School. 8:30, Times program. 10, Eddie Harkness orch.

**WCAE, Pittsburgh, Pa., 462 (E. S. T.)**—12:30 P. M., news; weather. 2:30, tea-dansant music from the Nixon restaurant. 6:30, concert from William Penn hotel. 7:30, Uncle Kaybee. 7:45, police reports. 8, current motor topics. 8:30, concert.

**WGY, Schenectady, N. Y., 379.5 (E. S. T.)**—8:15 P. M., United States Marine band. 9:30, Pbil Romano's orch.

**WGN, Chicago, Ill., 370 (C. S. T.)**—9:31 A. M., time. 9:35, stock and farm quotations. 10, wheat. 10:30, wheat and cable reports. 11, wheat, weather, dairy reports. 11:30, wheat, grain and livestock receipts. 11:56, time. 12, wheat, board of trade. 12:10 P. M., board of trade quotations; hog sales. 12:35, Tea Room orch. 1, wheat. 1:05, Tea Room orch. 1:35, readings. 1:40, Drake concert ensemble and Blackstone string quintet. 2:30, musical recital. 3, miscellaneous entertainment. 5, stock exchange and market. 5:30, Skeeex time for children. 5:57, time.

**WFAA, Dallas, Texas, 475.9 (C. S. T.)**—12:30 P. M., Cornfield Symphony orch. 6, Honey Boys orch. 8:30, Dallas Alumni of Beta Theta Pi. 11, Adolphus Hotel orch.

**KTHS, Hot Springs, 374.8 (E. S. T.)**—8:30 P. M., Charles L. Fischer orch.; tenor, Tubby Veil. 9, Hendrix College Glee Club. 10, Meyer Davis-New Arlington orch.

**WOL, Ames, Iowa, 270 (C. S. T.)**—9:30 A. M., weather. 12:30 P. M., chimes, weather; markets; dairy production. 9:30, weather.

**KFNF, Shenandoah, Iowa, 266 (C. S. T.)**—6:30 P. M., orch. 8:30, Oregon High School.

**WHAS, Louisville, Ky., 399.8 (C. S. T.)**—4 to 5 P. M., Louisville Conservatory of Music; police bulletins; weather; readings; news. 4:55, livestock, produce and grain market reports; time. 7:30 to 9, concert under the auspices of Levy Bros., Louisville; time.

**KOA, Denver, Colo., 323 (Mt. T.)**—12:20 to 12:50 P. M., organ. 1, N. Y. stock reports; livestock and weather. 9 to midnight, dance music; Joe Mann Rainbow-Lane orch.

**WMAQ, Chicago, Ill., 477.8 (C. S. T.)**—6 P. M., program by Postoffice Athletic asso. 8, Russell Pratt and Fred Daw. 8:30, "Philippine Islands," Mrs. F. J. Schotfeldt. 9, theatre revue.

**WGR, Buffalo, N. Y., 319 (E. S. T.)**—6 P. M., Hallpryd string music.

# LATEST PATENTS

## WASHINGTON.

**PATENTS** on radio inventions granted by the Patent Office include the following:  
**PRINTING TELEGRAPHY** (No. 1,527,259), invented by Pierre Lindet, of Paris, France. Relates to an electrical transmitting and receiving apparatus particularly applicable to telegraphy through wires and wireless telegraphy and so combined as to require no permanent synchronism between the emitting and the receiving station.

**VARIABLE CONDENSER** (No. 1,527,578), invented by David Harrison Sheriff, Jr., of Kansas City, Mo. Provides means for giving a fine or critical adjustment to the condenser after the usual adjustment.

## Eligibles Listed For Geneva Show

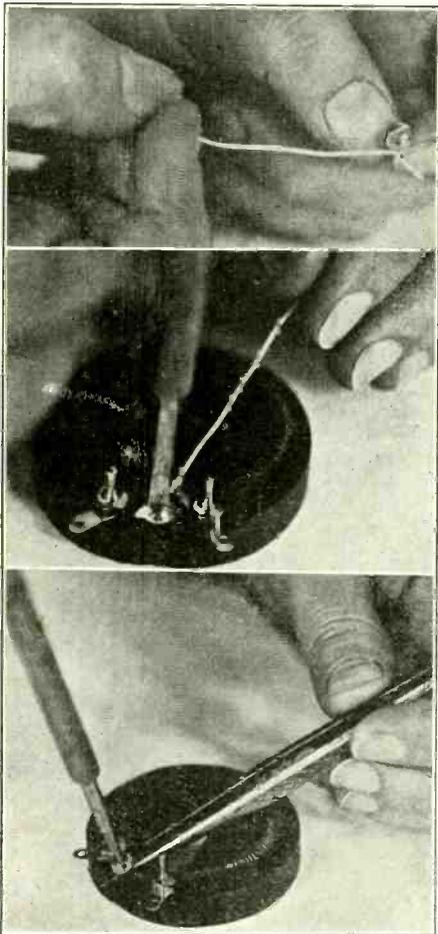
### WASHINGTON.

**AN INTERNATIONAL** exposition of wireless telegraphy, which will include the exhibition of moving picture apparatus, talking machines and scientific toys will be held at Geneva from September 23 to October 4. The exposition will be held in the rooms of the Electoral Palace at Geneva during the session of the Assembly of the League of Nations when great numbers of foreigners visit Switzerland. All firms, foreign or Swiss, manufacturers of wireless apparatus, moving picture machines, talking machines and scientific toys or products, are eligible to take part in the exposition.

## DEVICE TELLS HOW FAR OFF THAT DX STATION IS

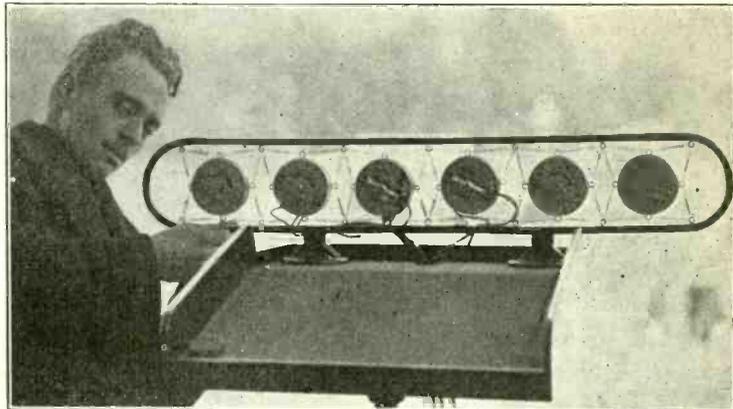
**A NEW** radio book has been placed on the market by A. W. Waite. It is pocket size, and is called "My Radio Records." There are sixty-four pages, including a list of broadcasting stations of the United States, Canada and West Indies. The list is alphabetically arranged for "logging" the stations. The form contains a space for wavelengths of stations, dial positions and also for noting distances the receiver is bringing in. With each copy of "My Radio Records" is furnished a device known as a "Locator and Scale of Miles" for locating stations on the map and measuring distance.

# Wire Holds Screw



DID YOU ever feel all out of sorts when, despite all imaginable precautions, a screw would obstinately persist in falling out of reach, and room was insufficient for you (unarmed with tweezers as in lower picture) to hold said evasive screw in place? A happy substitute for the tweezers is found in a short piece of wire, one end of which is twisted tightly around the screwhead. Thus is possible loss of temper avoided, for the screw is held firmly in place until the task is completed. This bent wire idea is also serviceable in getting in among transformers, as one can't pass his hand through them very conveniently! (Radio World Staff Photo)

# Coolidge Inaugural He



SIX LITTLE MICROPHONES ALL IN A ROW were used in broadcasting the inaugural; R. R. Halpenny, of WCAP, Washington, D. C., is examining the microphones. (Kadel & Herbert.)

FROM a framework over the coat of arms of the United States six little microphones, hanging in a row, at Washington, picked up the inaugural ceremonies and forwarded every sound over land wires to twenty-five broadcasting stations scattered from coast to coast.

WEAF, New York, and twenty other broadcasters were connected with two of the microphones; the transmitters of WJZ, WRC, WGY and WBZ were connected with two other microphones and the remaining two pick-up devices forwarded the sound to the public address system of horns distributed around the Capitol and among the crowd. In each case one microphone was for emergency, only one being used by each group for actual broadcasting of the President's address. Graham McNamee, one of WEAF's announcers, told the story to the audience of the Broadway station and twenty other stations located from Boston to San Francisco. Norman E. Brokenshire, one of WJZ's announcers, did the broadcasting for the Aeolian Hall station and the trio of stations linked with it.

### McNamee In a Booth

WEAF's announcer was located in a booth, built for the occasion, at the left of the President as he faced the audience. The booth was about fifty feet away from the microphones and seldom shows in the pictures of the inauguration because it was hidden from view by the pillars.

The announcer of the Radio Corporation of America was on the opposite side of the Capitol steps, but was in the open, as no booth was used.

W. C. Johnstone assisted McNamee at the booth by acting as a central operator. He wore a headset and had a telephone transmitter which kept him in communication with the control room located underneath the steps of the Capitol, and with the Wash-



WITH no teacher to play for them, the pupils of Washington Irving High School, New York City, enjoy school calisthenics to radio music, the most popular lesson of the day. (Underwood & Underwood).

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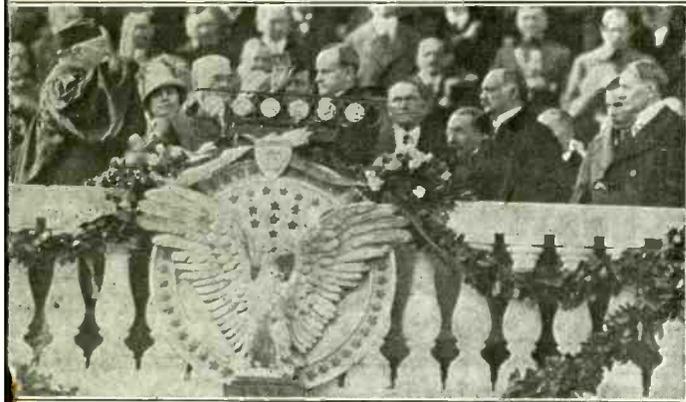
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# Mother Goose Debated



Calvin Coolidge before six microphones, takes his oath of office as the 29th President of the United States. Chief Justice Taft (left) administers oath—the first time in history that one who had taken that oath administered it. Vice-President Dawes is at extreme right, pipeless but not disconsolate. (Wide World).

on office of the Bell system, from which point all the land wires radiated to the different sections of the country. In the past, the president was also in constant communication with the announcer with an operator located about fifty feet away near the band stand. It was the duty of the sentinel near the musicians to signal the band to play, and he also flashed the name of the selection. Then the announcer notified McNamee, who announced it over the air. The microphone wire leading from the booth to the control room was then used to tell the operators to shift the circuit from the microphone in the booth to a microphone at the band stand. Just previous to the time President Coolidge started his address messages were received at the control room by wire from all but one of the transcontinental chain of stations telling the operators at the Capitol that the national network of wire and radio was working to perfection. During the broadcasting there appeared to be a trouble along one of the lines that led from Washington to Atlanta. Station WSB notified the American Telephone and Telegraph Company that the line was noisy. The Pacific Coast stations reported "Everything fine."

### "Hardest Job" for McNamee

After the broadcasting was finished and all the stations "signed off" announcer McNamee said: "It was the hardest job of announcing I ever did because we never knew just what would happen next and when the President would arrive. We had sentinels posted along the route to be taken by the President so that they could relay word to us relative to his approach."

After Chief Justice Taft administered the oath to President Coolidge there was a pause and the ether was silent. The next sound to come over the air was the voice of the President beginning his address. The radio audience did not hear him say, "I do," after Chief Justice finished speaking. Both announcers said that President Coolidge did not speak loud enough to actuate the battery-operated microphones and that only those in the immediate vicinity heard his words, "I do." However, just before the flourish of trumpets called the crowd to attention some one in the audience yelled: "Who's at bat? Who's at bat?" and it was clearly audible to those listening to WJZ and the stations linked with it.

### Radio Sets in Classrooms

Receivers and loudspeakers were installed in hundreds of classrooms and high school auditoriums, so that the students could be kept in closer contact with the great event. It was pointed out by an official of WEA that such broadcasting gives the school children a knowledge of history, the workings of the Government, and is likely to have a tendency to strengthen their patriotism. The announcer knew that they would have to "plug" the air during lulls in the program and they trusted to the Marine Band to fill many of the gaps in broadcasting. Both announcers had prepared talks on past inaugurations, descriptions of the Capitol decorations and the program which took place in the Senate when Vice President Dawes was inaugurated. The announcers know that their most difficult work is to "plug" the microphone and in their efforts to get material to broadcast they look all the time at the scene for the unexpected things to happen. WJZ's announcer said that everything went smoothly and nothing unexpected turned up within range of the microphones. It was estimated that 4,800,000 heard the program through WRC, WY, WJZ and WBZ, and that approximately 18,000,000 were in contact with the waves of the twenty-one other transmitters. It was the first time an inauguration ceremony was broadcast by radio.



MOTHER STONER, noted educator, undertakes negative argument in debate with Henry Hull, actor, on whether Mother Goose rhymes are worth while for kiddies. They are pictured at the microphone at Station WFBH, in the Hotel Majestic, N. Y. C. (Fotograms).



WITH A RADIO SET AT HAND, sickness was no obstacle to this courageous business man, who though confined for days actively conducted his business from his bedside and came out ahead of the stock market. (Sentinel).



MEET your "brother" operator Miss Elizabeth Zandonini of amateur station 3CD2 which she constructed with her own hands. Miss Zandonini is also secretary of the Washington Radio Club and radio aide at the U. S. Bureau of Standards. (Underwood & Underwood).

# The Radio University



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

WILL you kindly give a switching arrangement for use of either loop or aerial in a reflex?—Jeff Pfeffer, 1445 47th St., Brooklyn, N. Y.

Fig. 102 is the circuit you request. The jack, mounted on the panel, may be used to switch the primary circuit out, and the loop in. The loop will necessarily have to have a plug on the end of the leads, so that when plugging in the loop you will automatically cut out the aerial and ground.

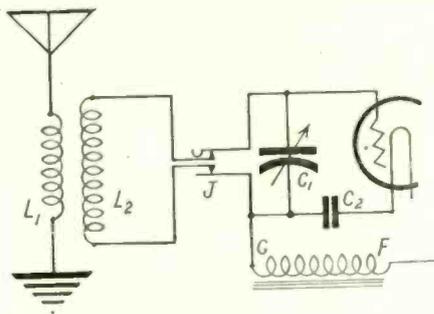


FIG. 102—How to connect a jack for use of either loop or aerial and ground in a reflex set. L1 and L2 are the primary and secondary, respectively, of your present set. J is the double-circuit jack. Connect one outer prong of the jack to the grid of the RF tube, other outer prong to the grid return lead. One of the inner prongs goes to one side of the coil L2 (secondary), the other inner prong to the remaining end of coil L2.

I HAVE a 5-tube set of the Neutrodyne type. Would you advise the use of a copper pipe aerial similar to the one used in Airica to receive KDKA? My present aerial is 100 feet long and the lead-in is 45 feet. At present we are having quite a contest in our city for long-distance reception and I am anxious to increase my range.—Charles L. Mulligan, 6802 Ridge Boulevard, Brooklyn, N. Y.

The copper tube antenna was designed especially for reception of extremely short waves from KDKA and the expense of such an antenna would not warrant the change from the antenna you have in operation. The distant stations are west of Brooklyn, so run the wire east and west and take the lead-in off the western end. Try all tubes as the detector. Tune in a weak signal and note which tube is the most sensitive. The range of a set is dependent to a great extent upon the sensitivity of the detector.

WILL you kindly tell me how I can make my three-circuit regenerative receiver more selective? The set is made up of the following parts: One 23-plate series aerial condenser, one variocoupler, one 23-plate secondary condenser and a plate variometer.—A. Michel, 654 Beck St., Bronx, New York City.

The only practicable way to increase the selectivity of any receiver, aside from placing a wave trap in series with the aerial, is to increase the efficiency of the parts used in the set. In other words, if the parts of your set are not the best obtainable, the selectivity of your receiver may be increased by substituting better parts, or by using a more selective hookup.

ON some nights all stations come in clearly, but in jerks, loud for one minute and then faint. The music may continue for a long time or just for a few minutes. What causes it? (2) I have a lot of trouble in clearing up stations below 280 meters. Is this because there are so many stations close together? (3) I can hardly hear WFAF and WNYC, here at New Haven, but the other New York stations come in good. The aerial is 125 feet long. What can I do to get WFAF better? (4) Does WKAQ use the 312-meter wave? I heard an announcer speaking in broken English and I could not get the call letters clearly. I am a shut-in and derive great pleasure in picking up the distant stations.—Gustave G. Zismer, 2571 Madison St., Ridgewood, Queens.

Atmospheric conditions cause fading of signal strength, but it is seldom noticeable on stations less than 100 miles away. There is very likely a loose connection in your set. Inspect the springs of the sockets and jacks to see if they make a good contact with the tube prongs and telephone plug. Run-down batteries will cause a fluctuation in signal strength. See that the lead-in or antenna does not sway in the wind and touch objects that ground the wires. (2) There are many stations on the low wave lengths and often an interaction

takes place between the waves, producing a whistle called a "beat note." (3) Add about 25 feet of wire to the antenna and you will undoubtedly get the higher waves better. (4) We have no record that WKAQ is on the 312-meter wave. Their programs that reach us list the wave as 372 meters.

I BOUGHT a second-hand storage battery and the terminals are not marked plus or minus. How can I tell which is positive and which is negative? (2) Which is the positive terminal of an ordinary dry cell?—Francis J. Tietzort, 520 West 124th St., N. Y. City.

Place two wires leading from the battery terminals in a glass of salt water. The wires must not come near each other. Small bubbles of gas will accumulate and rise from one of the wires when the current is turned on. The wire from which the bubbles arise is negative. A similar test which gives a clearer indication may be had by using with the salt one or two pills of pre-nephthalin obtainable at drug stores. The negative will be bright red in this test.

DOES it make any difference if the ground wire is long or short? My ground wire is about 32 feet around the room and attached to the cold water pipe. I could attach it to the radiator about 14 feet away. (2) Would this be better? I live on the ground floor and therefore the antenna and lead-in totals 150 feet but I cannot get distant stations past KDKA. The antenna points north and south and the set has four tubes.—Irving Phillips, 7317 Sixth Ave., Brooklyn, N. Y.

The length of the ground wire figures in the wave length range of the set just as the lead-in does. To add to the length of a ground wire or lead-in increases the wave length of the receiving system. (2) Try the radiator as the

ground contact because it will shorten your ground lead. Use whichever pipe gives the best results regardless of the length of the wire. There are very few stations north or south of you. In order to get the benefit of the directional characteristics of the antenna it would be advisable to point the wire east and west and take the lead-in off the western end.

WHAT causes the whistling in certain musical tones in my Ware Neutrodyne receiver? For instance, the violin sounds very well on the lower tones, but when the performer plays forte and in the middle register, the tones become more of a whistle. This is apparent with certain voices. At times the effect is much like the sound of a person who has lost certain teeth or has an improperly fitted set of false teeth. Have tried new batteries, new tubes, long and short antenna without being able to better this condition. Can you suggest a remedy?—Howard Morton, 190 Claremont Ave., N. Y. City.

The trouble is undoubtedly in the loudspeaker, which fails to reproduce all frequencies equally well.

I HAVE an aerial 100 feet long and 45 feet of intake wire. It is impossible for me to shorten this aerial, as I cannot get on the building where it is fastened. The stations come in very noisy and I have been told that a condenser placed between the aerial and ground will overcome the trouble. What can I do to stop the trouble?—Al Oberender, 367 Seventy-fifth Street, Brooklyn, N. Y.

The length of the antenna does not cause the noise. A condenser in series with the antenna or ground will help to reach the lower wave lengths but will not necessarily eliminate the noise, which may be caused by induction. The antenna should run at right angles to all other wires.

I HAVE a five-tube tuned radio frequency set located on Long Island about fifty miles from New York. This set was formerly hooked up in New York and worked well. After being transferred with the same loudspeaker it functioned so poorly that the New York stations come in low and distorted. The aerial is 100 feet long and it runs north and south. The lead-in is thirty feet. What can be done to get at least good local reception? The ground is made on the hot-water heating system.—Dr. Emil Shoree, 1478 Broadway, N. Y. C.

One of the tubes may be worn out and, if so, distortion and low signal strength are often the result. Shift the tubes around in the sockets to determine in which positions they work most efficiently. Pay particular attention to the detector. Tune in a weak signal and try each tube as detector and note which one gives the greatest signal intensity. In that way you can locate a worn-out tube. If the loudspeaker is of the adjustable type, it may need a slight readjustment. Try the cold-water pipe as the ground. The hot-water pipe does not always give good results. Test the batteries to find out whether they are run down. If you point the antenna east and west and take the lead-in off the western end you will get better results from New York stations and from the majority of stations in the United States. An antenna is directional and there are few stations north or south of you, so you are not getting the best results from the directional property of the wire.

I HAVE a three-circuit tuner, condenser across the secondary cell, which does not respond to stations on wavelengths above 500 meters. Can this set be loaded? If so, how?—J. Rielley, 405 Hawthorne Ave., Newark, N. J.

If a small inductance coil of about fifteen turns is fastened to one side of the plate variometer and connected as shown in the accompanying diagram the set will respond to the higher wave stations. The switch shown to short circuit this additional inductance coil must be installed according to the diagram so that the short wave stations can be tuned in by cutting this coil out of the circuit.

I HAVE a Radiola Super-Heterodyne. At WGY's exact dial setting the volume is tremendous, but terribly distorted. When I move the dial slightly one way or another from the exact setting the volume is reduced and the distortion stopped. How do you account for this? (2) How far will howls from a neighboring receiving set carry?—P. A. Dolan, 380 Sackett St., Brooklyn, N. Y.

The volume is too much for the loudspeaker to handle. Burn the tubes at a point where the volume is right for the loudspeaker. The set will give far more satisfactory results; the tubes will last much longer, and the batteries will give longer service. (2) It depends upon the size and type of set that radiates them.

DOES the thickness of the wire used in an inductance coil have any effect on the inductance of the coil, provided the number of turns is kept constant?—Herman Jacobs, 7401 Ridge Blvd., Brooklyn, N. Y.

For the same style coil, if when smaller gauge wire is used, the turns are wound so that they touch one another the inductance of the coil will be increased, since the number of turns per unit length is increased and the inductance varies with the square of this number. But if the smaller wire is used and the turns spaced, so that the coils have the same length, the inductance of the coil will be the same as with the larger wire; the only effect will be an increase in the resistance of the coil.

## Join RADIO WORLD'S University Club

and we will enter your name on our subscription and University lists by special number. Put this number on the outside of the forwarding envelope (not the enclosed return envelope) and also put it on your queries and the questions will be answered the same day as received.

And Get Free Question and Answer Service for the Coming 52 Weeks. RADIO WORLD, 1493 Broadway, New York City:

Enclosed find \$6.00 for RADIO WORLD for one year (52 Nos.) and also consider this as an application to join RADIO WORLD'S University Club, which gives me free information in your Radio University Department for the coming year, and a number indicating my membership.

Name .....

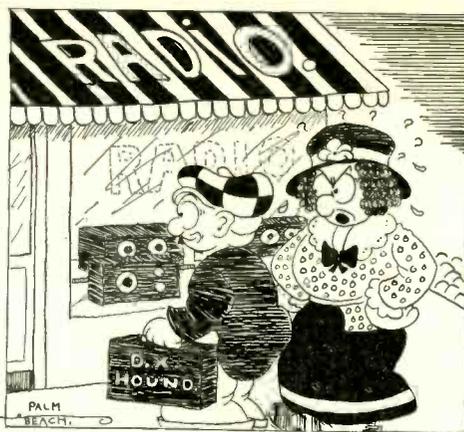
Street .....

City and State .....

**MR. DX HOUND**

*A Character Created  
By RADIO WORLD Artist*

**By HAL SINCLAIR**



**The Radio Trade**

**Trade Opposes Tax  
by 23 to 10 Vote**

**T**HE PROPOSAL of a 2 per cent. tax on radio sales to pay for broadcasting does not meet with unanimous endorsement of the trade, according to a questionnaire sent out by The Radio Dealer.

One hundred and ninety-six voted against a 2 per cent. tax and eighty-three favored such a tax. Federal control of stations received five votes; a tax on tubes, three votes and a tax on parts received one vote.

Phonograph dealers, radio retailers, manufacturers, jobbers and broadcasting stations answered the question touching on many important phases of the problem. The question was based on the theory that broadcasting continuance was promised the public by the sale of receiving sets, with the further idea that better broadcasting programs would mean increased sales for radio merchandise.

**Returns Called Ample**

Suggestions were made by correspondents representing the foremost concerns in the industry. The principal idea expressed was that the industry should not be taxed to support broadcasting. In every instance the correspondents believed that the broadcasting stations were receiving ample returns in the form of publicity to justify their existence. Alfred L. Smith, General Manager of the Music Industries Chamber of Commerce, pointed out that a strong trade association operating stations offered the best plan of financing broadcasting. "Advertising is the logical way to pay for broadcasting," declared Edward H. Jewett, President of the Jewett Radio and Phonograph Company. "Its results will be so profitable that broadcasters will be able to

obtain the services of the best artists available," added Mr. Jewett.

A number of correspondents took the stand that a 2 per cent. tax on radio equipment would do more to hinder the sales of radio equipment and hurt the industry than any other agency. In the opinion of the Central States Electric Company, Kansas City, Mo., the tax would be unfair to the ultimate consumer. The dominant keynote conveyed by Harry Alter, President of the Harry Alter Company, Chicago, seemed to express the general sentiment of the majority of those who answered the questionnaire. He declared that "conditions are not ripe in the industry at the present time for a tax of this nature. A point of stability should be reached before such a tax should be assessed."

**Against Federal Control**

In the event of such a tax being enforced many of the correspondents took the stand that its distribution, unless placed in the proper hands, would be the means of misappropriation, possibility of dishonesty and perhaps unfairness in allotting the fund subscribed to the various stations. The prospect of Federal control was commended by many, but the majority was not in favor of such a plan.

The control of radio in England was strongly stressed by many correspondents, but when consideration is made of the fact that only 1,000,000 sets are in operation in that country there was no reasonable ground for comparison. The possibility of Government ownership of stations aroused no great interest, many writers pointing out that it offered numerous disadvantages and would be unfair to the present operators.

**Suggests 1/2% Tax**

L. E. Reid of the American Electric Company, Jasper, Mo., made the lowest estimate of the amount of a tax when he suggested that one-half of 1 per cent. would be sufficient to support the stations. Naturally this tax was to be taken from the set owners at the time of the purchase. Several manufacturers of small parts declared that they should be overlooked in the matter of a tax, while battery manufacturers took the same attitude. Three different individuals declared that the tube manufacturers should be taxed, but gave no very convincing idea why that should be done.

**Call Tax a Limitation**

The industry as a unit is against anything bordering on a tax. One of the principal reasons advanced was that at the present time it would be out of the question to tax the trade in proportions that would be fair and equitable to all concerned. The very idea of a tax, many correspondents pointed out, was such as to limit future sales, due to the fact that the word "tax" was not a very popular one in the vocabulary of the American public. That the time would come when a tax would be inevitable, was stressed by many correspondents, but rather than act as prophets of an uncertainty, they took the stand that it would be better not to stipulate the exact date.

Included in the pages that carried the letters from correspondents in every section of the country was the article entitled "Who Is to Pay for Broadcasting?" written by H. D. Kellogg, Jr., who was awarded \$500 by the American Radio Association in a nation-wide contest to determine the best answer.

**Literature Wanted**

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

Trade Service Editor,  
Radio World,  
1493 Broadway, New York City.  
I desire to receive radio literature.  
Name .....  
City or town.....  
State .....  
Are you a dealer?.....  
If not who is your dealer?  
His Name .....  
His Address .....

- John P. Anderson, 1001 Diversey Park, Chicago, Ill.
- Palisade Sales Co., 404 Palisade Ave., Jersey City, N. J.
- Harry J. Sobotka, Soux Junction, Vt.
- R. L. Miller, R.F.D. Box 245, Termo, Cal.
- Thomas P. Fox, 7 Taylob Terrace, Dorchester, Mass.
- Clyde L. Woods, 348 Wells Ave., French Lick, Ind.
- Dave M. Beck, Box 54, North Cuello, Ohio.
- Tony Straka, Box 416, Fairchance, Pa.
- F. Kenneth England, Baier Hill, New York, Dealer, H. B. Coates.
- Clyde Brunson, R.F.D. No. 1, Mullins, S. C.
- Eugene M. Hodgson, Jr., Minonk, Ill.
- J. H. Knippenberg, dealer, Laurenceburg, Ind.
- Kenneth Veice, Toledo, Ohio.
- A. G. Hurlbutt, 112 York St., Ithaca, N. Y.
- Frank J. Jolly, Jr., Station "A", Ogden, N. Y.
- E. F. Henning, R.F.D. No. 3, Box 80, Little Rock, Ark.
- J. C. Dice Electric Co., dealer, 113 W. 5th St., Little Rock, Ark.
- J. F. Cahill, 518 3rd Ave., Lyndhurst, N. J.
- J. E. Berberich, 3702 Calhoun Ave., Houston, Tex.
- Lieut. T. W. Rass, Spring Hill, Tenn.
- L. V. Sluvely, dealer, Route No. 1, Box 116 N., Bakersfield, Cal.
- E. L. Hattac, 2331 Buena Vista St., Bakersfield, Cal.
- Vernon Beris, Box 164, St. Louis Park, Minn.
- Thos. E. Whalen, dealer, 460 W. 151st St., New York, N. Y.
- G. Harold Wilson, 63 So. Main St., Wilkes-Barre, Pa.
- Howard Bailey, Senath, Mo.
- J. T. Fields, dealer, Senath, Mo.
- John H. Allen, care United Cigar Stores, Sharon, Pa.
- G. E. Leffingwell, 357 W. State St., Sharon, Pa.
- Aitken Radio Co., 504 Superior St., Toledo, Ohio.

**Coming Events**

[Readers are requested to send in dates and places of future events not scheduled in this department.]

- APRIL 19 TO 25**—International Radio Exposition, Steel Pier, Atlantic City, N. J.
- SEPT. 12 TO 19**—Fourth Annual National Radio Exposition, by American Radio Exposition Co., 522 Fifth Ave., N. Y. C., to be held in Grand Central Palace.
- SEPT. 14 TO 19**—Second Radio World's Fair, 258th Field Artillery Armory, Kingsbridge Rd. and Jerome Ave., New York City.
- SEPT. 14 TO 19**—Pittsburgh Radio Show, Motor Square Garden. (Postponed from Jan. 19.)
- SEPT. 15 TO 19**—Washington (D. C.) Radio Show.
- SEPT. 23 TO OCT. 4**—International Wireless Exhibition, Geneva, Switzerland.
- NOV. 9 TO 15**—Milwaukee Radio Exposition, Civic Auditorium.
- NOV. 17 TO 22**—Fourth Annual Chicago Radio Exposition, Coliseum.
- DEC. 1 TO 6**—Boston Radio Show, Mechanic's Hall.

Date not set yet for exposition, also to be held in Chicago, direction of Harold Bolster.

**Business Opportunities  
Radio and Electrical**

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

**RADIO AND BATTERY SHOP FOR SALE**—Good opportunity; \$3,000, terms arranged; stock inventoried at about \$2,000. White Electric Shop, 1,016 Coney Island Ave., near Foster St., Brooklyn, N. Y. Phone Mansfield 1698; ask for Mr. R. White.

**OVERSTOCKED RADIO MERCHANDISE** wanted; quantities; send particulars, prices; confidential; (cipher). Box AA, Radio World.

**RADIO INVENTIONS, 4 BASIC PATENTS** pending, ready for immediate marketing; partner with \$60,000 wanted to start manufacturing; demonstration will prove exceptional value and possibility of large profits. Box BB, Radio World.

**A THOUGHT FOR THE WEEK**  
RADIO is bringing the nations closer together. Perhaps it will finally settle the whole question of a League of Nations.

# RADIO WORLD

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

TELEPHONES: LACKAWANNA 6976 and 2063  
PUBLISHED EVERY WEDNESDAY  
(Dated Saturday of same week)  
FROM PUBLICATION OFFICE  
HENNESSY RADIO PUBLICATIONS CORPORATION  
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M. B. HENNESSY, Vice-President  
FRED S. CLARK, Secretary and Manager  
1493 BROADWAY, NEW YORK, N. Y.  
(Putnam Bldg., Times Square and 43rd Street)  
European Representatives: The International News Co.,  
Breems Bldg., Chancery Lane, London, Eng. Paris,  
France. Brentano's 38 Avenue de l'Opera.

EDITOR, Roland Burke Hennessy  
MANAGING EDITOR, Herman Bernard

### SUBSCRIPTION RATES

Fifteen cents a copy. \$6.00 a year. \$3.00 for six months. \$1.50 for three months. Add \$1.00 a year extra for foreign postage. Canada, 50 cents.  
Receipt by new subscribers of the first copy of RADIO WORLD mailed to them after sending in their order, is automatic acknowledgment of their subscription order. Changes of address should be received at this office two weeks before date of publication. Always give old address also. State whether subscription is new or a renewal.

### ADVERTISING RATES

General Advertising		
1 Page, 7 1/2 "x11"	482 lines	\$300.00
1/2 Page, 7 1/2 "x5 1/2"	241 lines	150.00
1/4 Page, 4 1/2 "x7"	115 lines	75.00
1 Column, 2 1/2 "x11"	154 lines	100.00
1 Inch		10.00
Per agate line		.75
Times Discounts		
52 consecutive issues		20%
26 times consecutively or E. O. W. one year		15%
4 consecutive issues		10%

Advertising forms close Tuesday, eleven days in advance of date of issue.

### CLASSIFIED ADVERTISEMENTS

Ten cents per word. Minimum, 10 words. Cash with order. Business Opportunities, 50 cents a line; minimum, \$1.00.

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

MARCH 21, 1925

## Lack of Foresight

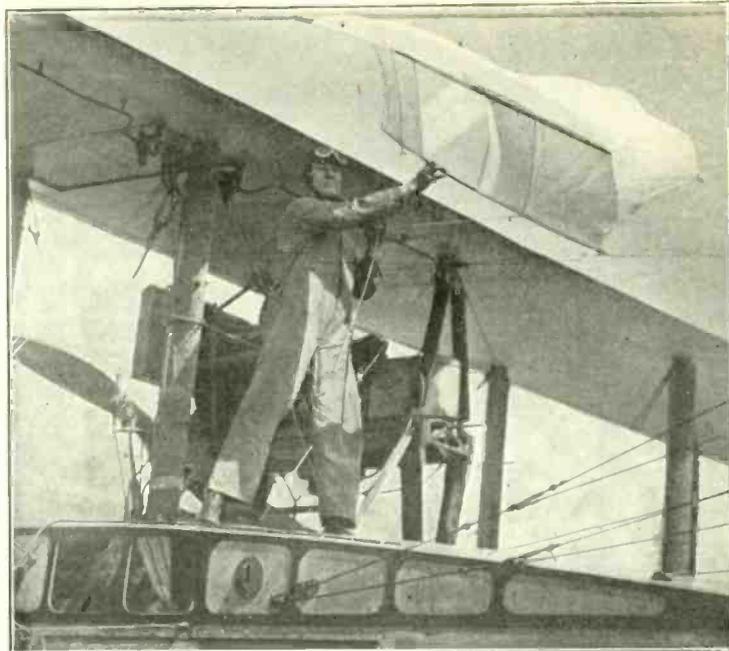


HOW did you happen to catch that severe cold, Bert?"

"I tuned in Miami last night, then suddenly changed to Montreal, without putting on my overcoat."

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

## New Kite Aerial for Planes



THE PROBLEM of a simple aerial for an airplane has been solved, say Navy officials, a trailing kite being used. Thus may lost or stranded airplanes send messages for help. The test shown above was made on Secretary Denby's own plane by Peter Ryan. (Underwood & Underwood).

## By Their Names

Ye Shall Know the Announcers

THE DECISION of the WJZ management to discard the call letter system of distinguishing one announcer from another and permitting these gentlemen to be known by their honest-to-goodness names, is an excellent instance of enlistment in the ranks of iconoclasm. It follows the established practice of WEAF and other stations, who were the forerunners of the iconoclastic movement. Nobody could quite understand why J. Montmorency Twaddleford, chief announcer of station WZXP, should be known as QMR. Some of the announcers who had to masquerade under call letters could not give any explanation of why this was done or how they came to choose the particular letters that were to become inseparably united with their fame. Call letters the station must have and must use, but the stations went far afield in cataloging and cross-indexing their announcers. Now if announcers will only divulge with intelligent frequency the identity of the stations they are serving, all will be as well as can be expected. Let it be hoped that the announcers will not be so flustered over the constant repetition of their own true names as to effectuate a total eclipse of the station. Avocative announcers, guiding the destinies of special programs, are incurable offenders, but real announcers ought not to be too dense to be reformed.

## A Mountain of Mail

WEAF Got 54,000 Letters in January. Why?

IN JANUARY 54,000 letters were received by WEAF. This is probably the hugest mail ever received in a single month by any station anywhere. Possibly a combination of reasons may be advanced for this. One should not lose sight of the fact that the month was ushered in by a recital in which John McCormack and Lucrezia Bori made their debut before the microphone. A deluge of letters immediately ensued. Two weeks later another Victor program was presented. When the best talent is attracted to the microphone the result is never in doubt. WEAF's huge mail is, of course, a compliment to it as one of the very best stations on the air.

A large percentage of the mail concerned programs and other matters of material importance to the station. The advice helped to guide the station in its program course. Again WEAF emphasizes that fans show an increasing trend toward better class music and voices, as against jazz. Maybe home dancing played too much havoc with the parquet floors.

### Radio Credited With Greatest Advance In Science

**T**HE GREATEST scientific advance in 1924 was in the field of communication—radio and radio-photography—said Dr. Arthur A. Hamerschlag, president of the Research Corporation, whose annual report was made public. He said the year had been notable for increased interest of the public in scientific inventions.

### Fingerprints Sent Overseas in Hunt for Criminals

LONDON.

**A**LL THE police chiefs in the principal cities of the United States and other parts of the world have been supplied with the key of a new telegraphic code perfected by Superintendent Charles Collins of the Finger Print Bureau at Scotland Yard. Under this plan, by which the radio is brought into play to assist the work of detectives in tracing criminals, the records of persons held on suspicion may be obtained by wireless broadcasting of their finger prints.

The first use of the new system was made recently when a man arrested in London was identified in New York upon receipt of finger prints taken here. The suspect had no police record in London, but Scotland Yard officials doubted the man's alibi and sent his prints by radio to the New York police, the records of the bureau in that city revealing him as a well known criminal.

In establishing the identity of the prisoner held in London approximately sixty letters and figures were used in the Scotland Yard code system.

### Radio Compass Makes Cape Horn Safe

WASHINGTON.

**C**APE HORN, the grave yard of many a staunch vessel, now has no terrors for any sea captain whose ship is equipped with radio. A radio compass station on Cape Horn is furnishing ships with extremely accurate bearings, according to reports to the Navy Department.

The Navy has also received appreciative letters regarding its radio compass station on Cape Henry. From a position 114 miles southeast of Cape Henry, the S. S. Cockapokset was navigated in a dense fog entirely by radio compass bearings and soundings to Virginia Beach Buoy.

### Navy Receives Thanks

WASHINGTON.

**M**ANY letters have been received by the Navy Department from broadcast listeners expressing appreciation because of action taken to reduce transmission on the Annapolis arc during the "listening" hours. A great deal of former Annapolis night traffic is now handled by the high-frequency set at the Naval Research Laboratory. Navy Press is still dispatched by Annapolis, but the schedule has been advanced from 10 p. m. to after midnight.

### Automatic Set Works Without Tuning, He Says



**TRACY T. HICKS**, of Kansas City, Mo., with his new pocket wireless receiving phone, of which he is the inventor. The phone is self-adjusting and no tuning in or batteries are required. All you have to do is connect up, by means of a clip, with any metallic substance that is grounded and you have results. You can attach one clip to the phone and the other to a bedspring, piano or even an umbrella and hear a radio station. Sometimes it may be necessary to get right under the antenna of a powerful transmitting station, one expert thought, but Mr. Hicks gave a demonstration and the expert is said to have changed his mind. Naturally DX is out of the question, but but locals come in fine. (Underwood & Underwood)

## How to Avoid Crystal Burnout Explained by Priess

By William H. Priess

**T**HE only detecting device known today that is entirely free from self-generated noise and at the same time has the property of detecting with absolute fidelity is the crystal detector. It eliminates the fog or felt-like background of noise present in most radio sets, and due to the hiss of a detector tube, and detects with the brilliant reproduction that is its inherent property.

I discovered that a crystal detector coupled to a radio-frequency amplifier is an entirely different problem from coupling a crystal to an antenna similar to the way it is used in the so-called crystal sets. A new phenomenon is introduced. The tube cancels out effective resistance present in the crystal contact and produces a result that may be described as amplifying detection action. Furthermore, the crystal is cushioned electrically so that its input is limited to the power output of the tube to which it is coupled. This value is below burnout or paralyzation value. A crystal so connected cannot burn out, or, more important, be paralyzed through a heavy signal or static pulse. A tube detector will paralyze under these conditions and cause the set either to distort or howl with a clucking sound.

## What Leak Values to Use For Different Tubes

**S**INCE the advent of broadcasting the grid leak has become popular. Changes in tube construction, regarding the various voltages used for their operation, different types of filaments, a multiplicity of circuits, all mean a different value of grid leak for most efficient operation.

When the specifications call for "one meg" or "two meg" grid leak, they mean that 1,000,000 or 2,000,000 ohms of resistance are required to enable the accumulated charge of the incoming signal to leak off the grid of the tubes in time for the grid to be free for the succeeding electric charge. A simple analogy may be made of the carburetor of an automobile. The motor is the detector tube of the receiver, the carburetor the grid leak.

#### The Carburetor Comparison

If the carburetor is fed too much gasoline, the motor is choked and, as a result, stops, and by the same token if the grid leak allows too much of a charge to remain on the grid of the tube it chokes or, as we say, paralyzes. If the carburetor is fed too little gasoline decreased power results in the motor, and the analogy to the grid leak is still correct, as when the grid leak is of too low a value decreased sensitivity results in the receiver.

The grid leak may be considered as a valve controlling the amount of electrical energy that the detector tube can efficiently take care of without overload.

#### May Cause Noises

Any loose connection or minute electrical defect in the grid circuit is more likely to cause noisy crackling reception than in any other portion of the receiving circuit, because in the detector tube the

actual transforming of energy from the air to the audible sound takes place, to be amplified many times in the audio frequency portion of the set. Thus any imperfection in the grid leak, because it is in the grid circuit of the detector tube, is certain to make itself well heard in the loudspeaker.

#### Exercise Caution

In purchasing grid leaks great caution should be exercised to purchase only a reliable type. Carbon paper, impregnated paper or pencil mark grid leaks, when examined under a microscope, look much like coarse sandpaper, and when electrical current is passed through them, as is constantly occurring in the grid circuit of the detector tube, a minute arcing effect is noticed, so small as to be invisible, but its effect can easily be heard as a hissing, rushing sound. This very considerably affects the quality and sensitivity of the receiver.

#### Values of Leaks for Tubes

The latest grid leaks are metalized. Ordinarily these values are correct:

Tubes	Resistance
UV 201A or 301A.....	2 to 3½ megohms
DeForest DV6.....	3 megohms
WD11 or WD12.....	3 to 5 megohms
UV199 or C299.....	3 to 5 megohms
UV200 or C300.....	1 to 2 megohms

The exact value of grid leaks to use depends upon the length of time that the tube has been in operating service, the plate voltage and the type of circuit employed, says the Atwater-Kent Co. As the value is often a deciding factor in the sensitivity of the receiver, a number of values should be experimented with or a reliable variable grid leak ranging from one to five megohms used.

# Fans' Letters Like Rudders to Steer Stations' Course

**ACME POWR-BEE**  
Better Than "B" Battery  
**NO HUM NO NOISE**  
Reduces the cost of radio. At your dealer's or write.  
**THE ACME ENGINEERING CO.**  
Dept. 3 LOUISVILLE, KY.  
*Dealers write for big sales proposition*

**NEW - NEW - NEW**  
**FRESHMAN MASTERPIECE**  
**KNOCKED DOWN KIT**  
Everything complete to build this wonderful receiver ..... **\$39.50**  
No cabinet included.  
Send order with cash to-day.  
WIRE or Phone; we will send C. O. D.  
*Regular discounts to dealers.*  
**THE BOWER RADIO SHOP**  
Wholesale Radio READING, MICHIGAN

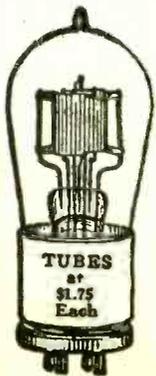
**PANELS**  
FOR ANY KNOWN  
CIRCUIT DRILLED AND ENGRAVED  
PRICES ON REQUEST  
**Cortlandt Panel Engraving Co.**  
81 Cortlandt St. New York City



Study Weather, Static Condition, with Barometer. Delivery Guaranteed on receipt Money Order. **\$5.00**  
**RADIO BAROMETER CO.**  
220 Devonshire Street Boston, Mass.

**HERCULES AERIAL MAST**  
20 Ft. Mast \$10  
40 Ft. Mast \$25  
60 Ft. Mast \$45  
All steel construction, complete with guy wires and masthead pulley. We pay freight.  
**S. W. HULL & CO., Dept. E3**  
2048 E. 79th St., Cleveland, O.  
Write for literature and FREE Blueprint

**LOG YOUR RADIO SET**  
**"MY RADIO RECORD"**  
A 64 page pocket size book of useful and instructive information.  
Alphabetically arranged forms for logging stations.  
A new pleasure and a real help to you.  
Complete list of broadcasting stations.  
Improved Radio Map.  
"Locator and Scale of Miles" never before offered for sale. (Patent Pending.) "Complete and Compact."  
If your dealer has not received a supply, send money order or check for 50c. Mailed postpaid.  
**A. W. WAITE, Inc.**  
23 Sea Avenue Rosebank, N. Y.



**SAVE \$1.25**  
**ON COST OF NEW TUBES BY HAVING YOUR OLD TUBES REBUILT AT \$1.75 EACH.**  
Guaranteed equal to new. Send us your tubes by parcel post. We return them parcel post, C.O.D., and try to maintain 24-hour service.  
**HARVARD RADIO LABORATORIES**  
400 Old Colony Ave. Boston, Mass.

**T**HERE has been a significant change of late in the nature of the letters addressed by radio fans to the broadcasting stations. The "applause" has not only increased in volume, but is becoming an important factor in the development of radio. In an earlier stage of the industry thousands of cards and letters poured into the stations expressing the enthusiasm of the audience. They were for the most part merely friendly wishes or some general expression of pleasure. Such applause encouraged the performer as well as those concerned in broadcasting the programs. Today the majority of the letters making up the "applause" have a more serious purpose. They are becoming more specific in their discussion of radio problems. Out of this great volume of correspondence comes an immense amount of serious constructive praise and criticism. A year or more ago the radio fan was content to pick up a card supplied by some advertising concern to be readily filled out by writing a few words on the dotted lines. Such "applause" was friendly and encouraging.

The applause nowadays is made up very largely of serious business communications. The radio fan asks a bewildering variety of questions and expects helpful answers. The change is partially explained by the fact no doubt that the great radio public now includes people of every conceivable point of view and interest. The programs regularly broadcast again touch every side of life, and are coming more and more to have a practical application to the most serious interests. The radio fan is no longer content merely to express his pleasure in a program. He finds new interests every day and tries to get the most out of them.

**Got 54,000 Letters in Month**

Since the "applause" is a measure of the size of the audiences which daily listen in on the hundreds of broadcasting stations it is naturally very ample. To cite actual figures, a single New York station, WEAJ, received during the month of January 54,000 letters from its invisible audience. The monthly average for 1924 was 17,000 letters. Obviously the handling of such a volume of mail calls for special system and organization. The radio fans who contribute to this tonnage of mail may be interested to know what becomes of his or her letter, and the machinery put in motion to bring him a prompt and intelligent answer. Similar methods are followed in other stations which find themselves confronted with the same problem.

A considerable clerical force is engaged to handle the "applause" and goes about the work in a thoroughly business-like manner. All letters received are as a rule first sorted out into three general divisions. The letters addressed directly to the artist fall into one class. The letters addressed to the broadcasting station direct are kept apart, while all

**NEUTRODYNE KIT \$19.75**  
Complete kit of licensed Neutrodyne parts including panel, tube sockets, rheostats, jack, fixed condensers and grid leak. Neutroformers complete with variable condensers and neutrodons. Every part included even to screws and wire. Easy read Plans.  
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HELENA MONTANA



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Send it to us with \$1.50 and receive a perfect tube—any type.  
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**Federal** Standard RADIO Products  
Over 130 standard radio parts, each bearing the Federal iron-clad performance guarantee.  
Write for Catalog.  
**Federal Telephone & Telegraph Co.**  
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Describes fully the complete line of radio frequency sets, regenerative sets (licensed under Armstrong U. S. Patent No. 1,113,149) and parts  
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**THE CROSLEY RADIO CORPORATION**  
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**Tower's Scientific** **ONLY 8 1/4 OUNCES**  
\$2.95

**Bankrupt Stock**  
**Cunningham Regenerative one tube long range sets, \$10.50 each**  
Formerly sold at \$32.50  
No Circulars. Order from This Ad. Hurry before they are all gone. Prepaid while they last.  
**S. A. TWITCHELL**  
1930 Western Av., Minneapolis, Minn.

Regular \$30 Value  
**3 TUBE SET \$18.50**  
3 Circuit Tuner Guaranteed to give as good results as sets selling at \$60. Fine mahogany Cabinet. Engraved Panel and dials to match. We pay transportation. Send Post Office or Express Money Order. Gives satisfaction or money refunded.  
**JULIUS HOWARD, Dept. R.W.**  
217 West 125th Street, New York, N. Y.

**HOW TO MAKE A STORAGE B BATTERY** described by Herbert E. Hayden in March 7 issue. Copy, 15c. **RADIO WORLD**, 1493 Broadway, New York City.

**COMPLETE 1924 INDEX OF RADIO WORLD**, appeared in **RADIO WORLD**, dated Oct. 18, 1924, and Jan. 10, 1925. 15c per copy.

**Radiofeet** Cushion your Set!  
Stop tube vibration! Prevent set from marring furniture! Used under set or tube shelf. Made of pure wool felt.  
Set of 4 Radiofeet, including attaching screws or washers sent postpaid anywhere in the United States or Canada for \$1.00. Do not send stamps. Specify dark red (mahogany) or brown (oak) color.  
**NEODYNE ASSOCIATES**  
G. M. Reg. Pat. 3121 Benson Building  
165 BROADWAY, NEW YORK

# WEAF Got 54,000 Letters in a Single Month

**FILKO-LIGHTNING ARRESTER**  
SCIENTIFICALLY CORRECT  
RADIO LIGHTNING ARRESTER  
with the "100% Guarantee"



\$1.50  
\$2.10 in  
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Protects your set from lightning or we repair or replace the set. Send 2c stamp for literature on improved reception. Dept. R.W.-321.

**DX Instrument Company**  
Harrisburg, Pa.

## INDEPENDENT



**NEW TUBES** EACH \$1.59  
ALL TYPES OF HIGH CONDUCTANCE AND LOW IMPEDANCE, ALL MATCHED VOLUME

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Exclusive Distributors for Associated Manufacturers

communications addressed to the firms using the facilities of the station are kept out for further sorting. The moment the letters have thus been sorted out they are routed or sent through the special channels which assure their prompt delivery to the proper destination.

The letters addressed to the various artists are not opened, but are considered in a sense private, and are promptly forwarded to the address left by the artist. Many letters reach stations addressed to artists who have been broadcast from other stations, but these are as far as possible sent to the proper address. The communications sent directly to the firms using the station's facilities are also forwarded in the same way.

By far the greater part of the mail, however, must be opened by the clerical force of the broadcasting station. The  
(Concluded on next page)

## New Broadcasters

Call	Stations	Meters	Watts
WHBJ	Lauer Auto Co., Fort Wayne, Ind.	234	10
WHBK	Franklin St. Garage, Inc., Ellsworth, Maine	231	10
WHBL	Jas. H. Slusser, Logansport, Ind.	220	50
WHEC	Hickson Elec. Co., Inc., Rochester, N. Y.	258	100
<b>TRANSFER, CLASS A to CLASS B</b>			
KFR	Northwest Radio Service Co., Seattle, Wash.	384.4	1000
WOAN	Jas. D. Vaughan, Lawrenceburg, Tenn.	282.8	500

Nine Class A stations were marked off the list during February. They follow:  
KFDD—Knight Campbell Music Co., Denver Colo.  
KFQD—Chovin Supply Co., Anchorage, Alaska.  
KFQE—Dickenson-Henry Radio Lab., Colorado Springs, Colo.

WBBD—Barbey Battery Service, Reading, Pa.  
WEBP—E. Budd Peddicord, New Orleans, La.  
WJAB—American Electric Co., Lincoln, Neb.  
WOAR—Lundskow, Henry P., Kenosha, Wis.  
WOAV—Pennsylvania National Guard, Eric, Pa.  
WRAO—St. Louis Radio Service Co., St. Louis, Mo.

### LIKES DX WONDER BEST

THE DX Wonder has them all "cheated" for stepping out, for volume and tone quality. I tuned in WSAI, Cincinnati, on 309 meters, while KGO, Oakland, was working on 312, a feat seldom accomplished in this part of the country, as KGO is powerful here. This and other feats were accomplished on the loud-speaker.

I wish to thank RADIO WORLD for helping me through numerous radio difficulties.  
**M. F. VANDEVEER,**  
P. O. Box 395, Belton, Mont.

## "Morsing Bus-Bar Union"

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

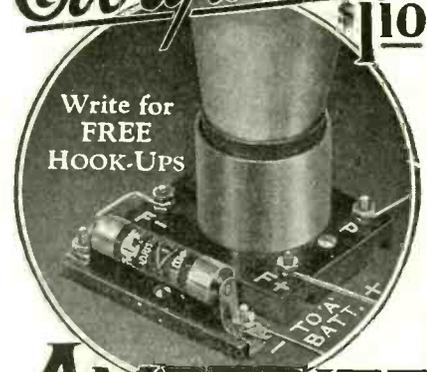


Quick Assembling. Repairs Can Be Made Without Taking Set Apart.

Enough for one set, 25c  
No. 1 for 14; No. 2 for 12 wire.  
Ten dozen for \$1.00.

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DISTRIBUTORS WANTED

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Dept. R.W. 6 50 Franklin Street, New York City

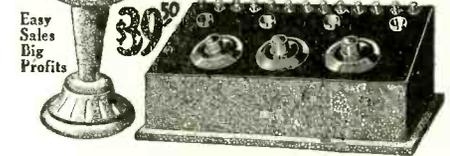
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6-Volt, 130-Amperes	15.00
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1125	Radio Jobbers, rated \$5,000 and up	Per List	15.00
714	Radio Jobbers, rated \$50,000 and up	Per List	10.00
597	Radio Mfrs. making complete sets		5.00
128	Radio Battery Mfrs.		2.50
125	Radio Cabinet Mfrs.		2.50
60	Crystal Mounters for Wireless apparatus		2.50
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Guaranteed 98% correct. Ask for Price List and all other lists.			

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**PHONOGRAPH-RADIO BUSINESS, ESTABLISHED 15 years, busy section New York City; exclusive territory Victor-Victrola, Sonora and Brunswick; also carry leading radios; \$25,000 over stock and fixtures secures business; excellent opportunity active man. Box M4, Radio World.**

# Battery Tips for 'Neutrodyners'

A NEUTRODYNE receiver, using five UV201A or C301A vacuum tubes, will draw about one and one-quarter amperes of current from a storage battery. If this battery is of, say, "eighty-ampere hours" capacity, about sixty hours of service can be expected.

The battery charger employed in charging such a battery may be supplied by either alternating or direct current and should be of the two or five ampere type. A two-ampere charger will recharge the above "eighty-ampere-hour" battery in about forty hours, and if a five-ampere charger be used, the same work will be done in approximately fifteen hours. From this it can be seen that if a two-ampere charger is used, the storage battery must be charged nearly as often as it is used. It is preferable to change the storage battery during the idle periods rather than wait till the battery become entirely discharged.

The best plan is to charge the battery at night directly after receiving broadcast programs and to shut off the charger the next morning. Carrying out such a plan and making frequent hydrometer readings to be sure that "the specific gravity" is approximately at 1280, will keep a storage battery in good condition and assure successful reception of both local and distant broadcasting stations.

## Why Aperiodic Primary Is Better

THE aperiodic primary is superior to the tuned primary for all practical purposes. The tuned primary is undoubtedly more selective and volume is a little greater but tuning is much more difficult, one extra control is needed and the set can not be logged.—Anderson.

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comes with full instructions for assembly. Easy to build—efficient in operation. (Without sockets and condensers.)

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Acme Radio Trans. all types	3.55
Acme Audio Transformer A2	3.55
General Radio 400 ohm Potentiometer	1.15
Brownlie Ver. Detector—list \$2.00	1.50
Bremer-Tully 3-circuit Tuner—list \$5.00	3.55

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Thordarsen Transformers 3 1/2 to 1	\$2.75
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**INFORMATION—** Owing to the large number of inquiries and requests for more detailed constructional data on

**The New PRESSLEY SUPERHETERODYNE**

Described in Herald Tribune Radio Magazine of Feb. 8, 1925, and displayed at the Fifth Annual Radio Show during the past week

Our Engineers have prepared complete data on **HOW TO BUILD**

This Receiver, including picture diagrams and instruction for balancing, testing and tuning. The price of these instructions is **\$1.00**

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**RADIO WORLD'S** 1925 MODEL 4 TUBE DX **WONDER**

We are Expert-Specialists on BERNARD'S WONDER and have helped hundreds of fans to success with this great set. Let us help you.

Complete Parts for Superdyne Circuit as Specified and Checked by Herman Bernard	
One Wallace Coupler for Superdyne Circuit	\$7.50
One Double Flewelling Condenser	9.00
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One Bradleystat	1.00
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Wire, Screws, etc.	1.00

**\$42.50**

**The Flewelling Condenser**

A Low-Loss Instrument of Precision Mechanically Superior—Rugged

**THE CONDENSER DE LUXE**

100% Perfect for Bernard's 1925 Model DX Wonder. Price, Complete **\$9.00**

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A real low-loss product correctly wound to cover entire broadcast range. A laboratory development by our skilled engineers, guarantees you real satisfaction for Bernard's 1925 Hookup. Price, complete, with blue print **\$7.50**

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**RESULTS GUARANTEED—MAIL ORDERS SOLICITED**

# Monopoly Inquiry Under Way

By Thomas Stevenson

THE IMPORTANCE of the hearings of the Federal Trade Commission complaint against eight companies, charg-

ing monopoly, is based primarily on the patent situation and the cross-agreements among the companies. There are more than 1,000 radio patents, ownership scattered among many companies. Some of the patents are absolutely essential for the construction of a set.

During the World War, the necessity for efficient radio apparatus and devices for naval and military purposes became of increasing importance. As a result of Government appeal, some concerns disregarded patent rights and engaged in the manufacture of radio apparatus and devices for the Government, upon the Government's guarantee of protection against infringement suits.

### Marconi Interests Purchased

Prior to the World War, radio communications in this country were handled principally by the Marconi Co. of America.

Although the Marconi Company controlled the two-electrode vacuum tubes embodied in the Fleming patent, the device of real efficiency known as the three-electrode vacuum tube was covered by the De Forest patents controlled by the American Telephone and Telegraph Company. For this purpose a machine of much greater power was required and the efforts of a great many engineers were directed to inventing a machine capable of producing a sufficient amount of power whereby the distance could be bridged.

In 1915 Doctor Alexanderson, an engineer in the employ of the General Electric Company, succeeded in perfecting such a machine, now known as the Alexanderson alternator.

Recognizing the value of the machine, the British Marconi Company attempted to buy it. At this point Admiral Wm. H. G. Bullard, Director of Communications of the Navy, stepped in. He pointed out that with the Alexanderson alternator and its accessories, reliable trans-oceanic radio service could be maintained, and that if the General Electric Company should sell these devices to the Marconi interests the result would be to make possible for foreign interests to maintain a monopoly of world-wide communication for an indefinite future period. He asked the officers of the company, as patriotic American citizens, not to make it impossible to establish an American radio communication company powerful enough to meet competition of foreign radio interests, by allowing the rights to the Alexanderson machine and its accessories to be controlled by foreign countries.

### New Competitor Arises

On October 17, 1919, the General Electric Company caused to be organized the Radio Corporation of America. On November 2, 1919, the Radio Corporation entered into an agreement with the Marconi Wireless Company of America whereby the Radio Corporation obtained all of

the tangible physical assets of the latter company.

On the same date it entered into a contract with the General Electric Company wherein in addition to securing rights under the patents owned or controlled by the General Electric Company, the Gen-

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**\$1.50**

CANADA 35c EXTRA

All Tubes Guaranteed.

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RECORD YOUR RADIO STATIONS

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**\$3.00**

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100 Cards, Mahogany Finish or Oak Cabinet, and Index Dividers. A Useful Accessory to Any Set. Give Name of Set and Sketch of Dial Arrangement. Postpaid on Receipt of Cash or Money Order. Dealers Write for Terms.

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**LOW-LOSS COILS**

in the Famous Pickle bottle form designed by M. B. Sleeper

**Certified by HERMAN BERNARD**

for use in the Radio World's 1925 Model

**DX SUPERDYNE**

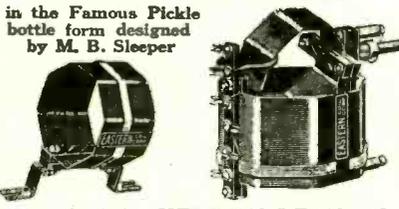
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Radio Tubes

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Light Your Tubes Right from Lamp Socket

**SUPER-A-UNIT**

replaces the "A" battery, furnishes 6 volts for the filaments direct from 110 v. lamp socket.

**CLEAN — ECONOMICAL — CONVENIENT**

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# History of the Patent Tangle

eral Electric Company agreed to manufacture exclusively for the Radio Corporation and the Radio Corporation agreed to purchase from the General Electric Company exclusively all radio

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Adjustable to Fit Any Type of Roof  
Get better reception with a good outside Aerial. Long distance sets, including ships at sea use the best possible Aerial. Eagle Radio Towers are handsome and sturdy. We ship on a money-back guarantee. Ask your dealer or write us for literature.  
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apparatus and devices required by it. As a result of the above agreement the Radio Corporation obtained control of practically every privately owned high-power station in the United States, together with a number of important radio patents.

On May 22, 1920, the Westinghouse Elec. and Mfg. Co. formed a new company known as the International Radio Telegraph Company for the purpose of competing with the Radio Corporation. Up to the time of the formation of the International Telegraph Company, broadcasting for entertainment purposes or, in other words, the use of radio for telephonic purposes, was still in an experimental stage. Late in 1920 the Westinghouse Elec. & Mfg. Company erected a broadcasting station at East Pittsburgh and although the apparatus which it then had was crude, it was enabled to demonstrate to those interested in the radio industry that if proper transmitting and receiving apparatus could be designed and developed, unhampered by patent restraints, broadcasting would become a great public utility.

### A Hitch in Selling Plan

In anticipation of the probability of the patent situation being cleared up the Westinghouse Company proceeded with the development. During 1921 it developed four types of sets for receiving purposes, all of which required for their efficient operation the use of vacuum tubes which were controlled by the Radio Corporation of America, the American Telephone and Telegraph Co., and the General Electric Company. Because of the control of these patents by the latter companies, the Westinghouse Company was unable to sell its sets to the general public.

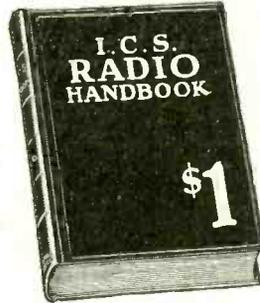
On June 30, 1921, the Westinghouse Company caused the International Radio Telegraph Company to sell its patents and assets to the Radio Corporation, and on the same date the Westinghouse Company entered into an agreement with the Radio Corporation wherein it agreed to manufacture radio apparatus exclusively for the Radio Corporation.

### R. C. A. Has Valuable Rights

Through agreements of one kind or another, the Radio Corporation also acquired the patent rights of the American Telephone and Telegraph Co., the Wireless Specialty Apparatus Co., Federal Telegraph Company, Western Electric Company, United Fruit Company and Radio Engineering Company of New York. The Federal Trade Commission claims

that through these agreements a practical monopoly of the radio field was established and that because of the patent situation competition was prohibited.

## The Biggest Dollar's Worth in RADIO



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HARRY F. DART,  
E.E.

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and bottom. This introduces some difficulties in the design of the bearing; the capacity through the dielectric is likely to be large and the choice of insulators is limited.

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# Conserving Condenser Losses

By Carl Kaplan

RESISTANCE and insulation in variable condenser construction are intimately related. Every dielectric or non-conductor used for electrical separation between the movable and stationary plates has what is known as an absorption factor; that is, the materials are capable of absorbing a certain percentage of the

total energy that passes through the device. The larger the quantities of this material introduced and the greater the mass, the greater the losses will be.

The placing of this material is also an important factor, for if it is placed where the electrostatic field is most intense and where the electrostatic lines of force passing through it are great, greater losses will result. This may be compared in a way with magnetic phenomena, for it is well known that the magnetic lines of force influenced by a piece of soft iron will depend entirely upon the position of the iron in relation to the coil producing the lines of force.

### Sidetracked Lines of Force

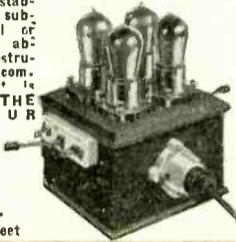
If an extremely poor dielectric substance is placed between the plates, the electrostatic lines of force will at once redistribute themselves and in many of them, instead of passing through the more efficient dielectric, the air, will pass through the poor dielectric, with consequent loss in electrical efficiency through the increase of resistance. If the

electrostatic lines of force are building up and collapsing with every change of potential from zero to maximum.

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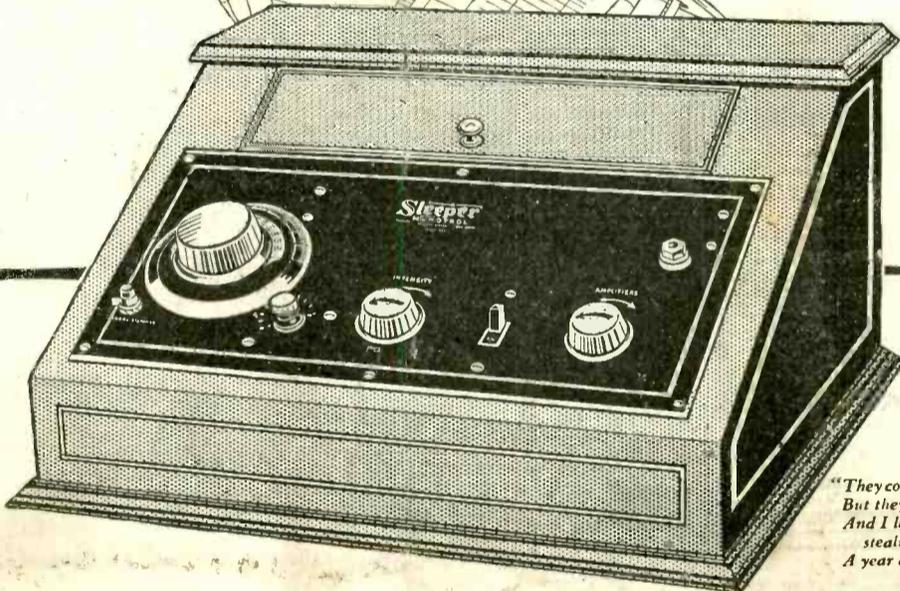
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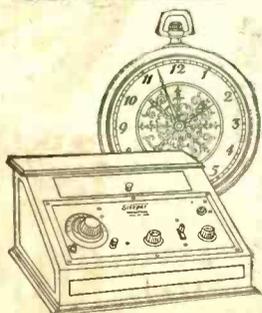
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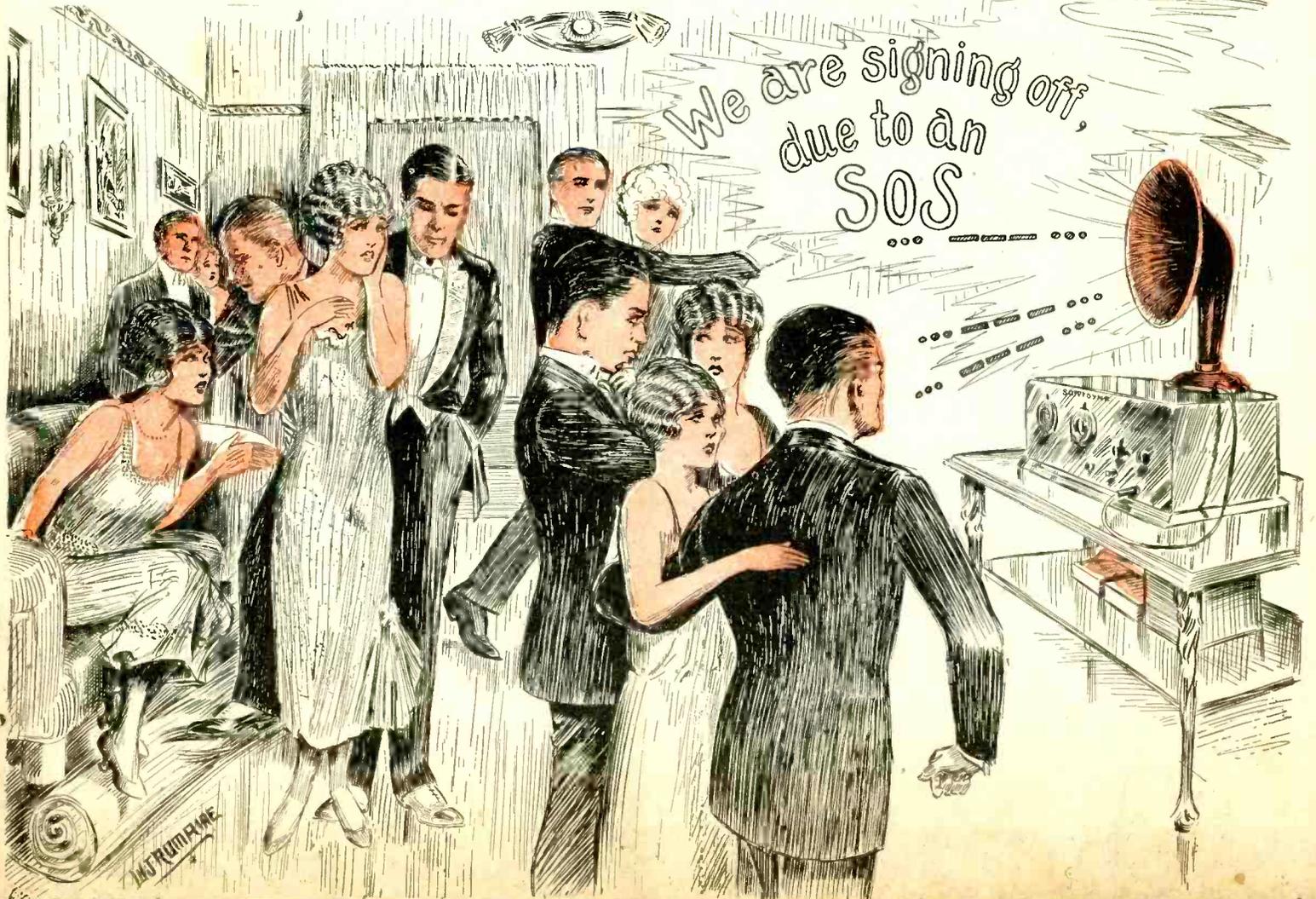
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*By Herbert E. Hayden*

**Picture Diagram of Benson's New 6-Tube  
Super-Heterodyne**

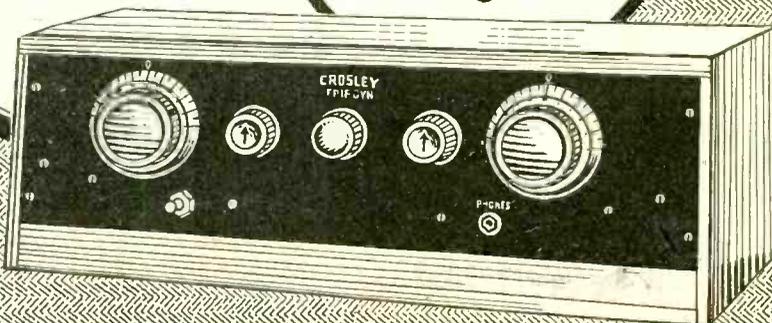
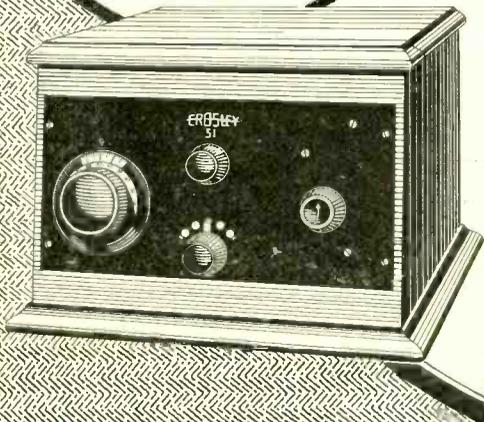


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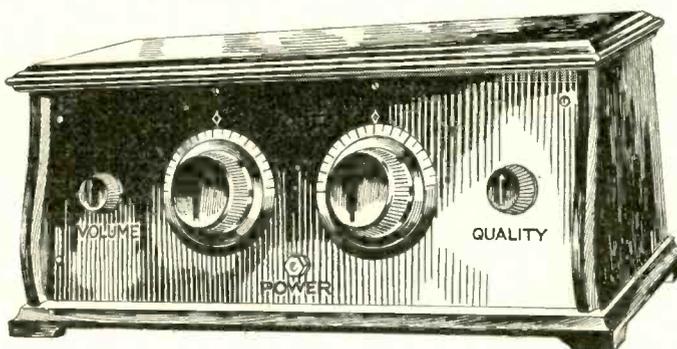
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Allow us to present to you this newly developed, most modern 5-tube Hetro-Magnetic Receiver, the most sensitive, most powerful and greatest distance getter of all.

Its construction is entirely different than the common radio frequency sets now being offered on the market at break neck prices. Each instrument is custom built.

The cabinet is a beautiful mahogany and highly polished product.

The tuning is exceptionally simple, stations always being obtainable at the same dial settings.

The daylight distant adjustment, something new in Receivers enables one to get real distant stations in broad daylight and makes the set exceptionally powerful at night.

The instrument makes a beautiful appearance and is suitable for the most aristocratic reception room.

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Most all progressive farmers, schools and banquet halls are using Hetro Receivers, for reason of its exceptionally good volume and clearness in speech. The volume control regulates the amount of power required when receiving stations.

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Competitive manufacturers are selling this Receiver for \$100.00 and

\$150.00 respectively. Deducting the dealers', the jobbers' and salesmen's discounts, the rock bottom net price would therefore be \$43.50.

### GENERAL INFORMATION

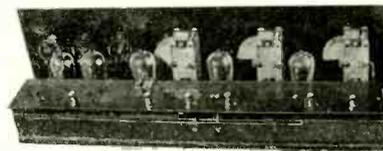
**ANTENNA:** Single wire, 10 to 150 feet long; works satisfactorily on indoor antenna.

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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]

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

Vol. VI. No. 24. Whole No. 154.

March 7, 1925

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## How to Wind Nearly Ideal Coils for the Best Circuits

### Directions for Making the Most Efficient Radio-Frequency Transformer to Be Tuned By a .0005 Mfd. Variable Condenser—What Turns Ratio to Use—Data for Winding Other Coils.

[Many are the considerations that affect the determination of what approaches "the ideal coil." J. E. Anderson, noted consulting engineer, has very sanely and expertly analyzed the conditions and presents herewith his directions for winding the preferred coils for given circuits. Where variable factors had to be considered, Mr. Anderson made a definite choice, carefully explaining how a different choice would require a different coil. For instance, as the .0005 mfd. variable condenser is most popular, and it is not always safe to use one of less capacity (for fear of not tuning in the entire broadcast belt) Mr. Anderson took a .0005 mfd. variable condenser for granted. Another consideration was the ratio of coil diameter to axial length. Roughly, the coil diameter may be identified by the outside diameter of the tubing on which it is wound. The axial length is the number of inches taken up by the coil when the sum total of turns and space between are measured, from one end of the coil to the other. The Bureau of Standards' finding that a diameter equal to 2.3 times the axial length was as near to ideal as was practical has governed Mr. Anderson's choice. Resistance was considered, too, and high-resistance wire (smaller than No. 26) was not used in the experiments.

It will be a surprise to many when they learn that No. 20 double silk covered wire was chosen for the "nearly ideal" radio-frequency transformer, if only because double cotton covered has been the ruling favorite with home constructors, due to the spacing afforded by the insulation and the air between turns. Mr. Anderson's choice was made because—

(1) An inductance of between 160 and 170 microhenries was found necessary to reach 550 meters with the condenser, and 167.4 readily presented itself when one wound 41 turns of No. 20 DSC wire on a 3½-in. diameter tubing;

(2) The ratio of diameter to axial length was exactly 2.3; and

(3) No other combination came so close to satisfying the three requisites of inductance, diameter-to-length-ratio and resistance.]

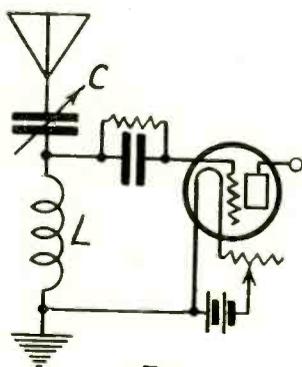


Fig. 1

A SERIES condenser tuning the aerial, a parallel-connected condenser in the aerial circuit and the antenna capacity effect (left to right).

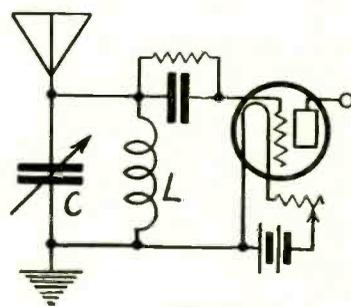


Fig. 2 a

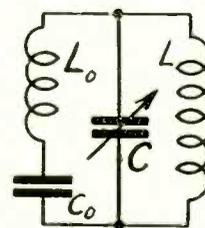


Fig. 2 b

By J. E. Anderson

Consulting Engineer

#### PART I

THE most common form of inductance coil in radio reception is the single-layer solenoid. The reasons for its prevalence are that it is the simplest to wind, it is about as efficient as any type, it is easy to design to have a predetermined value of inductance, and it is of rugged construction. It will be considered, therefore, that cardboard, bakelite or similar tubing is used, but if basketweave windings are employed the same winding directions may be adopted for the same mean diameter. The spider-web winding does not readily lend itself to calculation by standard formulae and as it is no better than the Lorenz (basketweave) type, it is not considered in this article.

A formula as devised by Nagaoka was used in the computations.

#### Two Great Requisites

In designing a coil for radio purposes two things are of great importance: making the resistance the least possible and keeping the distributed capacity down to a minimum. Investigation has shown that for a given length of wire the inductance will be greatest, and hence the low-frequency resistance will be least, when the shape ratio is equal to 2.46, that is, when the diameter of the coil is 2.46 times the axial length of the winding. This is the condition that should be sought in designing a coil, except as this may be modified by other factors.

The Bureau of Standards considers a coil having a shape ratio of 2.3 to be near the ideal when the several factors are taken into consideration. This is the ratio I followed in determining the nearest approach to the ideal.

There are many radio fans who desire to wind their own coils but who do not care to perform the necessary calculations. They wish to know directly how many turns of a given kind of wire they should use on a

given size of tubing to give the desired inductance. Some of them do not even care what the inductance is; they want to know how to wind the coil to cover a given wavelength range with the particular tuning condenser they have. To their needs and preferences I have paid particular regard.

#### The Condenser Choice

Fortunately, many of the factors involved have been more or less standardized. The sizes of wire have also become standardized. Only the even numbers 26, 24, 22, 20, and 18 are universally carried in radio stores, and of these enamel, double silk, single silk, double cotton, and single cotton are most common. There is rarely any advantage in using finer wire than No. 26, and the advantage of using heavier wire than No. 18 is doubtful. Condensers also are more or less standardized. The so-called 23-plate, or .0005 mfd., variable condenser is universally available, and the various makes of these do not vary greatly from their rated capacity. A smaller condenser than one of .0005 mfd. is not always satisfactory when it is desired to cover the entire broadcast range without taps and switches in the tuned circuit. I took for granted that a .0005 mfd. variable condenser was to be used.

The distributed capacity of the coil and the capacities of the associated parts also affect the tuning range. So does the manner in which the coil is coupled to other parts, or the position in which it is used. But these points will be taken up separately. If the circuit is properly designed the effect of coupling on the effective inductance of the coil may be neglected, and the distributed capacities may be allowed for in fixing the value of inductance of the coil.

In designing a tuned circuit for the broadcast range it is not necessary to provide for wavelengths much in excess of 550 meters. But it is always well to allow a margin of safety in case some of the factors vary appreciably in an unfavorable direction. If the tuning coil be chosen so that the upper limit of the tuning range is 560 meters when the

# Anderson's Scientific Coil Data

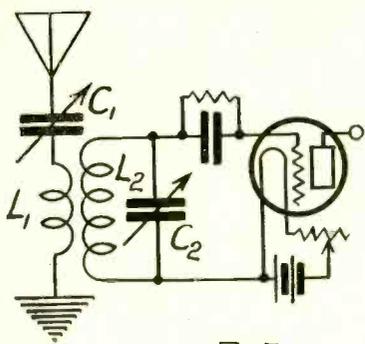


Fig. 3

TUNED primary and secondary (left) and impedance coupling.

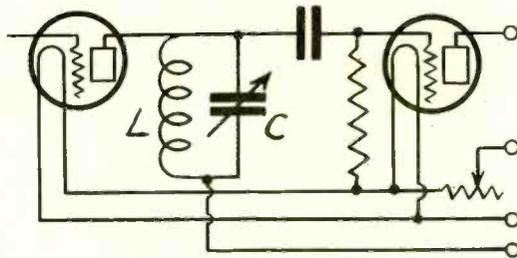
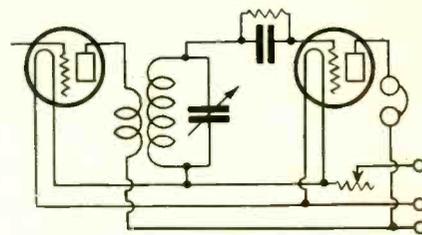


Fig. 4



TUNED transformer coupling is best (Fig. 5).

tuning condenser is of the rated value of .0005 mfd., then it is probable that no condenser will be so greatly overrated that the circuit will not tune up to at least 550 meters. In case the condenser has been underrated, that is, if its actual capacity is a little higher than .0005, the circuit will tune above the 560 mark.

Let us assume then that the condenser has a capacity of .0005 mfd. and that the upper tuning limit of the circuit is to be 560 meters. For purposes of design it may be assumed that the distributed capacity is 50 micro-microfarads. This is about the correct value in an average circuit when the zero setting capacity of the condenser (plates all out) is added to the distributed capacity of the coil and the capacity of the associated parts. With these assumptions the maximum capacity in the tuned circuit is 550 micro-microfarads. It is required to determine what value the inductance coil must have to tune up to 560 meters. An application of the formula connecting wavelength, capacity, and inductance gives the required inductance as 160 microhenries. It is best to work on the safe side, and hence any value of inductance lying between 160 and 170 microhenries may be considered satisfactory and 167.4 is a likely choice.

### Sizes of Tubings Used

The sizes of tubings used in the tests were 2½", 3", 3½" and 4" in diameter, because these are the usual available sizes. For the 2½" diameter tubing the wire sizes used were No. 24 DCC, DSC, SCC, SSC and No. 26 DCC and DSC. For the larger sizes of tubing only double silk and cotton insulations have been used but the three sizes of wire (No. 24, No. 22, and No. 20) were used for all. Wire sizes not considered suitable for a given size of tubing have not been included.

The inductance required in a circuit depends on the position and manner of use of the coil and also on the coupling between

## How to Wind RF Transformer

**F**OR a radio-frequency transformer, to be tuned by a .0005 mfd. variable condenser, wind 10 turns of No. 20 double silk covered wire on a 3½" diameter tubing, terminate; leave ¼" space and wind 41 turns of the same kind of wire in the same direction. The tubing should be about 4" high. The inductance of the secondary is 167.4 microhenries, which is just right. The diameter is 2.3 times the axial length of the winding. The Bureau of Standards considers a coil having a shape ratio of 2.3 to be near the ideal.—Anderson.

the primary and secondary circuits in a tuned radio-frequency transformer. Let us consider some of the more common cases.

In Fig. 1 is shown a single-circuit tuner in which the detector is coupled directly across the tuning coil and the tuning condenser is connected in series with the antenna lead. The capacity of the antenna depends on the condenser's size and position. This type of circuit should not be used unless a very large antenna is used, and then only if taps and switches in the tuned circuit are not objectional. While this circuit gives very loud signals, it is so broad of tuning as to render it useless in most cases, hence it was ruled out of consideration.

### Impedance Coupling

Another type of coupling is shown in Fig. 2, sometimes known as the tuned impedance coupling of the antenna. It is involved because the capacity and inductance of the antenna are effectively connected in series, while the tuning coil L and the tuning condenser C are both in parallel with the series-connected antenna values. Fig. 2b gives an idea of what the circuit really looks like. Suppose that the inductance  $L_0$  of the antenna is neglected. The circuit then is a simple series-tuned circuit in which the capacity is the sum of the two capacities  $C_0$  and C and the inductance is that of the coil L.

Suppose a large antenna is used, one which has a capacity of .0005 microfarad. Also suppose that the desired tuning condenser has the same maximum value. The total capacity in the circuit then is .001 microfarad. This requires an inductance of

about 90 microhenries so that the wavelength 560 meters be reached. The minimum capacity in this circuit cannot be less than the capacity of the antenna, in fact it will always be greater than that. But with a capacity of .0005 mfd. and an inductance of 90 microhenries the circuit will tune to about 400 meters. The circuit will not even reach this wave as a minimum. Hence it is impracticable. If the antenna had been smaller, a larger coil could have been employed and the variation in capacity that could have been effected with a 23-plate condenser would have been a larger percentage of the total. This would have widened the tuning range.

### Impedance Difficulty

Suppose a small indoor open circuit antenna is used with this type of coupling, one that has a capacity of only 30 micro-microfarads. Suppose further that the distributed capacity of the coil and the zero capacity of the condenser add up to 70 mmfd., so that the total minimum capacity is 100 mmfd. The maximum capacity may be taken as 580 mmfd. This value requires that the inductance of the coil be 152 microhenries. With this inductance and 100 mmfd. as the minimum capacity, the minimum wavelength of the circuit will be 230 meters. This is at least near the lower end of the broadcast range, and it is possible that the distributed capacities may be reduced so that the lower limit may be reached. A coil having an inductance of about 160 microhenries may be taken for this purpose.

### The Impedance Coil

The nearest approach to the ideal for a coil used in this circuit (Figs. 2a and 2b) is one wound with No. 24 DCC wire, 43 turns being put on a 3" diameter tubing, the shape factor then being 2.37, the inductance 160.1.

[Part II, the conclusion of J. E. Anderson's valuable contribution to coil literature, will be published next week, issue of March 14. Inductance tables and other ready reference data will be published in that installment.]

## Tuned RF Is Best Form of Coupling

**T**HE most satisfactory form of coupling between two high-frequency tubes is a tuned radio-frequency transformer. The number of turns on the primary is of no importance, except that it must be at least half the number on the secondary, for voltage step-up. A good rule is to have ¼ the number of turns on the primary as is on the secondary.—Anderson.

## The Tuned Impedance Coil

**F**OR an impedance-tuned circuit, using a .0005 mfd. variable condenser, use a 3" diameter tubing about 3" high and wind thereon 43 turns of No. 24 double cotton covered wire. The shape factor is 2.37, or only .07 above the requirement, and the nearest possible. The inductance is 160.1, or .1 microhenry above the requirement, the nearest possible inductance where full turns are used.—Anderson.

# "The Best!"

The Creator of the Circuit Does Not Say So.

The Magazine That Published It Does Not Say So.

The Fans Who Build It DO Say So.



**A Marvel in Tonal Quality, Tuning Simplicity, DX and Volume**

Colored Nameplate for Panel Free to All

## A FEW RESULTS

### LETTERS:

**I** HAVE built the 1925 Model Superdyne and find it the best I ever had, and I have built close to 200 sets.—WM. MITZEL, 1310 E. Price Street, Philadelphia, Pa.

**T**HE 1925 Model Superdyne is the best set I ever built, and I have built almost every other kind of set.—JOS. RITS, Petersburg, Nebr.

**I** HAVE built many Superdynes but I like the 1925 Model best of all.—EARL S. JOHNSTON, 1919 Butler Avenue, McKeesport, Pa.

Construction fully described in issues of January 10, 17 and 24. Send 45c, get all three copies.

## Special Offer

Send \$1.00 (saving of 20c), and get these three issues, also five others, from which you can learn all the facts about this wonder circuit. The five extra issues are: Trouble-Shooting, Jan. 31; Tuning, Feb. 7; Questions Answered, Feb. 14; Dry-Cell Operation, Feb. 21; Neutralization Directions, Feb. 28. Any single number for 15c, or send NOW \$6.00 for yearly subscription and get those eight copies FREE.

RADIO WORLD

1493 Broadway New York City

# How the Number of Turns Affects Coupling

**T**HE effect of loose coupling, or a wide separation between the primary and secondary coil of a regenerative tuner is to increase the distance range, make the set more selective, decrease distortion and diminish radiation.

When the primary is wound close to the secondary the regenerative effect cannot rise beyond a point limited by the absorption of the aerial. In this way much of the energy that should go to produce a signal in the telephones is fed back into the aerial and is wasted. The energy that returns to the aerial is radiated in the form of a feeble wave which causes interference to nearby receivers.

Loose couplings must be obtained by experiment. The space separation of the coils is not in itself a standard, because the length of the aerial and the number of turns in the primary and also in the secondary are governing factors.

Much unsatisfactory operation of receivers is due to this failure to recognize the factors that determine coupling. To say that a separation of one-half inch between the coils produces tight or loose coupling is not correct, because of the other limiting conditions.

Two tuners, one having a twenty-turn primary and another a ten-turn primary, separated one-half inch, have different coupling. The former has a tight and the latter a loose coupling.

One tuner using a fifty-turn secondary and another a seventy-turn secondary will also have different coupling at the primary, assuming that the distances and number of turns are equal on the primary side.

Increasing the number of turns in one of the linking coils has the effect of tightening the coupling.

Another feature of coupling not generally recognized by the amateur builder

is the difference that occurs with a change of wavelength. If the primary coil is small it will have greater effective coupling to the secondary on the shorter waves. This condition is that is frequently reported from stations below four hundred meters.

### How to Improve Set

The set building trend toward simplicity has caused the elimination of some controls that are essential to efficient tuning, among which are the vario-coupler and tapped primary. The tapped primary, of five turns each, is a simple solution of much of the trouble, and is a compromise between unwise simplicity and the other extreme of the too many controls.

Any set that produces interference can be improved by separating the primary from the secondary. The coil should be moved until the signal drops, when a new adjustment should be made on the secondary condenser; then the coil is moved again, and another adjustment made, continuing this until a point is reached just before where the signal becomes weak.

## Superdyne Laudation Almost Taxes Credulity

SUPERDYNE EDITOR:

**I** HAVE built RADIO WORLD's 1925 Model Superdyne, as described by Herman Bernard, and it certainly is a wonder.

JOHN KIRK,  
1467 Gerrard St., East.,  
Toronto, Canada.

SUPERDYNE EDITOR:

**I** CONSTRUCTED RADIO WORLD's 1925 Model DX Superdyne for a friend and like it so much better than my \$200 set that I am going to build one for myself.

FRANCIS A. SURFACE,  
RF2, Lebanon, Ohio.

SUPERDYNE EDITOR:

**I** HAVE built the 1925 Model Superdyne and there is not a better set in town.

NICHOLAS F. HABELKA,  
Watertown, Conn.

SUPERDYNE EDITOR:

**A** FRIEND and I each have completed a 1925 Model Superdyne and with sets proving satisfactory beyond our expectations. I have built several circuits but this one beats them all for selectivity, volume and distance. I would recommend this set highly to any one who wants real results.

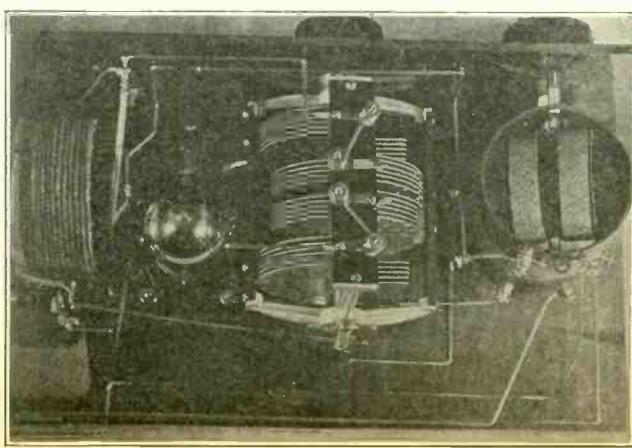
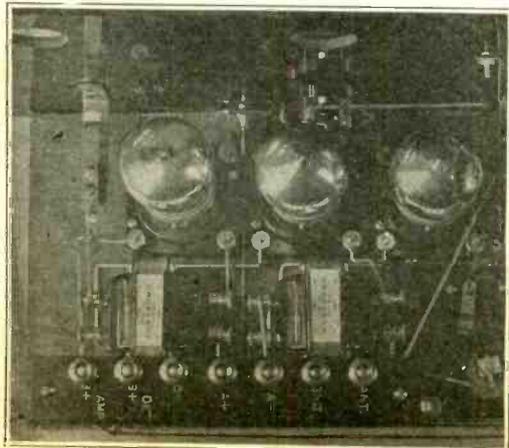
HAROLD WILSON,  
1019 Perry St.,  
Davenport, Iowa.

SUPERDYNE EDITOR:

**M**Y RADIO WORLD Superdyne is my favorite receiver.

CYRIL C. HALL,  
1402 St. Germain St.,  
St. Cloud, Minn.

## "1925 Model Superdyne My Favorite," Says Another Fan



SECTION photo of the 1925 Model Superdyne constructed by Bertram Reinitz, of 127 A Woodruff Avenue, Brooklyn, N. Y. He incorporated a few personal preferences, but stuck to the hookup published in the January 10, 17 and 24 issues. "It's my favorite receiver," he writes. He used an ARC coupling Bruno condenser and wound his own RFT.

# Benson's Super-Heterodyne

**B**ENSON'S set solves the problems of audio-frequency feedback, low amplification and too high noise level. Read this absorbing article by the noted Engineer.

By Thomas W. Benson  
Noted Radio Engineer

## PART II

THE wiring of the 6-tube reflexed Super-Heterodyne is simple enough, if a system is used, as I pointed out in last week's installment. Many novices may be tempted to construct this circuit, because of the successful combination of the Super-Heterodyne with the reflex principle and the consequent economy of tubes. Therefore, the wiring diagram is presented this week in picture form and also the wiring directions are given textually.

I have not specified the location of the second single-circuit jack (J2), which may be placed on the panel at any point found most convenient. This is the jack for plugging in the speaker. There is another single-circuit jack used for connecting the loop to the .0005 mfd. variable condenser tuning the loop. In Fig. 1, published last week, the loop jack was shown, and the third audio output was represented by phones. But a jack will be used by most constructors for the audio output and may be placed to the right of the last rheostat in Fig. 2 of last week's issue, that is, under the panel-mounted crystal detector.

The use of a switch to cut off the A battery current is optional. It may be placed either in the negative or positive A lead, but I prefer the positive, and the switch so appears in Fig. 4, the picture diagram of the wiring.

### Theory of the Circuit

As explained last week, this circuit uses the plate modulation system, in Ultradyne fashion, the heterodyned note being at 600 meters, which enables successful reflexing because a higher intermediate wavelength would cause a feedback of audio currents through the intermediate transformers, due to the large windings. In the present case the intermediate transformers are of a type used in broadcast reception, as part of a combination of short-wave RFT whose peaks are at varying wavelengths. However, only the one type of RFT is used whose peak is at the highest of this combination, and the efficiency of the Super-Heterodyne principle is preserved. The list of parts identifies these.

### Wiring Directions

Most of the wiring is done before the baseboard is affixed to the panel. Such connections as are to be made from baseboard-mounted parts to panel parts are provided with bus bar leads which may be soldered to the panel parts after panel and baseboard are joined.

**1.** CONNECT the positive A battery to one side of the switch S, the other side of the switch to the filament plus posts of all six sockets, also to one side of the potentiometer and to B minus. The negative A battery is joined to one side

of each of the two rheostats (R2 and R3 in Fig. 4) and to the remaining terminal of the potentiometer. This leaves the movable arm of the potentiometer still unconnected. One of the rheostats controls the amplifier tubes and has a resistance of 6 ohms (R3). The remaining unconnected side of this rheostat goes to the filament minus posts of the five tubes other than the oscillator. The tubes to which this connection is made are numbered 2, 3, 4, 5 and 6 in Fig. 4. The remaining unconnected side of the oscillator rheostat goes to the filament minus post of the oscillator tube socket, No. 1 in Fig. 4. The oscillator rheostat is 30 ohms, if UV199 or C299 tubes are used, as in the original model. This completes the filament wiring. It will be noted that most of this wiring is done on the baseboard, but that actually the connections to where made from the terminal block to the rheostat and from the baseboard filament leads to the rheostat are completed after the panel is mounted to the baseboard.

**2.** The positive B connection is now made. There is only one B plus lead, 90 volts. This goes to the right angle of the single-circuit jack J, in Fig. 4, also to the B posts of two of the audio transformers, AFT2 and AFT3, to the B post of the one of the RFT (No. 2 in Fig. 4), to the end of L2, the small plate coil of the oscillator, and to one side of C1, a .001 mfd. fixed condenser.

**3.** The C battery is mounted inside the set and requires no binding posts. C plus connects to the F minus post of the oscillator tube (No. 1 in Fig. 4), while C minus goes to the B post of the first audio transformer (AFT1), to the F post of the same audio transformer, to one side of the .00025 mfd. fixed grid condenser, on which the gridleak is mounted. This same C minus lead is connected further to the F post of the AFT2, one side of the .00025 mfd. fixed condenser C2, and to the F posts of RFT4 and AFT3.

**4.** The loop terminals are inserted in a jack plug. The right angle of the loop jack connects to the stator plates of the modulator tuning condenser and to the grid of the modulator tube socket, No. 2. The jack spring connects to the rotor plates of this variable condenser and to F—. The plate of the modulator tube connects to the P post of RFT1, whose B post goes to the grid of the oscillator tube and to the END of L1, the grid coil of the oscillator. Actually this grid coil is on top of the form or tubing on which the two coils are wound, but for physical convenience and clarity it is shown on bottom in Fig. 4. The lead common to the B post, grid and end of L1 also goes to the stator plates of the oscillator tuning condenser. The other side of that condenser (rotor plates) connects to the negative filament lead, also to the beginning of the grid coil L1, and to the remaining unconnected side of the fixed condenser C1, whose other side went to the beginning of the plate coil. Again, for convenience, the plate coil L2 is shown on top of the form in Fig. 4, although actually it is on bottom. The BOTTOM terminal of the plate coil, you will please verify, goes to the plate of the oscillator tube and the TOP terminal to B plus and to one side of the fixed condenser C1 whose other side has been joined to the filament minus.

**5.** F on RFT1 goes to the midpoint or movable arm of the potentiometer, hitherto unconnected and G on RFT1 goes to the grid of tube No. 3. The plate of this tube is connected to the P

**T**HIS set is extremely selective and gives tremendous volume, due to the great audio-frequency amplification, while the range is all that could be wished for.—Benson.

post of RFT2, whose B post already was joined to B plus. The F post of RFT2 goes to the remaining unconnected side of the grid condenser and leak and to the G post of AFT1. The plate of tube No. 4 joins the P post of RFT3, whose B post goes to P of AFT2. The end or B of AFT2 goes to B+. The F post of RFT3 is connected to the G post of AFT2 and to the remaining side of C2, the .00025mfd. fixed condenser bridging the secondary (G and F) of AFT2. The grid of tube No. 5 joins the G post of RFT3. The plate of this tube goes to the P post of RFT4, whose B post is connected to P on AFT3 and to one side of C3, a .002 mfd. fixed condenser. The other side of this fixed condenser goes to the B plus lead, which was connected to B of AFT3. The F of RFT4 goes to C minus, and also goes to one side of a fixed condenser, C3, .002 mfd. The G of RFT4 connects to one side of the Brownlie crystal detector, the other side of the crystal joining to the P post of AFT1. C3, fixed .002 mfd. condenser, connects between F of RFT4 and F of AFT1. The G post of socket 6 goes to G on AFT3, whose F goes to C minus. The plate of tube No. 6 goes to the spring of the single-circuit jack used in the output (J2 in Fig. 4) and the right angle of the jack, as explained, was connected to B plus. The fixed condenser C4, .005 mfd., bridges the jack, that is, one side of the condenser goes to one side of the jack, the other side of the condenser to the other side of the jack. As will be seen, this is a bypass condenser between the plate of the last tube and B plus.

The directions for making the terminal block, so that it will fit over two of the audio transformers, were given in last week's installment.

### Tubes

The set is designed for dry-cell operation. UV199 or C299 tubes should be used throughout. Six 4½-volt C batteries are connected in parallel to constitute the A battery. In other words, seven C batteries are needed, one of which is used as a C battery, the others as the A battery. UV201A or C301A tubes, fed by a storage battery, may be used, but in that case both rheostats would be 6 ohms.

When everything appears clear the tubes may be inserted and the batteries connected up, connecting the phones to the two right-hand posts of the terminal strip. Switch on the tubes, turn the potentiometer all the way to negative and with the catwhisker of the detector touching the crystal rotate the oscillator condenser. A series of whistles should be heard indicating the oscillator is working. Turn back on the potentiometer until the whistles stop and plug in the loop. Try to tune in locals.

The operation of this receiver is

*Concluded on page 24)*

# Picture Diagram of Benson's 6-Tube Super-Heterodyne

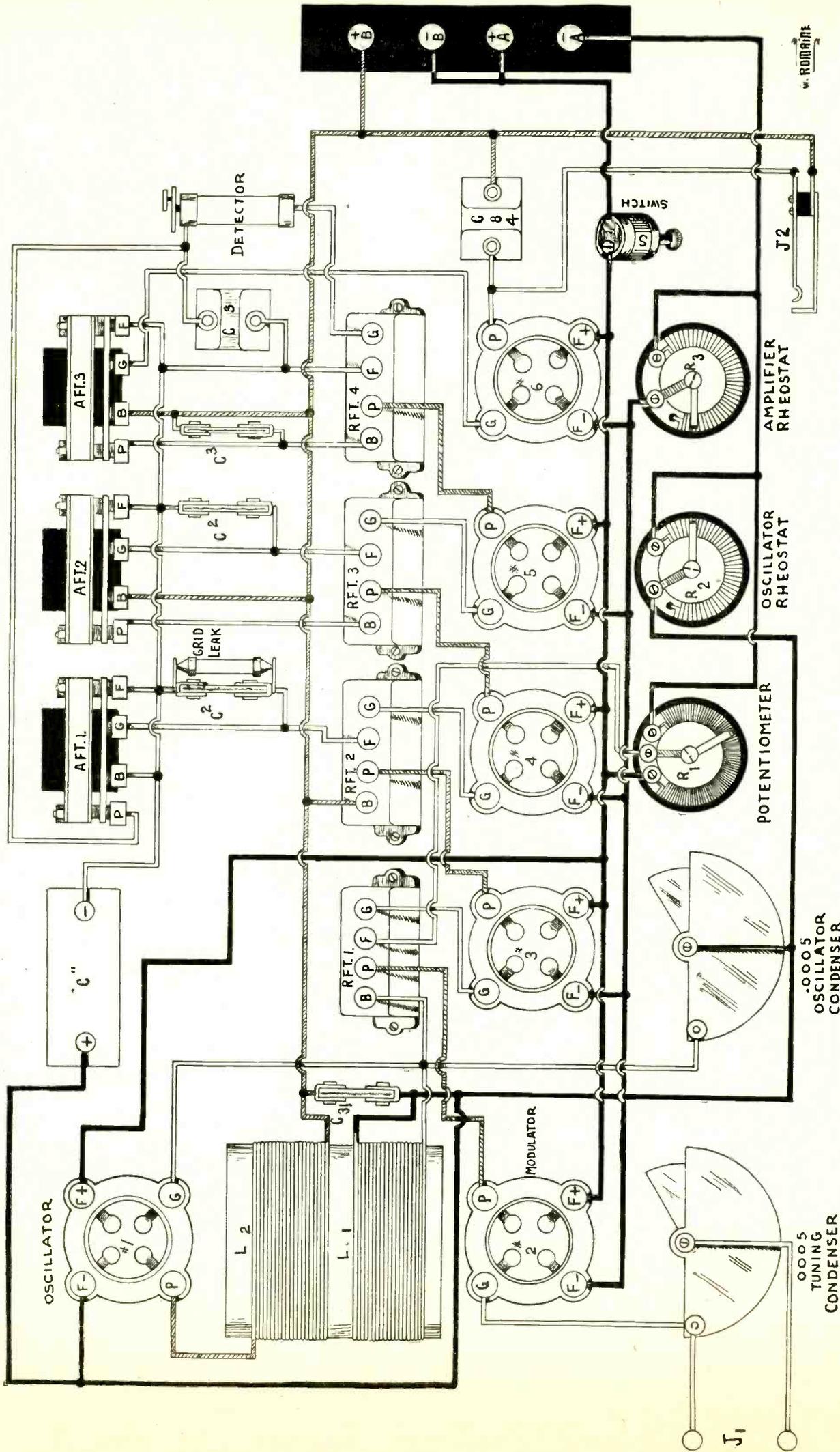
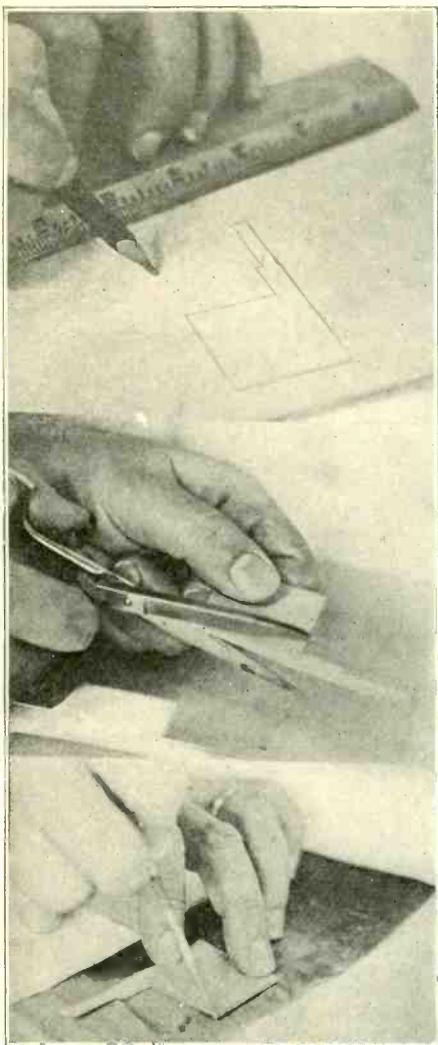


FIG. 4—The 6-tube Reflexed Super-Heterodyne, with six stages of amplification, as designed by Thomas W. Benson. This corresponds with the schematic circuit

published last week (Fig. 1). The grid return of L1 to F minus (shown above) worked better than to F+, as shown last week.

# Making a Storage B Battery



HOW the cardboard pattern is made for the lead or tin plate that is to be drilled is shown in Fig. 1, top, where the measurements have been made and the shape of the plate determined. The cardboard is cut (Fig. 2, middle photo), and next a scriber is used to scratch the design on the plate (Fig. 3, bottom photo).

By *Herbert E. Hayden*

Illustrations by the Author

A STORAGE B battery that I made myself, as shown by the accompanying photographs, is working so well in my laboratory that I believe that many another fan would like to make one of these B batteries.

The battery has to be recharged, of course, like any other storage battery, but if you do not send it out for recharging you can use one of the devices on the market that enables the use of the same charger that replenishes the storage A battery.



HERBERT E. HAYDEN

### How to Cut the Pattern

To begin operations, draw a  $1\frac{1}{4}$ " square, as shown in Fig. 1, with a strip extending therefrom. The extra strip is  $\frac{1}{4}$  x  $1\frac{1}{2}$ ". For this purpose cardboard is used. The cardboard, when cut, will be a pattern for cutting  $\frac{1}{8}$ " thick the sheet lead plates. The resulting pattern is then placed on the piece of sheet lead (Fig. 3). The pattern is then removed (but kept safe for future use) and sixteen holes are drilled. I used a  $\frac{1}{4}$ " drill.



THE pattern is removed and sixteen holes are drilled (Fig. 4, top). Fig. 5 is the middle photo. Fig. 6 the bottom one.



FOR the positive plates a paste is prepared of the ingredients shown in Fig. 7, top photo, and a knife is used (Fig. 8, lower) to press the paste into the drilled holes.

Fig. 4 shows how these holes were arranged by dividing the square into four equal parts on each side and drawing the intersecting lines. The centers for drill holes were determined by tri-square measurement. A pair of snips are used, or old scissors, for cutting the sheet lead plate accordingly (Fig. 5). The net result is depicted in Fig. 6. The drill holes have rough edges. Let them stay rough. They serve a purpose that way, as I shall show presently.

### Preparation of Paste

Next a paste is prepared, using red lead and a very dilute, say 20-to-1, solution of sulphuric acid. This paste is for the positive plates. The ingredients are shown in their respective bottles in Fig. 7, while Fig. 8 shows how the paste is to be spread over the plate. A springy knife serves the purpose very handily. The rough edges of the drill holes are thus put to advantageous use, since they facilitate the adhesion of the paste to the lead (Fig. 8). The plate with the paste on it is shown in the close-up photo, Fig. 9.

### Different Chemical for Negative

Now that the making of the positive plate is understood, let us consider the negative plate. It is made in exactly the same way. But when it comes to spreading a paste over the negative plate a different chemical is used. It is known as litharge, and comes in powdered form, purchasable in a drug store. The powdered litharge is grey. It is substituted for the red lead used in making the positive plate paste. Do not forget, however, that the dilute solution of sulphuric acid plays an equal part in making the paste for both positive and negative plates. The alternative chemicals are, red lead for positive, litharge for negative.

### How to Cut the Wood

Thin wood is now cut into  $1\frac{1}{2}$ " squares. Such wood is easily obtainable. It is the kind used for berry boxes, egg crates and the like. One piece of wood, cut to size, is placed between the two plates, that is, the wood is like the meat in a sandwich, with the plates representing the two pieces of bread. The pasty side faces the wood. Two more similar squares are used, to constitute the cover on the outside. Fig. 10 shows one piece of wood in center, another on outside, in back, and the third one lying on the table, ready for its important use.

A piece of soft rubber is cut to fit the glass container into which the product is to be put. Although the actual glass container I used is not visible in the photo, Fig. 11, the rubber cap gives a good idea of the form and shape of the top of the container,

# How to Use Jar or Tumbler

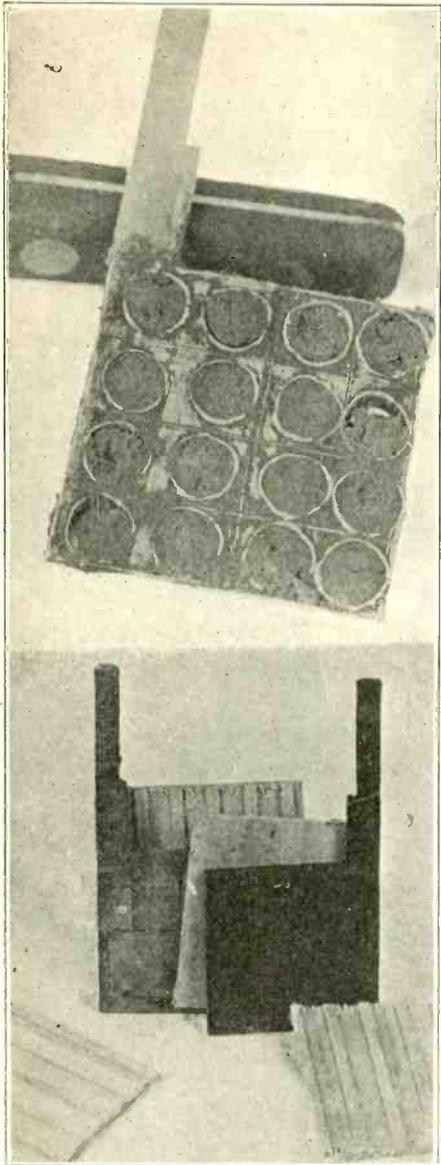


FIG. 9, top, shows a close-up of the plate holes plugged up with the paste. Small pieces of thin wood are cut and placed between the plates. These pieces of wood are shown in the lower photo, FIG. 10.

and FIG. 12 gives the proportions, with the resilient wood on the outside, bound with rubber bands. FIGS. 13 and 14 show a glass container used for mixing the solutions.

FIG. 12 in particular shows the risers from the plates. These are the protrusions provided in cutting the plates, and the two side holes in the rubber cap permit these poles of the cell to protrude. Mark the positive, preferably red, so you will easily know which is which. The center hole is a vent, left open during the "charging" operation. A small rubber cork is fitted into this hole after the "charging" is completed.

FIG. 12 shows the completed elements, rubber top, plate separators and rubber bands.

### Preparation of Solution

The solution is now prepared. Use distilled water. Just ordinary water will not do. Distilled water is purchasable in a drug store. Chemically pure sulphuric acid is mixed with the water. Using a hydrometer, the reading should be 1.210 when just enough acid has been added. If there is a garage handy you probably will be able to buy there a bottle of standard electrolytic, which is the correct acid and water combination. If you prepare your own electrolytic, always pour the acid into the water. Never pour the water into the acid.

The plates and rubber top are placed in

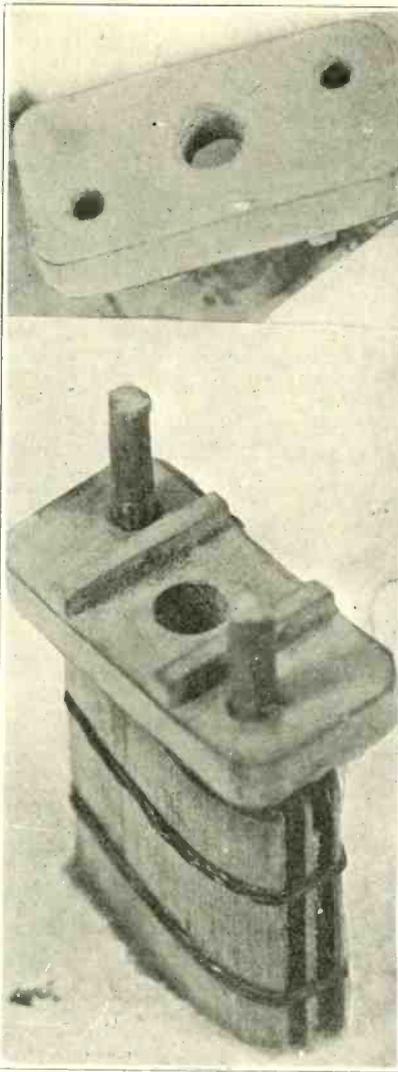


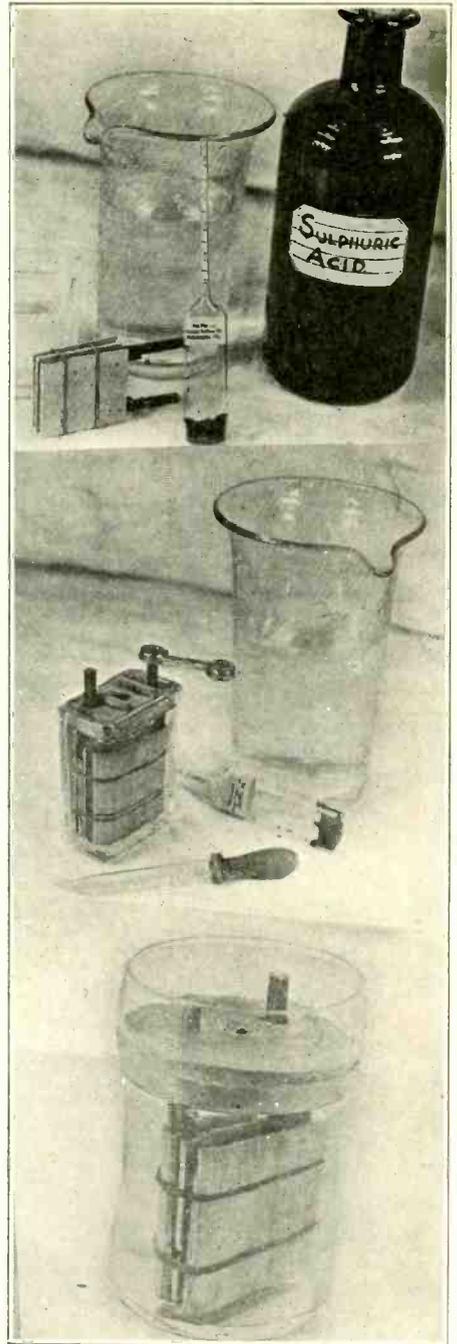
FIG. 11 (top) shows a piece of soft rubber, cut to fit the outside container. Details of the container are shown in subsequent photos. FIG. 12, lower, shows a close-up of the completed elements.

the jar and the solution added through the vent hole. Use a medicine dropper and be sure not to get any of the solution on your clothes or on the floor or carpet. The solution will cause a blue-pink stain difficult if not impossible to remove. If you spill some acid on your clothes, etc., neutralize the acid at once. A solution of ammonia and baking powder serves this purpose very nicely.

FIG. 14 shows the medicine dropper and the assembled elements. Note that a connecting rod is included. I used this to facilitate series connection of the cells to form the battery.

If a tumbler or the like is used, having a round top, be sure to cut the soft rubber round, snugly to fit this top.

The cell will furnish a 4-volt current supply. Therefore, by series connection, that is, joining the positive of one cell to the negative of another, the voltage is brought up to the desired amount, and of course taps may be taken for intermediate voltages in units of 2 volts. The cells in B batteries



THE solution is made next, distilled water being one ingredient, sulphuric acid the other (FIG. 13, top). The plates and rubber top are shown next to the jar in which they are to be placed (FIG. 14, middle photo). The bottom photo shows an ordinary tumbler used as the outside container (FIG. 15). In such a case the soft rubber cap would have to be cut to fit the top of the tumbler. An elliptical jar was used by the author, as shown in FIG. 12 in the column to the left of this one. There the rubber cap has the three holes in it, two for the positive and negative poles, the other for access to the electrolyte. The electrolyte hole should be provided with a cork. The two rods fit snugly into the other holes, requiring no extra sealing.

normally have 2 volts or so. You continue making cells until you have just the requisite number for your demands.

## Controversy Between WLW and WMH Settled

WASHINGTON.

OFFICIALS of the Department of Commerce are very much gratified at the settlement of the controversy which developed at Cincinnati when stations WLW and WMH went on the air simultaneously on the same wave length on different evenings. Commissioner Carson and Chief Radio Supervisor Terrell went to Cincinnati and

succeeded in having the participants sign an agreement in regard to a division of time which, it is believed, will prevent future outbreaks.

"We are very much pleased at the settlement of what might have been a very unpleasant situation," says Judge S. B. Davis, Acting Solicitor.

Others echoed his sentiment.

# BROADCAST PROGRAMS

## Thursday, March 5

**WLW, Cincinnati, O., 423 (C. S. T.)—8 A. M.,** setting-up exercises. 10:45, weather, business reports. 11:55, time. 12:15 P. M., noonday concert. 1:30, business reports. 3, market reports. 4, French lesson; piano solos by Adelaide Aptel. 6, dinner hour concert, Selinsky instrumental quintet. 8, The Passion Play. 10, message from the Civil Service Department. 10:03, Cooper Corporation, The Cooper orch. and male quartet; solos and ensembles from the Cooper male quartet; selections by Larry Grueter, piano-accordion; popular program by The Doherty Melody Boys.

**KGO, Oakland, Cal., 312 (P. S. T.)—10:40 A. M.,** classroom instruction. 11:30, luncheon concert. 1:30 P. M., N. Y. and S. F. stock reports; weather. 4, concert orch. 6:45, final reading, stock reports, weather, S. F. produce news, and news. 8, Arton trio; Winifred Hlanon, soprano; C. A. Harwell, whistler; Mrs. Cyril Roche, soprano; Hawaiian novelty three; Waldemar Engberg, bass; piano duets, William P. and Bonita Keasbey; address, "Music and Shirts," Rev. George W. Phillips; Joyce Holloway Barthelsson, pianist; Josephine Holuh, violinist. 10, Henry Halstead's orch.

**WMAK, Lockport, N. Y., 265 (E. S. T.)—12 M.,** Murray Whiteman's midnight serenaders.

**KFI, Los Angeles, 467 (P. S. T.)—5 P. M.,** Herald news. 5:30, Examiner news. 6:45, KFI radiatorial and Carlyle Stevenson's Bon Ton orchestra. 7:20, Y. M. C. A. speaker. 7:30, male quartet. 8, play with music. 9, Los Gatos trio, and Carol Blaine, contralto. 10, Examiner program.

**WFAA, Dallas, Tex., 476 (C. S. T.)—12:30 P. M.,** Edmund F. Boettcher, singing; William H. McRaven, playing; DeWitt McMurray, speaking. 6:30, Lone Star Five's orch. 8:30, Miss Lucile Lechner, singing, and Mrs. Lillian T. Cummings, pianist. 11, violin recital by Edward Cramer, first violin in the orch.

**WOAW, Omaha, Neb., 526 (C. S. T.)—12:30 P. M.,** horticultural program. 5:45, public news period. 6, every child's story hour. 6:20, to be announced. 6:45, dinner program, Randall's Royal Fontenelle orch. 9, program transmitted from WOAW. 10:30, Frank W. Hodek, Jr., and his Nightingale orch.

**WEEL, Boston, 303 (E. S. T.)—1 P. M.,** assembly luncheon. 2, Eleanor Baldwin Cass, "Your Girl and the Movies." 3:15, Noah's Arkadians, Joe W. Rinea, director. 6:30, Big Brother Club. 7:15, sport talk by Wm. E. Mullins. 7:25, program arranged by the Greater Boston Churches. 7:55, Pathe News flashes. 8, New York program, musical. 8:30, musical. 9, Atwater-Kent musical. 10, musical.

**WHAS, Louisville, Ky., 400 (C. S. T.)—4 P. M.,** selections from Conservatory of Music; police bulletins; weather; readings; late news. 4:55, local livestock, produce and grain market reports. 5, time. 7:30, concert under the auspices of Mrs. Robert K. Van Pelt; four-minute digest of Sunday school lesson; four-minute talk; late news; official time.

**KOA, Denver, Colo., 323 (M. S. T.)—12:20 P. M.,** Rialto organ recital. 1, N. Y. stock reports, live stock, fruit, vegetable report, and weather. 3, half hour matinee for housewives. 6, final reading; N. Y. stock reports, live stock, vegetables, and late news.

**WCAE, Pittsburgh, Pa., 462 (E. S. T.)—12:30 P. M.,** news; weather. 4:40, stock market; The Sunshine Girl. 6:30, dinner concert. 7:30, Uncle Kaysbee. 7:45, special feature. 8, Moore's radio review. 9, Atwater-Kent radio artists.

**WMC, Memphis, Tenn., 500 (E. S. T.)—2:30 P. M.,** Harry O. Nichols at the console of the Scottish Rite Cathedral organ.

**WDAF, Kansas City, Mo., 365 (C. S. T.)—3:30 P. M.,** The Star's radio trio. 5:50, marketgram, weather, time and road. 6, Cecile Burton, from popular poems and essays; address, one of a series of book talks by Louis Mecker; The Tell-Me-a-Story Lady; music, Trianon ensemble. 11:45, Nighthawk Frolic.

**WGN, Chicago, 376 (C. S. T.)—9:31 A. M.,** time. 9:35, stock and farm quotations. 10, wheat. 10:30, wheat and cable reports. 11, wheat, weather, dairy reports. 11:30, wheat, grain and livestock receipts. 11:56, time. 12, wheat, board of trade. 12:10 P. M., board of trade quotations; hog sales. 12:35, Tea Room orch. 1, wheat. 1:05, Tea Room orch. 1:35, readings. 1:40, Drake concert ensemble and Blackstone string quintet. 2:30, musical recital. 3, miscellaneous entertainment. 5, stock exchange and market. 5:30, Skeezix time for children. 5:57, time.

**KGW, Portland, Ore., 492 (P. S. T.)—11:30 A. M.,** weather. 12:30 P. M., concert by Rose City trio. 5, children's program. 7:15, markets, weather, and news bulletins. 8, Oregonian concert orch. 10, Multnomah Hotel Strollers.

**KDKA, E. Pittsburgh, Pa., 326 (E. S. T.)—9:45 A. M.,** stockman reports. 11:55, time. 12, weather, stockman reports. 12:20 P. M., Lenten services. 3:30, closing quotations on hay, grain and feed. 6:15, dinner concert by Brody's orch. 7:15, stockman reports. 7:30, Daddy Winkum, the radio rhymster. 8, program arranged by the National Stockman and Farmer studio. 8:30, special program. 9:55, time, weather. 11, concert from the Pittsburgh Post.

**KSD, St. Louis, Mo., 545 (C. S. T.)—8 P. M.,** recital by James R. Keyes, tenor; Paul Millstone, pianist. 10, special "request" program by Vin James, pianist.

**WCCO, Minneapolis, Minn., 417 (C. S. T.)—10:45 A. M.,** Gold Medal Home Service Talk by Betty Crocker, "Suggestive Lenten Menus." 2 P. M., woman's hour, "The Popular Concert." 4, magazine hour, "In the Winter of War," by Her Majesty Marie. 5:30, children's hour, Mrs. Walter Stevens. 7, national program by Remote Control. 10, silent.

**WEAF, New York City, 492 (E. S. T.)—11 A. M.,** musical program and talks to housewives, market and weather. 4, Helen Sherman Gue, contralto; dramatic readings by Beatrice Becker; "Needs of Our Youth," by Dr. Henry Newman. 6, dinner music; mid-week services; Art talk; James E. Phillips, bass; Paul Stoeving, violinist; lecture on English fiction; "Touring"; Atwater Kent Radio Artists; Vitali Koretsky, Russian tenor; Russian Ensemble; Vincent Lopez and his orch.

**WGY, Schenectady, N. Y., 380 (E. S. T.)—2 P. M.,** music; one act play, "A Quiet Family," by William Suter. 2:30, organ recital by Stephen E. Boisclair. 6:30, dinner music by Hotel Ten Eyck trio. 7:30, "A Few Moments with New Books," by W. F. Jacob, librarian. 7:45, half hour of music by WGY orch. 8:15, drama, "The Turning Point," by Preston Gibson. 11:30, organ recital by Stephen E. Boisclair.

**KHJ, Los Angeles, Cal., 464 (P. S. T.)—12:30 P. M.,** program through Loew's State Theatre. 2:30, Jose Arias and his Mexican orchestra. 5, Art Hickman's concert orch. 6:30, children's program. 7:30, "Art" talk by Harold Swartz. 7:45, talk on "Care of the Body," by Dr. Philip M. Lovell. 8, program presented through the courtesy of the Western Auto Supply Co., arranged by J. Howard Johnson. 10, Art Hickman's dance orch.

**WNYC, New York City, 526 (E. S. T.)—7:20 P. M.,** sports analysis by Thornton Fisher. 7:30, police alarms. 7:35, Irving Bloom and his Club Tokio orch. 8:15, "Timely Topics" by Francis P. Bent. 8:30, Rita Rozada, dramatic soprano; Ambassador male quartet. 9:30, The Serenaders, Mandolin Club. 10:30, police alarms and weather.

**WOR, Newark, N. J., 405 (E. S. T.)—7 A. M.,** gym class. 2:30 P. M., recital by Theophilus Alban, tenor. 2:45, Regina Wallace, "The Road to Stage Success." 3, Theophilus Alban, tenor. 3:15, Melody trio. 3:30, Edna Eckert, dramatic reader, "Alfred L. Tennyson." 3:45, Melody trio. 6:15, Jimmy Lent's Society orch.

**WOO, Philadelphia, 508 (E. S. T.)—11 A. M.,** grand organ. 11:30, weather. 11:55, time. 12, police reports. 4:45, grand organ and trumpets. 9:55, time. 10:02, weather.

## Friday, March 6

**WLW, Cincinnati, O., 423 (C. S. T.)—8 A. M.,** setting-up exercises. 10:45, weather and business reports. 11:55, time. 12:15 P. M., Ahaus Brunswick orch. 1:30, business reports.

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

**KFI, Los Angeles, 467 (P. S. T.)—5 P. M.,** Herald news. 5:30, Examiner news. 6:54, KFI radiatorial. 7, Examiner program. 8, Aeolian organ recital, Dan McFarland at console. 9, Herald program. 10, Hollywood Girls quartet and soloists.

**WFAA, Dallas, Tex., 476 (C. S. T.)—12:30 P. M.,** address, Dr. Robert Stewart Hyer. 4:30, Woman's Hour. 6:30, Honey Boys orch. 8:30, band and entertainers.

**WEEL, Boston, 303 (E. S. T.)—2 P. M.,** Happy Hawkins and his orch. 6:30, Big Brother Club. 7:15, concert by the U. S. Army band. 8, program by Ice Cream Co. 8:30, The Gilechrist quartet. 9, Grindell's Colonial Club orch.

**KFOA, Seattle, Wash., 455 (P. S. T.)—Times** Studio program, by Mrs. H. C. Simpkin.

**KHJ, Los Angeles, Cal., 464 (P. S. T.)—12:30 P. M.,** Santa Monica athletic club orch; R. M. Wright, baritone; Pathe News talks. 2:30, matinee musical. 6, Art Hickman's concert orch. 6:30, children's program. 7:30, better-speech talk. 7:45, Capt. John T. Riley, on "Income Tax." 8, program through Henley and Scott. 10, Art Hickman's dance orch.

**WOAW, Omaha, Neb., 526 (C. S. T.)—4 P. M.,** program transmitted from WOAW's remote control. 5:45, public news period. 6, story hour. 6:20, to be announced. 6:30, Harry Brader, violinist-conductor, and Frank Strawn, pianist, of the Rialto Symphony orch. 7, to be announced. 7:15, current sport events by Ivan L. Gaddis. 9, program under auspices of Chicago, Burlington & Quincy Railroad Co.; address, "Seeing by Radio Territory Covered by the Burlington Route," Dr. G. E. Condra. 10:30, orchestra at Brandeis.

**KOA, Denver, Colo., 323 (M. S. T.)—12:30 P. M.,** Rialto organ recital; N. Y. stock reports, live stock, fruit, vegetable report, and weather. 3, half hour matinee for housewives. 6, final reading N. Y. stock reports, livestock, vegetables, late news. 6:40, book of knowledge program. 8, ten minutes of music. 8:10, studio program, courtesy the Tuesday musical club.

**WHAS, Louisville, Ky., 400 (C. S. T.)—4 P. M.,** selections from Louisville Conservatory of Music; police bulletins; weather; readings; late news. 4:55, local livestock, produce and grain market. 5, time. 7:30, concert by Barney Rapp's orch.; thirty-minute concert.

**WMC, Memphis, Tenn., 500 (E. S. T.)—8:30 P. M.,** to be announced. 11, midnight frolic.

**WDAF, Kansas City, Mo., 365 (C. S. T.)—3:30 P. M.,** The Star's radio trio. 3:50, marketgram,

weather, time and road. 6, address, speaker from Children's Bureau; The Tell-Me-a-Story Lady; the Trianon ensemble. 8, popular program. 11:45, Nighthawk Frolic.

**WCAE, Pittsburgh, Pa., 462 (E. S. T.)—12:30 P. M.,** weather; news. 4:30, Sunshine Girl; stock market. 6:30, dinner concert. 7:30, Uncle Kaysbee. 8:30, Apollo quartet. 9:30, Hampton S. Lundestad, baritone.

**WGN, Chicago, 376 (C. S. T.)—9:31 A. M.,** time. 9:35, stock and farm quotations. 10, wheat. 10:30, wheat and cable reports. 11, wheat, weather, dairy reports. 11:30, wheat, grain and livestock receipts. 11:56, time. 12, wheat, board of trade. 12:10 P. M., board of trade quotations; hog sales. 12:35, Tea Room orch. 1, wheat. 1:05, Tea Room orch. 1:35, readings. 1:40, Drake concert ensemble and Blackstone string quintet. 2:30, musical recital. 3, miscellaneous entertainment. 5, stock exchange and market. 5:30, Skeezix time for children. 5:57, time.

**KGW, Portland, Ore., 492 (P. S. T.)—11:30 A. M.,** weather. 12:30 P. M., concert by Rose City trio; 5, children's program. 7:15, markets, weather, and news bulletins. 8, lecture. 10:30, Hoot Owls.

**WGBS, New York City, 316 (E. S. T.)—6:30 P. M.,** Herman Bernard, managing editor of RADIO WORLD, "Radio Hookups, Questions and Answers." Mr. Bernard is on the air at this station every Friday at 6:30 P. M.

**KDKA, E. Pittsburgh, Pa., 326 (E. S. T.)—7 A. M.,** morning exercises. 8, morning exercises. 9:45, stockman reports. 11:55, time. 12, weather, stockman reports. 12:25 P. M., Sunday school lesson. 3:30, closing quotations on hay, grain and feed. 6:15, concert by Charlie Gaylord's orch. 7:15, stockman reports. 7:30, a story by Uncle Ed. 8, concert by the American Legion. 8:15, "The College Student as Literary Material," by Thyrsa W. Amos. 8:30, American Legion. 9, time, weather. 10, basketball score.

**WCCO, Minneapolis, Minn., 417 (C. S. T.)—10:45 A. M.,** Gold Medal Home Service Talk, Betty Crocker, "The diet for Early Spring." 2 P. M., woman's hour. 4, magazine hour, "The Celebrated Jumping Frog Calaveras County," by Mark Twain. 5:30, children's hour, Court of Gold Medal. 6, sport talk. 6:30, dinner concert, Minneapolis Athletic Club orch. 7:30, lecture. 7:45, lecture. 8, the Musical Millards of Worthington, Minn. 9, "The F. & R. Family." 11, dance program, Dick Long's Nankin Cafe orch.; Paul Davin, tenor.

**WEAF, New York City, 492 (E. S. T.)—11 A. M.,** musical program; health talk; talk on "Styles of Country Homes," by Henry B. Humphrey; market and weather. 4 P. M., James Blauvelt, tenor; Elementary French lessons by William Doub-Kerr; children's stories; Matilda Durr Lindsay, soprano. 6, dinner music; Sylvia Buchman, pianist; Charles Mertens, baritone; Blanche Elizabeth Wade, story teller; duets by Adele Parkhurst, soprano, and Edna Indemauer, contralto; The Happiest Candy Boys; Spear and Company. 7, entertainers; Elsie May Gordon, impersonator; Jascha Gurewicz, saxophonist; Eleanor Starkey, soprano; Meyer Davis Lidonice Orchestra, direct from the Lido-Venice, New York City.

**WGY, Schenectady, N. Y., 380 (E. S. T.)—2 P. M.,** music; talk, "Good Taste in Home Decoration," Mildred Gagen Bowen. 6:30, International Sunday School lesson. 7, Mark Strand Theatre orch. 7:30, health talk. 7:35, program of Gounod compositions by WGY orch. 10:30, talk, "Manors of New York." Ernest C. Brown. 10:40, piano duets by Elsie Schillers and Elsie Firestone.

**KHJ, Los Angeles, Cal., 464 (P. S. T.)—12:30 P. M.,** White's Californians. 2:30, program through Pacific States Electric Co. 6, Art Hickman's Concert orch. 6:30, children's program. 7:30, Gladys DeWitt on "The Santa Fe Trail." 8, program presenting the Piggly Wiggly Girls. 9, program through Rotary Club. 10, Art Hickman's dance orch.

**WPG, Atlantic City, N. J., 296 (E. S. T.)—7 P. M.,** Hotel Traymore dinner music. 9, Ambassador concert orch. 10, studio recital; Helen Kennedy, soprano; Cecile Steiner, violinist; Anna Caster Heiss, pianist; L. Powell Evans, vocal students; Alice Warren Sachse, pianist.

**WIP, Philadelphia, Pa., 509 (E. S. T.)—1 P. M.,** Gimbel Tea Room orch. 1:30, weather. 3, "A Diet for Anaemics," by Mrs. Anna B. Scott. 3:15, recital by Lillian Biddle Reader, Mathilda S. Eyes, soprano; Mrs. Allen, contralto; Flora Ripka, accompanist. 4, "Present Conditions in the Balkans," a lecture by Dr. Michael M. Dorizas. 6, weather. 6:05, popular numbers by Mark Fisher and Joe Burke. 6:15, dinner music by Harvey Harburger and his vaudeville orch. 6:45, U. S. Department of Agriculture, livestock and produce market reports. 7, Uncle Wip's bedtime story, roll call and birthday list.

**KFOA, Seattle, Wash., 455 (P. S. T.)—12:30 P. M.,** Seattle Chamber of Commerce program. 4, the Times, Wm. F. Hoffman's concert orch. 6:45, Sherman, Clay and Co. program. 8:15, weather. 8:35, the Times program, Credit Men's Glee Club. 10, Eddie Harkness and his orch.

**WNYC, New York City, 526 (E. S. T.)—7:30 P. M.,** police alarms. 7:35, resume of meeting of the Board of Estimate and Apportionment. 7:45, dance program. Colonel James Churchward, geologist and traveler. 9, an hour of German music, Constance Scharpegge, contralto; Prof. Fuchs-Jerin, piano recital. 10:10, "Pickwick Papers," by Dickens, Prof. J. G. Carter. 10:30, police alarms. 10:35, Joseph M. White, tenor.

**WOO, Philadelphia, 508 (E. S. T.)—11 A. M.,** grand organ. 11:30, weather. 11:55, time. 4:40 P. M., police reports. 4:45, grand organ and trumpets. 7:30, A. Candelori and his Hotel Adelphia orch. 8:30, "Christianity and Business," Samuel R. Boggs. 8:45, WOO orch. 9:55, time.

10:02, weather. 10:03, grand organ recital, Mary E. Vogt. 10:30, Vincent Rizzo and his Hotel Sylvania orch.

**WOR, Newark, N. J., 405 (E. S. T.)—7 A. M.,** gym class. 2:30 P. M., Henry Hull, "A Travesty on Leisure." 3:15, Harry Jentes and his entertainers. 6:15, Hotel Lorraine orch. 6:30, "Man in Moon" stories. 7, Hotel Lorraine orch.

**Saturday, March 7**

**WLW, Cincinnati, O., 423 (C. S. T.)—8 A. M.,** setting-up exercises. 10:45, weather and business reports. 11:55, time. 1:30 P. M., business reports; stock quotations. 3, dance program and other features. 6, dinner hour concert; Lafafone by E. D. Leonard. 8:30, popular music presented symphonically by Henry Lange and his Hotel Sinton orch.

**KGO, Oakland, Cal., 312 (P. S. T.)—11:30 A. M.,** luncheon concert. 12:30 P. M., final reading, stock reports; weather. 4, concert orch. 8, The Melody Maids; Elsa Behlow Trautner, soprano; Carey male quartet; concertina solos, Antone Tomsic; Eva Gruninger Atkinson, contralto; Ray Nealan, tenor; address, "The Sunny Side of the Street," Thomas A. Boyer. 10, Henry Halstead's orch.

**KFI, Los Angeles, Cal., 467 (P. S. T.)—5 P. M.,** Herald news. 5:30, Examiner news. 6:45, KFI radiatorial; Dr. Clyde Sheldon Shepherd. 7, Lake Arrowhead orch. 7:45, the book shelf. 8, Examiner program. 9, Classic instrumental trio and vocalists. 10, Packard Radio Club; the Varsity trio. Barney Weber, Jean Shock, pianist.

**WFAA, Dallas, Tex., 476 (C. S. T.)—12:30 P. M.,** Alex Hughes, pianist. 8:30, Boy Scout program. 11, band recital by De Molay boys.

**KHJ, Los Angeles, Cal., 404 (P. S. T.)—10 A. M.,** weekly broadcasting class. 12:30 P. M., program by Hi Moulton and his orch. 2:30, Saturday afternoon frolic. 7:30, better-peace talk. 7:45, Capt. John T. Riley, on "Income Tax." 8, program featuring a "Trip to Mt. Lowe." 12, pep program by the Lost Angels.

**WOAW, Omaha, Neb., 526 (C. S. T.)—5:45 P. M.,** public news period. 6, dramatic hour, Davis Studio of Expression. 6:30, to be announced. 6:45, dinner program. 7:30, weekly address. 9, program under auspices of the Omaha Printing Co. 11, Frank W. Hodek, Jr., and his Nightingale orch. 11:30, organ music.

**WHAS, Louisville, Ky., 400 (C. S. T.)—4 P. M.,** selections from Louisville Conservatory of Music; police bulletins; weather; readings; late news. 4:55, local livestock, produce and grain market. 5, time. 7:30, concert under the auspices of Arthur Findling; news; time.

**KOA, Denver, Colo., 323 (M. S. T.)—12:20 P. M.,** Rialto organ recital. 1, final reading. N. Y. stock reports, livestock, and weather. 9, dance music program by Joe Mann and his Rainbow-Lane orch.

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

**WMC, Memphis, Tenn., 500 (E. S. T.)—8:30 P. M.,** program arranged by Mrs. Marie Worden.

**WDAF, Kansas City, Mo., 365 (C. S. T.)—3:30 P. M.,** The Star's radio orch. 5:50, marketgram, weather, time and road. 6, piano tuning-in number; address, personal message from Roger W. Babson, statistical expert and "doctor of business"; The Tell-Me-a-Story Lady; music, the Truman ensemble. 11:45, Nighthawk Frolic.

**KGW, Portland, Ore., 492 (P. S. T.)—11:30 A. M.,** weather. 12:30 P. M., concert by Rose City trio. 10, Colburn's Melody Men.

**WGN, Chicago, 370 (C. S. T.)—9:31 A. M.,** time. 9:35, stock and farm quotations. 10, wheat. 10:30, wheat and cable reports. 11, wheat, weather, dairy reports. 11:30, wheat, grain and livestock receipts. 11:56, time. 12, wheat, board of trade. 12:10 P. M., board of trade quotations; hog sales. 12:35, Tea Room orch. 1, wheat. 1:05, Tea Room orch. 1:35, readings. 1:40, Drake concert ensemble and Blackstone string quintet. 2:30, musical recital. 3, miscellaneous entertainment. 5, stock exchange and market. 5:30, Skeeix time for children. 5:57, time.

**KDKA, E. Pittsburgh, Pa., 326 (E. S. T.)—9:45 A. M.,** stockman reports. 11:55, time. 12, weather, reports. 12:20 P. M., Lenten service at Trinity Church. 1:30, concert by Daugherty's orch. 7:30, Wimple the Wanderer. 7:45, last minute helps to Bible School teachers. 8:30, concert by the Westinghouse band. 9:55, time, weather.

**WCCO, Minneapolis, Minn., 417 (C. S. T.)—10:45 A. M.,** Gold Medal Service Talk. 2:30 P. M., matinee musical. 8, "Fireside Philosophies," Rev. Roy L. Smith, pastor. 8:30, diversified program. 10, dance program; the Lowry Male Quartet.

**WEAF, New York City, 492 (E. S. T.)—4 P. M.,** Bud Fisher's Happy Players; Middlebury College Glee Club. 6, dinner music, Thuel Burnham and Agnes Brennan, pianists; Joseph Wilber-scheid, violinist; "Trips and Adventures," by Fred J. Turner; special musical program to be announced; Vincent Lopez and his orch.

**WGY, Schenectady, N. Y., 380 (E. S. T.)—9:30 P. M.,** dance music by Phil Romano's orch.

**KPO, San Francisco, Cal., 423 (P. S. T.)—7 A. M.,** "Daily Dozen," by Bernard Drury. 10:30, "Ye Towne Crier" News Bulletins. 10:40, "What is Playing at the Local Theatres." 11:50, market report. 12, time. 1 P. M. Rudy Seiger's Fairmont Hotel orch. 2:30, Mount Tamalpais Military Academy band. 3:30, Gene James's Rose Room Bowl orch. 6:20, garden hints. 6:30, "What is Playing at the Local theatres." 8, Art Weidner's Dance orch.

**KHJ, Los Angeles, Cal., 404 (P. S. T.)—10 A. M.,** class in broadcasting. 12:30 P. M., news items and music. 2:30, Charlie Wellman and his Sat-

**Bori Ready to Repeat**



**LUCREZIA BORI,** brilliant soprano of the Metropolitan Opera House, who suffered a little "microphone fright" at her radio debut on New Year's night, looks forward with pleasure to singing again for the radio audience. John McCormack, with whom she "duetted" that memorable holiday night, was first quoted as having said he sang for the first last time before the microphone, but later denial was made. Miss Bori is a Victor artist, by the way, and a charming beauty. She is shown wearing her pompously beautiful costume in "Tales of Hoffman."

urday Afternoon Frolic. 6, Art Hickman's concert orch. 6:30, children's program. 8, an evening of Chamber Music. 10, Art Hickman's Dance orch. 11, program presenting the Lost Angels.

**WPG, Atlantic City, N. J., 296 (E. S. T.)—9 P. M.,** Governor Silzer banquet.

**WIP, Philadelphia, 509 (E. S. T.)—1 P. M.,** organ recital by Karl Bonawitz. 1:30, weather. 3, Gerald O'Dell and his entertainers. 6, weather. 6:05 Charles Masters Hotel St. James orch. 6:45, U. S. Department of Agriculture, livestock and produce market reports. 7, Uncle Wip's bedtime stories and roll call; M. E. Junior Choir. 8, Lenten Meditations, E. A. E. Palmquist. 8:15, His Honor, Mayor W. Freeland Kendrick, presents a demonstration of "The Boy in Music." 10:05, dance music by Howard Lanin's orch. 11:05, organ recital by Karl Bonawitz.

**KFOA, Seattle, Wash., 455 (P. S. T.)—4 P. M.,** the Times, Wm. F. Hoffman's Concert orch. 6:45, Rhodes studio program. 8:30, the Times program; Rainier Serenaders. 10, Eddie Harkness and his orch.

**WNYC, New York City, 526 (E. S. T.)—6:30 P. M.,** Sam Wooding and his Club Alabam' orch. 7:30, police alarms. 7:35, The Chateau Four. 8:15, Arthur S. Tuttle, chief engineer, "Work of the Traffic Commission." 8:30, James Brennan, cornet solos. 8:45, Police quartet. 9:15, Fred Ben-sen's Society orch. 10:10, "Alaska," by Maurius Hansome. 10:30, police alarms and weather.

**WOR, Newark, N. J., 405 (E. S. T.)—7 A. M.,** gym class. 2:30 P. M., Marion Estelle Adams, contralto. 2:45, Mildred Frazee, soprano. 3, Dr. George Watson Little, canine specialist. 3:15, Mildred Frazee, soprano. 3:30, Marion Estelle Adams, contralto. 3:45, Louise Gium, "Clothes for Girls." 6:15, Mabelle Cowan and her orch. 7:30, "The Commanders." 8, Harold Colonna, tenor. 8:15, Mme. Florence Wessell, pianist. 8:30, Harold Colonna, tenor. 8:45, Mme. Florence Wessell, pianist, and Reba Dale Corder, dramatic soprano. 9, Robert Coleman, "Little Theatre Movement." 9:15, Mabel Thum, soprano; Serge Glence, tenor and violinist; Maurice LaFarge, baritone and pianist. 10, Virginia State program. 11, Kalmor and Ruby and his playmates.

**WOO, Philadelphia, 508 (E. S. T.)—11 A. M.,** grand organ. 11:30, weather. 11:55, time. 12, Golden's Crystal Tea Room orch. 4:40 P. M.,

police reports. 4:45, grand organ and trumpets. 9:55, time. 10:02, weather.

**Sunday, March 8**

**KSD, St. Louis, Mo., 545 (C. S. T.)—8 P. M.,** concert by St. Louis Symphony orch.

**WEMC, Berrien Springs, Mich., 286 (C. S. T.)—11 A. M.,** sacred music by the Radio Light-house Choir. 11:40, sermon, Pastor W. R. French. 8:15 P. M., sacred music by the Radio Light-house Choir.

**KPO, San Francisco, Cal., 423 (P. S. T.)—10:30 A. M.,** "What is Playing at the Local Theatres." 11, undenominational church services. 6:30 P. M., "What is Playing at the Local Theatres." 8:30, concert by Rudy Seiger's Fairmont Hotel orch.

**KGW, Portland, Ore., 492 (P. S. T.)—10:30 A. M.,** services. 3 P. M., municipal concert. 6, church services. 7, Colburn Concert orch.

**WIP, Philadelphia, 509 (E. S. T.)—3:15 P. M.,** Civic Junior Symphony orch. 4, services under the auspices of the Germantown Y. M. C. A. 7:15, evening service, broadcast direct from Holy Trinity church. 9:30, Germantown Theatre orch.

**KTHS, Hot Springs, Ark., 375 (C. S. T.)—11 A. M.,** services, Rev. J. J. Stowe, pastor. 8:30, P. M., Meyer Davis-New Arlington orch. 10, dance concert and frolic by Phil Baxter's Sing-ing orch.

**WGN, Chicago, 370 (C. S. T.)—11 A. M.,** Uncle Walt reads the funnies to the children. 11:45, concert from Balaban & Katz Chicago Theatre. 2 P. M., Master Artists Recital, Lyon and Healy organ, and Chicago Musical College Concert. 9, concert specially directed by Charles H. Gabriel, Jr., with WGN singers and by Drake concert ensemble.

**KOA, Denver, Colo., 323 (M. S. T.)—11 A. M.,** services. 7:50 P. M., service.

**WLW, Cincinnati, O., 423 (C. S. T.)—9:30 A. M.,** school by the editorial staff of Sunday School Publications. 11, services, Dr. Frank Stevenson, minister; organist, J. Warren Ritchey; mixed quartet: soprano, Charlotte Sandman Angert; alto, Louise Koetter; tenor, Erwin Meyer; bass, Edwin Weidinger. 7:30 P. M., services, Dr. E. P. Dannenfeldt, pastor. 8:30, concert by the Western and Southern orch; William Kopp, direc-tor; Bess Hall, soprano; Norma Maichen, con-

# Programs

(Sunday, March 8, continued)

tralto; Edward Durr, tenor; Charles Button, bass; Hazel Barnes, accompanist.

**WOO, Philadelphia, 508 (E. S. T.)—2:30 P. M.**, musical exercises and Sunday school. 6, sacred recital on the Wanamaker grand organ, Clarence K. Bowden at the console. 7:30, evening services.

**WGR, Buffalo, N. Y., 319 (E. S. T.)—3 P. M.**, Vesper services. 4, Randolph Maynard, organist. 7:15, pre-service organ recital. 7:30, evening service.

## Monday, March 9

**WEMC, Berrien Springs, Mich., 286 (C. S. T.)—8:15 P. M.**, "The Collegian String Trio" or Emmanuel College.

**WHAS, Louisville, Ky., 400 (C. S. T.)—4 P. M.**, selections from the Louisville Conservatory of Music; selections played on the Alamo theatre organ; police bulletins; weather; readings; late news. 4:55, local livestock, produce and grain market.

**WWJ, Detroit, Mich., 353 (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. 12:05 P. M., Jules Klein's Hotel Statler orch. 3, news orch. 3:50, weather. 3:55, market reports. 6, dinner concert. 8, News orch.; Stellar Quartet.

**KPO, San Francisco, Cal., 423 (P. S. T.)—10:30 A. M.**, "Ye Towne Cryer" News Bulletins. 10:40, "What is Playing at the Local Theatres." 12, time. 1 P. M., Rudy Seiger's Fairmont Hotel orch. 4:30, Rudy Seiger's Fairmont Hotel orch. 5:30, children's hour stories by Big Brother of KPO. 7, Rudy Seiger's Fairmont Hotel orch. 8, organ recital by Theodore J. Irwin, official organist. 9, Pearl Hassock Whitcomb, soprano. 10, Gene James's Rose Room Bowl orch.

**WPG, Atlantic City, N. J., 296 (E. S. T.)—3:15 P. M.**, organ recital. 10, studio concert by Galen Hall trio; Phyllis Herbine, violinist; Vera Chadsey, pianist; Adine Barozzi, cellist; assisted by Madame Blanche Mazet, soprano; E. F. Gallapher, baritone; Alice Warren Sachse, pianist.

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

**KTHS, Hot Springs, Ark., 375 (C. S. T.)—8:30 P. M.**, selections by members of the Conservatory of Music. 9, selections by the Meyer Davis Ensemble. 9:30, selections by artists of Henderson-Brown College. 10, dance frolic by the Charles L. Fischer orch.

**KOA, Denver, Colo., 323 (M. S. T.)—12:20 P. M.**, Rialto organ recital. 1, N. Y. stock reports, live stock, fruit and vegetable report and weather. 6, N. Y. stock reports, live stock, vegetables and late news. 8, ten minutes of music by Fred Schmitt. 8:10, two-act comedy, "Safety First."

**WLW, Cincinnati, O., 423 (C. S. T.)—10:45 A. M.**, weather and business reports. 11:55, time. 12, physical exercises. 12:15 P. M., Lenten services. 1:30, business reports. 3, market reports. 4, Babson reports. 6, Selinsky Instrumental Quartet. 8, The Times-Star orch. Marjory Garrigus Smith, pianist; Howard Hafford, tenor; Joseph Vito, harpist.

**WEEI, Boston, 303 (E. S. T.)—2 P. M.**, musicale. 6:30, Big Brother club. 7:15, Dok-Eisenbourg and his Simfonians. 7:55, Pathe News flashes. 8, program by C. Leroy Lyon. 9, A. & P. Gypsies.

**WMAQ, Chicago, 448 (C. S. T.)—4 P. M.**, mothers in council. 4:30, Chicago High School Teachers' Council. 6:30, Hotel LaSalle orch.

**WGR, Buffalo, N. Y., 319 (E. S. T.)—10:45 P. M.**, Gold Medal home service talk. 6:30-7:30 P. M., Knell's Tokio orch. 8, recital by Bertha Drescher. 9, Robertson musical program. 10, concert by H. G. Boice.

**WGN, Chicago, 370 (C. S. T.)—9:31 A. M.**, time. 9:35, stock and farm quotations. 10, wheat. 10:30, wheat and cable reports. 11, wheat, weather, dairy reports. 11:30, wheat, grain and livestock receipts. 11:56, time. 12, wheat, board of trade. 12:10 P. M., board of trade quotations; hog sales. 12:35, Tea Room orch. 1, wheat. 1:05, Tea Room orch. 1:35, readings. 1:40, Drake concert ensemble and Blackstone string quintet. 2:30, musical recital. 3, miscellaneous entertainment. 5, stock exchange and market. 5:30, Skeezix time for children. 5:57, time.

## Tuesday, March 10

**WHAS, Louisville, Ky., 400 (C. S. T.)—4 P. M.**, selections from the Louisville Conservatory of Music; selections played on the Alamo Theatre organ; police bulletins; weather; readings; late news. 4:55, local livestock, produce and grain market reports. 5, time. 7:30, concert by Eddie Rosson and his orch.; a chapter of the "Billy and Jane" stories; late news; time.

**WWJ, Detroit, Mich., 353 (C. S. T.)—8 A. M.**, setting-up exercises. 9:30, "Tonight's Dinner" and a special talk. 10:25, weather. 11:55, time. 12:05 P. M., Jules Klein's Hotel Statler orch. 3, News orch. 3:50, weather. 3:55, market reports. 6, dinner concert. 8, concert from New York.

**KPO, San Francisco, Cal., 423 (P. S. T.)—7 A. M.**, "Daily Dozen" by Bernard Drury. 10, chat for the housewives on "Home Making." 10:30, "Ye Towne Cryer" News Bulletins. 10:40, "What is Playing at the Local Theatres." 11:50, market report. 12 P. M., time. 1, Rudy Seiger's Fairmont Hotel orch. 2:30, matinee by Pavo Real orch. 4:30, Rudy Seiger's Fairmont Hotel orch. 5:30, children's hour stories. 6:30, garden hints; "What is Playing at the Local Theatres." 7, Rudy Seiger's Fairmont Hotel orch. 8, program

by the San Francisco Music Society. 10, Gene James's Rose Room Bowl orch.

**KTHS, Hot Springs, Ark., 375 (C. S. T.)—8:30 P. M.**, Old Southern Melodies Night. 9:45, Meyer Davis-New Arlington orch.

**WREO, Lansing, Mich., 286 (C. S. T.)—8:15 P. M.**, musical program; Reo Broadcasting band; Reo Male Glee Club; local artists. 10, weather.

**KOA, Denver, Colo., 323 (M. S. T.)—12:20 P. M.**, Rialto organ recital. 1, N. Y. stock reports (2 o'clock quotations); live stock; fruit and vegetable report and weather. 3, half hour matinee for housewives. 6, dinner music. 6:30, final reading, N. Y. stock reports; live stock; vegetables and late news bulletins.

**WPG, Atlantic City, N. J., 296 (E. S. T.)—7 P. M.**, Hotel Ambassador dinner music. 9, Hotel Traymore Ensemble. 10, A. C. Kiwanis Club Night.

**KGW, Portland, Ore., 492 (P. S. T.)—11:30 A. M.**, weather. 12:30 P. M., Rose City Trio. 5, children's program. 7:15, markets, weather, news bulletins and police reports. 8, Oregon Agricultural College Extension Service. 8:30, concert. 10, Multnomah Hotel Strollers.

**WLW, Cincinnati, O., 423 (C. S. T.)—10:45 A. M.**, weather and business reports. 11:55, time. 12, setting-up exercises. 12:15 P. M., Delta Omicron Sorority program. 1:30, business reports. 3, market reports. 4, "Mah Jong" by Lucy Blackburn. 6, Selinsky Instrumental Quintet. 8, concert program; selections by Quartet of Brass; instrumental trio. 8:30, R. G. (Gregg) Henkle in "O'Gooferty and Goofus"; Adelaide Apfel, pianist; Earl Derbis, violinist; Edith MacDonald Taube Trio; violin, Edith MacDonald Taube; cello, Winifred Hazelwood; piano, Olive Terry. 9, entertainment by Higginbottom's orch.; popular piano numbers by Missouri Kenney; old time fiddlin' by Jake Rutz.

**WEEI, Boston, 303 (E. S. T.)—1 P. M.**, Civitan club. 2, Napoli Four. 4, Shawmut Juvenile Synopators. 6:30, Big Brother club, Uke band. 7:15, Dok-Eisenbourg and his Simfonians. 8, musicale. 8:30, Gold Dust Twins. 9, Eveready hour. 10, Goodrich Cord orch.

**WMAQ, Chicago, 448 (C. S. T.)—12 P. M.**, Illinois Manufacturers' association program. 4, American Red Cross talk by Dr. H. W. Gentles. 4:30, pupils of the Gunn School of Music. 6, Chicago theatre organ. 6:25, Hotel LaSalle orch. 6:50, "Daddy." 8, Harry Hansen, literary editor. 8:20, Clara E. Laughlin, travel talk. 8:40, weekly talk from the Association of Commerce. 8:55, lecture by the U. of C. 8:30, Jane Fitch, soprano. 9:15, program by Reform Church.

**WGR, Buffalo, N. Y., 319 (E. S. T.)—11 A. M.**, Mrs. Katherine Norton Britt. 6 P. M., Hallpyrd string trio. 8, joint broadcasting with WEA.

**WGN, Chicago, 370 (C. S. T.)—9:31 A. M.**, time. 9:35, stock and farm quotations. 10, wheat. 10:30, wheat and cable reports. 11, wheat, weather, dairy reports. 11:30, wheat, grain and livestock receipts. 11:56, time. 12, wheat, board of trade. 12:10 P. M., board of trade quotations; hog sales. 12:35, Tea Room orch. 1, wheat. 1:05, Tea Room orch. 1:35, readings. 1:40, Drake concert ensemble and Blackstone string quintet. 2:30, musical recital. 3, miscellaneous entertainment. 5, stock exchange and market. 5:30, Skeezix time for children. 5:57, time.

## Wednesday, March 11

**WEMC, Berrien Springs, Mich., 286 (C. S. T.)—8:15 P. M.**, Ardice Bentley, pianist. 8:30, Marguerite Bordeaux, reader. 8:40, "The Cardinal Ladies' Quartet." 8:55, talk: "What Books Do You Enjoy?" Lyndon L. Skinner.

**WHAS, Louisville, Ky., 400 (C. S. T.)—4 P. M.**, selections from the Louisville Conservatory of Music; weather; readings; late news. 4:55, 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.; late news; time.

**WWJ, Detroit, Mich., 353 (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. 12:05 P. M., Jules Klein's Hotel Statler orch. 3, News orch. 3:50, weather. 3:55, market reports. 6, dinner concert. 8, News orch. 10, Jean Goldkette's Victor Recording orch.

**KPO, San Francisco, Cal., 423 (P. S. T.)—7 A. M.**, "Daily Dozen" by Bernard Drury. 10:30, "Ye Towne Cryer." 10:40, "What is Playing at the Local Theatres." 11:50, market reports. 12 P. M., time. 1, Rudy Seiger's Fairmont Hotel orch. 2:30, dance music. 4:30, Rudy Seiger's Fairmont Hotel orch. 5:30, children's hour stories. 6:30, "What is Playing at the Local Theatres." 7, Rudy Seiger's Fairmont Hotel orch. 7:30, program by the Conn Band Instrument Co.

**KGW, Portland, Ore., 492 (P. S. T.)—11:30 A. M.**, weather. 12:30 P. M., Rose City Trio. 5, children's program. 7:15, markets, weather, news bulletins and police reports. 8, concert, arranged by Mrs. L. W. Waldorf. 10, Colburn's Melody Men of the Hotel Portland, and intermission numbers by Shefler's Novelty String Quartet.

**KTHS, Hot Springs, Ark., 375 (C. S. T.)—8:30 P. M.**, Meyer Davis Trio. 9, concert by the Meyer Davis Ensemble. 10, dance frolic by Chas. L. Fischer's orch.

**KOA, Denver, Colo., 323 (M. S. T.)—12:20 P. M.**, Rialto organ recital. 1, N. Y. stock reports (2 o'clock quotations); live stock; fruit and vegetable report; weather. 8, Fred Schmitt and his orch. 8:10, Men's Glee club; "The Florist Shop." KOA Studio players. 10, Joe Mann and his Rainbow-Lane orch.

**WLW, Cincinnati, O., 423 (C. S. T.)—10:45**

**A. M.**, weather and business reports. 11:55, time. 12, physical exercises. 12:15 P. M., program by Mu Phi Epsilon Sorority; Ahaus Brunswick orch. 1:30, business reports. 2:30, at Music Hall with the Radio Show. 4, "Shut In" program. 8, half hour programs at the Radio Show; The Milnor Instrumental Trio; Russian dances in costume with accordian accompaniments; Clifford Lang, pianist; Formica Entertainment; Walter Esberger's Instrumental Quartet; Lyric Male Quartet.

**WGN, Chicago, 370 (C. S. T.)—9:31 A. M.**, time. 9:35, stock and farm quotations. 10, wheat. 10:30, wheat and cable reports. 11, wheat, weather, dairy reports. 11:30, wheat, grain and livestock receipts. 11:56, time. 12, wheat, board of trade. 12:10 P. M., board of trade quotations; hog sales. 12:35, Tea Room orch. 1, wheat. 1:05, Tea Room orch. 1:35, readings. 1:40, Drake concert ensemble and Blackstone string quintet. 2:30, musical recital. 3, miscellaneous entertainment. 5, stock exchange and market. 5:30, Skeezix time for children. 5:57, time.

**WEEI, Boston, 303 (E. S. T.)—2 P. M.**, Frankie Ward and his Avalon orch. 6:30, Big Brother club. 7:25, Jack Griffin and Eddie McKinley. 7:50, Harry Einstein. 8, The Traveler Shoe orch. 8:30, M. B. Cohan's half-hour cusciale. 9, Gillette Safety Razor band.

**WMAQ, Chicago, 448 (C. S. T.)—1 P. M.**, speeches from the weekly luncheon. 4, beauty talk by Mme. Grace Earl. 4:30, pupils of the Cosmopolitan School of Music. 6, Chicago theatre organ recital. 6:30, stories for the children by Georgene Faulkner. 6, lecture Northwestern University. 8:30, piano concerto. 9, WMAQ players, Carl Craven, tenor.

**WGR, Buffalo, N. Y., 319 (E. S. T.)—10:45 A. M.**, Gold Medal home service. 8 P. M., recital by Ethyl McMullen. 9, Atwater-Kent radio artists. 10, recital by Mrs. Wm. J. Carpenter. 10:30, H. C. Weasner and friends.

## Thursday, March 12

**WHAS, Louisville, Ky., 400 (C. S. T.)—4 P. M.**, selections from the Louisville Conservatory of Music; police bulletins; weather; readings; late news. 4:55, local livestock, produce and grain market reports. 5, time. 7:30, concert under the auspices of Mrs. J. E. Harmon, Jr.; four-minute digest of International Sunday school lesson; four-minutes welfare talk; late news; time.

**WWJ, Detroit, Mich., 353 (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. 12:05 P. M., Jules Klein's Hotel Statler orch. 3, News orch. 3:50, weather. 3:55, market reports. 6, dinner concert. 8, concert from New York.

**WPG, Atlantic City, N. J., 296 (E. S. T.)—10 P. M.**, studio concert, Edna Irene Peech, mezzo contralto; Evan Prosser, tenor; Hannah Shaeffer, pianist; Minnie Shaeffer, violinist; Alice Warren Sachse and Joseph Lilly, pianists.

**KGW, Portland, Ore., 492 (P. S. T.)—11:30 A. M.**, weather. 12:30 P. M., concert by Rose City Trio. 5, children's program. 7:15, market, weather, news bulletins and police reports. 8, The Oregonian Concert orch. 10, Multnomah Hotel Strollers.

**WREO, Lansing, Mich., 286 (C. S. T.)—8:15 P. M.**, musical program; Reo Broadcasting orch.; Reo Male Quartet; soloist. 10, weather.

**KTHS, Hot Springs, Ark., 375 (C. S. T.)—8:30 P. M.**, organ concert by Lawson Reid. 12 midnight, Owl concert and dance frolic by the Meyer Davis orch.

**WKAQ, Porto Rico, 341 (E. S. T.)—8:30 P. M.**, musical concert from restaurant "La Cafetera."

**KFDY, Brookings, S. D., 273 (C. S. T.)—8 P. M.**, clarinet and saxophone solos by R. M. Endresen. 8:10, "Increased Returns Through Seed Treatment," by A. T. Evans. 8:20, vocal solos by Mrs. James Milne, soprano. 8:30, news and farm facts. 8:35, "Spring Care of Orchard" by G. T. Gilbertson. 8:45, Clarinet and saxophone solos. 8:50, soprano solos with guitar accompaniment.

**KOA, Denver, Colo., 323 (M. S. T.)—12:20 P. M.**, Rialto organ recital. 1, N. Y. stock reports; live stock; fruit and vegetable report and weather. 3, half hour matinee for housewives. 6, final reading, N. Y. stock reports; live stock; vegetables and late news.

**WLW, Cincinnati, O., 423 (C. S. T.)—10:45 A. M.**, weather and business reports. 11:55, time. 12, physical exercises; William Stradtman, instructor. 12:15 P. M., noonday concert. 1:30, business reports. 3, market reports. 4, French lesson; piano recital by Adelaide Apfel. 6 P. M., Selinsky Instrumental Quintet. 10, three-minute message. 10:03, Cooper Corporation; Cooper Concert orch. and Male Quartet; Larry Grueter, piano accordian solos; Doherty Melody Boys.

**WGN, Chicago, 370 (C. S. T.)—9:31 A. M.**, time. 9:35, stock and farm quotations. 10, wheat. 10:30, wheat and cable reports. 11, wheat, weather, dairy reports. 11:30, wheat, grain and livestock receipts. 11:56, time. 12, wheat, board of trade. 12:10 P. M., board of trade quotations; hog sales. 12:35, Tea Room orch. 1, wheat. 1:05, Tea Room orch. 1:35, readings. 1:40, Drake concert ensemble and Blackstone string quintet. 2:30, musical recital. 3, miscellaneous entertainment. 5, stock exchange and market. 5:30, Skeezix time for children. 5:57, time.

**WMAQ, Chicago, 448 (C. S. T.)—4 P. M.**, household hour. 4:30, Illinois Federation. 6, organ recital. 6:25, Hotel LaSalle orch. 6:50, "Daddy." 8, garden talk, James H. Burdett. 8:15, Western Railways Commission. 8:30, Jane Fitch, soprano. 8:45, income tax. 8:50, University of Chicago lecture. 9:15, Edgewater Glee club.

**WGR, Buffalo, N. Y., 319 (E. S. T.)—6 P. M.**, (Continued on page 26)

### Literature Wanted

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

Trade Service Editor,  
Radio World,  
1493 Broadway, New York City.

I desire to receive radio literature.

Name .....  
City or town.....  
State.....  
Are you a dealer?.....  
If not who is your dealer?.....  
His Name.....  
His Address.....

Melbourne Lancaster, Lockhart, Tex.  
Burton Anderson, Rt. 4, Box 44, Longmont, Col.  
Clarena Hassler, Amherst, Col.  
John J. Wise, Jr., 301 S. Court St., Crown Pt., Ind.

F. B. Bunch, Jr., Statesville, N. C.  
Jos. D. Taboda, Sancto Spinetos, Cuba.  
Eldren Farr, Rt. 2, Box 122, Tucson, Ariz.  
J. T. Rand, 3040 Hull Ave., Cheviot, Cincinnati, Ohio.

Wm. Twyman, Petty, Tex.  
S. J. Miller, Pen Argyll, Pa.  
Charles Allison, Murray, Ia.  
M. J. Wergis, Crosee, N. D.  
Phillips Young, Slater, Mo.  
J. H. Ayera, Grove City, Ohio.  
Chas. Shoup, 204 Bronx Ave., W. View, Pittsburgh, Pa.

D. I. Fox, Peona, Ill.  
C. D. Reynolds, Franklin, Ohio.  
Harold Arnold, Kenmudy, Ill.  
Lewis Gombert, 452 Linwood St., Brooklyn, N. Y.

### Business Opportunities Radio and Electrical

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

**RADIO CABINET FACTORY**—Now operating profitably, capacity over 1,000 cabinets weekly, offers interest in business to successful set manufacturer as means of securing steady business and avoiding sales expense; in return furnishing cabinets at attractive prices possible under such arrangement. Box W. 1, RADIO WORLD.

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**PIANO, RADIO AND MUSIC** business, doing \$17,000 year; sacrifice at \$2,500; well stocked. Box W. 4, RADIO WORLD.

**RADIO, ELECTRICAL**—California representative; accounts and personal commissions solicited; leaving few days. Box W. 5, RADIO WORLD.

**RADIO PRODUCTS**—We are distributors of radio products in metropolitan territory; are interested in representation of additional items; if meritorious might carry accounts. Box W. 6, RADIO WORLD.

**RADIO STORE, EXCELLENT BUSINESS** section, East Bronx; have other business cannot attend to this store; will consider any reasonable offer. Box O5, Radio World.

**RADIO STORE**; good location, neighborhood and transient trade; owner's opportunity in making bigger connections reason for selling. Inquire 532 Nostrand Ave., cor. Fulton St., Brooklyn, N. Y.

**RADIO STORE**, located on one of the business corners of the downtown section; wonderful opportunity for one who desires to get into this fast growing business. Box O6, Radio World.

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**FRESHMAN MASTERPIECE**, \$46.00; Trirdyn. \$46.00. F. J. Terry, Broadalbin, N. Y.

**IF YOU WANT \$96 A WEEK**, a big permanent business, an honest company and an Essex coach without a cent of expense, write now. I need 100 men and women quick to take orders for Jennings hosiery. Don't delay. Send post card now for details. Jennings Mfg. Co., Dept., N-31, Dayton, Ohio.

**FINANCING**—Will negotiate with new enterprise, individual or established business needing capital. Incorporating attended to. Box 95, Wall Street Station, New York.

# The Radio Trade

## Grebe, Being Sued, Challenges Hazeltine's Right to Neutrodyne Patent

A SUIT charging infringement of patent has been brought in the Brooklyn Federal Court by the Hazeltine Corporation and the Independent Radio Manufacturers against A. H. Grebe & Co. The defendant company contends that the question of the validity of the Hazeltine patents is one for legal interpretation.

During the war Prof. Louis Hazeltine, of Stevens Institute of Technology, in the employ of the Navy Department, developed the Neutrodyne, for which a patent was granted. At that time, the Grebe company stated, the dedication act, which provided that the patent became public property, was effective.

Later, the defendant company claims, Hazeltine was allowed by the Patent Office to cancel the dedication clause. It is held that the question to be decided by the court is whether Hazeltine had the legal right to withdraw his dedication.

### 6-FOLD SALES INCREASE IN A YEAR IN SOUTH AFRICA

WASHINGTON. IMPORTS of radio equipment in South Africa were more than six times greater during 1924 than the previous year, according to reports reaching the Department of Commerce. It is estimated that the 1924 imports were \$820,390, compared to \$137,352 for 1923.

### UNITED SCIENTIFIC LABORATORIES REDUCES PRICES

DUE to the nation-wide demand for United Scientific Laboratory products, David Wald, president, has ordered a price reduction amounting in some instances to 25% on the famous line of Scientific low-loss condensers, rheostats and potentiometers. Increased facilities have also helped in the saving which is passed on to the consumer. This concern has also just brought out the new Scientific low-loss tuned radio-frequency kit which has made a hit with the set-builder on account of its distance-getting qualities.

### BOB BARBLEY PERFECTS AMBASSADOR CIRCUIT

BOB BARBLEY, well known in the radio field as one of the original radio experts, has established radio laboratories and a factory at 135 Liberty Street, New York City, where he specializes on Super-Ambassador circuits. Complete kits for building the new low-loss 4-tube Ambassador and the Ambassador 3-tube deluxe are sold at lowest prices, or sets are built and wired for the fellow who wants expert work. Only genuine low-loss Ambassador parts are used and panels, sub-panels and cabinets are the finest procurable. Blueprints for the Ambassador circuit are available and free advice is always on tap. The Ambassador is one of the best of the regenerative circuits, being remarkably selective and a consistent distance getter.

## Coming Events

**MARCH 7**—End of Fifth Annual Radio Show and Convention, Hotel Pennsylvania, New York City. Executive Radio Council, Second District.

**MARCH 7**—End of Kansas City Radio Show, Convention Hall, Kansas City, Mo.

**MARCH 4**—Broadcasting of President Coolidge's inaugural speech.

**MARCH 9 TO 14**—Cincinnati Radio Show, Music Hall.

**APRIL 19 TO 25**—International Radio Exposition, Steel Pier, Atlantic City, N. J.

**SEPT 12 TO 19**—Fourth Annual National Radio Exposition, by American Radio Exposition Co., 522 Fifth Ave., N. Y. C., to be held in Grand Central Palace.

**SEPT. 14 TO 19**—Second Radio World's Fair, 258th Field Artillery Armory, Kingsbridge Rd. and Jerome Ave., New York City.

**SEPT. 14 TO 19**—Pittsburgh Radio Show, Motor Square Garden. (Postponed from Jan. 19.)

**SEPT. 15 TO 19**—Washington (D. C.) Radio Show.

**SEPT. 23 TO Oct. 4**—International Wireless Exhibition, Geneva, Switzerland.

**NOV. 9 TO 15**—Milwaukee Radio Exposition, Civic Auditorium.

**NOV. 17 TO 22**—Fourth Annual Chicago Radio Exposition, Coliseum.

**DEC. 1 TO 6**—Boston Radio Show, Mechanic's Hall.

Date not set yet for exposition, also to be held in Chicago, direction of Harold Bolster.

## Canadian Business \$7,000,000 in Year

WASHINGTON. REPORTS reaching the Department of Commerce indicate that 1924 will prove to have been the biggest year yet for radio in Canada. In 1924, it is estimated, the sales of sets, loudspeakers, tubes and other radio apparatus in Canada totaled \$7,000,000. A large part of it was American make.

### SCHWAB UPHELD IN RIGHT TO USE THE NAME OF BRUNSWICK RADIO

SUPREME COURT JUSTICE BIJUR in New York City denied the application of the Brunswick Balke Collender Co., manufacturers of phonographs, to restrain Harold M. Schwab, manufacturer of Brunswick De Luxe Radio Receiving Sets, from manufacturing, advertising and merchandising radio sets and parts under the Brunswick De Luxe trade mark. Justice Bijur decided radio and phonographs were two separate industries and there was no intent to deceive or misrepresent on the part of Mr. Schwab in using the name of Brunswick De Luxe.

## New Corporations

Heteroplex Radio Corp., apparatus, \$1,500,000. F. Vondorn, Raymond G. Penglase, New York; E. C. Ballantyne, Jersey City, N. J. (Capital Trust Co., of Delaware.)

R. & L. Radio Corp., \$15,000. E. T. LeBerthon, A. S. Robbins, A. E. Ruehe. (Atty., H. M. Bassett, 56 Wall St., New York City.)

Aircraft Industries, Radio and Printing, \$10,000. M. E. Schecter, F. Arndt, E. Friberg. (Attys., Schecter & Letsch, 34 Wall St., New York City.)

Brainson Radio Corp., \$10,000. C. H. Levitt, A. Dulak, H. H. Simon. (Attys., Perlman & Levitt, 1 Madison Ave., New York City.)

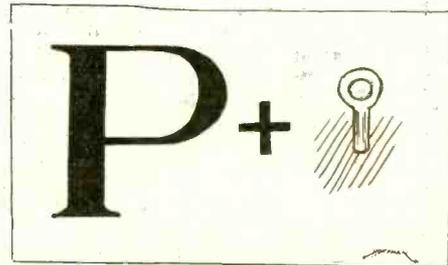
Durus Radio Corp., Wilmington, Del., \$2,000,000. (Corporation Trust Co. of America.)

Lincoln Radio Research Laboratories, Wilmington, Del., \$500,000. (Atty., Chas. G. Guyer, Wilmington, Del.)

Renowned Elec. Products, Wilmington, Del., \$300,000. (Colonial Charter Co.)

## The Weekly Rebus

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

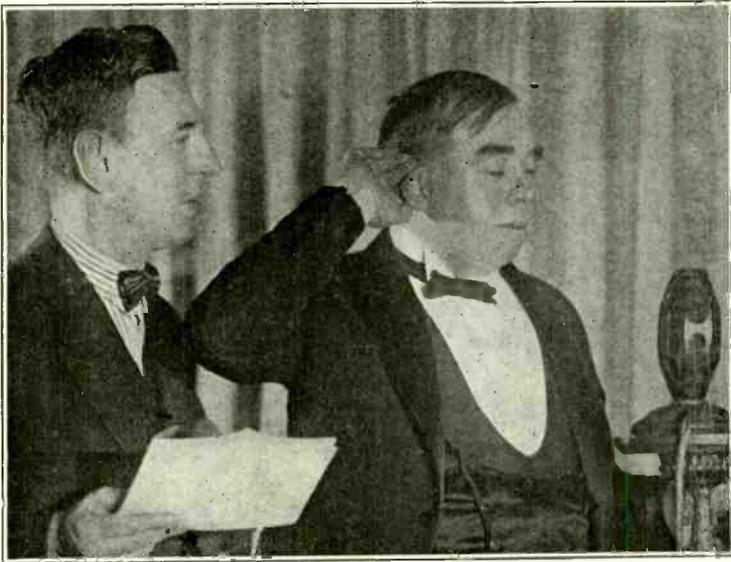


The names of those sending the solution will be published.

## Recent Back Numbers of Radio World

may be obtained by sending 15 cents in stamps or coin for each issue desired. Address Circulation Manager, Radio World, 1493 Broadway, New York City.

## 13th New York Station



RUBE GOLDBERG, left, and Irwin S. Cobb at WMCA opening. (Foto Topics.)

By Sidney E. Finkelstein

**T**HIRTEEN! Do you consider it unlucky? Anyway, Greater New York, as a radio entity, doesn't seem to think so. Its thirteenth station is on the air—WMCA, 428.6 meters, 500 watts, atop the Hotel McAlpin. On the opening night stars were introduced by four masters of ceremony, Irvin S. Cobb, journalist and author; Walter Catlett, star of "Lady Be Good"; Harry Herschfield, cartoonist, and Ed Squires, "the globe-trotting announcer."



SIDNEY E. FINKELSTEIN

Among the famous persons on the program were Cliff Edwards, comedian; Countess Peggy Hopkins Joyce Morner; Milton Sills and Madge Kennedy, screen stars; Rube Goldberg, cartoonist; Earl Carroll, theatrical producer, and Holbrook Blinn, actor. Eddie Squires is studio manager and chief of the announcers. He was formerly at WDAP, of Chicago; WLAG, of Minneapolis, and KDKA, of Pittsburgh. Ralph C. Powell, Jr., chief of the engineering staff, was operator and announcer at WAAM and later chief engineer at WGBS. Mr. Powell formerly was a contributor to RADIO WORLD.

Storage batteries are to be used almost exclusively in order to eliminate foreign noises from the wave 428.6 meters which has been assigned to the station. The antenna is one of the highest in the country, approximately 430 feet above the ground.

The transmitter employs the Meissner inductive coupled type of circuit, with Heising modulation. Power can be obtained from either storage battery or generator equipment. There are two 250-watt oscillator and two 250-watt modulator tubes, with all extra tubes and other equipment that may be needed to insure continuity of program.

Storage batteries will be used almost exclusively as the source of power, to eliminate hum or ripple.

The antenna is 430 feet from the ground. This extreme height, and the freedom of the antenna from the effects of surrounding structures, is doubtless responsible for the good results that have attended the test programs broadcast for the few weeks before the opening. The signals travel equally well in all directions, according to reports. The station during its testing period was heard regularly in the region extending from Iowa and North Dakota as far West as the Pacific Coast, with occasional reports from Northwestern Canada.

The antenna is of the sloping type, has four wires and is supported above the roof of the hotel by steel masts, with a lead connecting it to the transmitter on the top floor of the hotel. The hotel being of steel construction, serves as the ground.

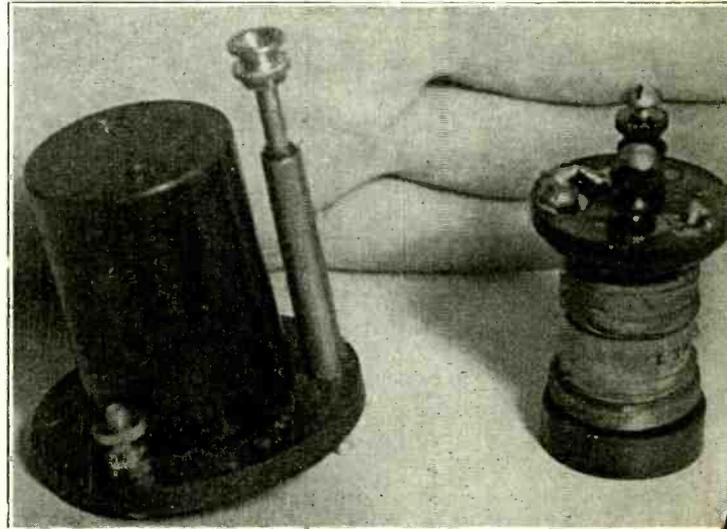
WMCA will also be equipped to broadcast from numerous outside points.

Manager Director Arthur L. Lee is having his telephone engineer experiment with a plan to link up every room in the McAlpin and Martinique Hotels with the radio station on the roof, whereby any guest who wishes to hear the program may simply listen in at the telephone. Many hundreds of the guest rooms are already equipped with radio receiving sets, as almost every "permanent" guest of the hotels has such an outfit.

## Mary Garden's Air Personality



MARY GARDEN'S only radiic appearance this season was at WGN, Chicago, Drake Hotel. The picturesque and gifted operatic character charmed her audience and has an "air personality."



A DEVICE to prevent radiating receiving sets from sending their squeals to neighbors has been just perfected, says Roy A. Weagant, vice-president and Forest Co. The device is very small. A choke coil is placed in series with circuit of the audio-frequency amplifier. A small condenser connects the plate tube to the grid of the regenerative tube. The condenser is made similar to the of neutrodynic sets. The photo shows the interior and exterior views of the ne



GRAHAM McNAMEE, guest; Eddie Squires, announcer; J. Andrew White, guest, at WMCA.

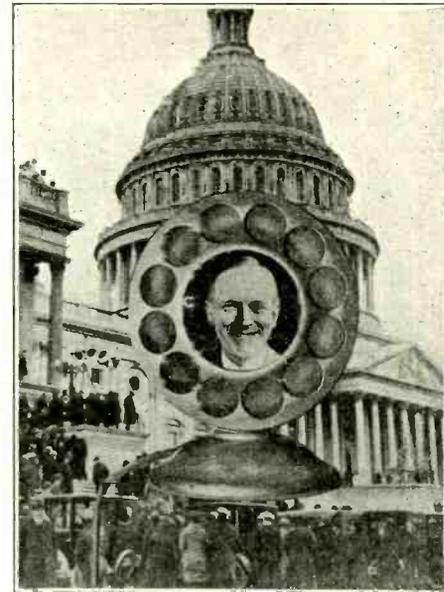
ality

Two Lucky Girls

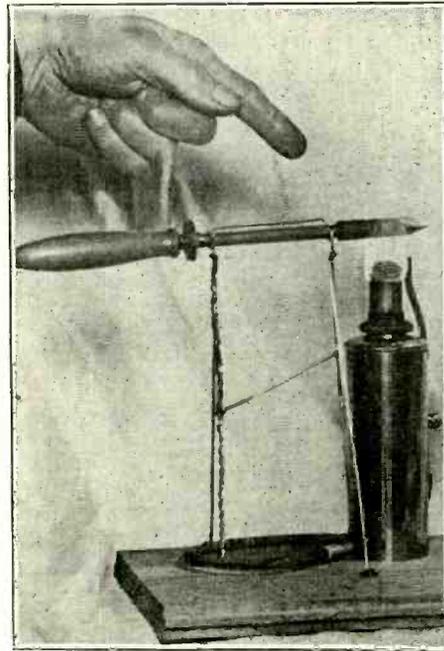
Inaugural Broadcast



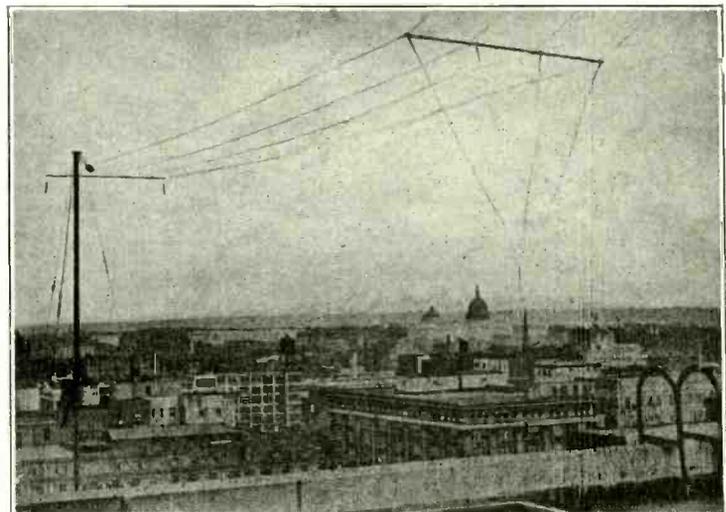
MISS RUTH BILGER (left) and Miss Margaret Butterfield won first honors by solving the crossword puzzle of the Ponce de Leon Celebration Committee of St. Augustine, Fla. The problem of the puzzle was radioed from the committee's headquarters and as it came over the wire from the receiver was solved by the young women. (Underwood & Underwood)



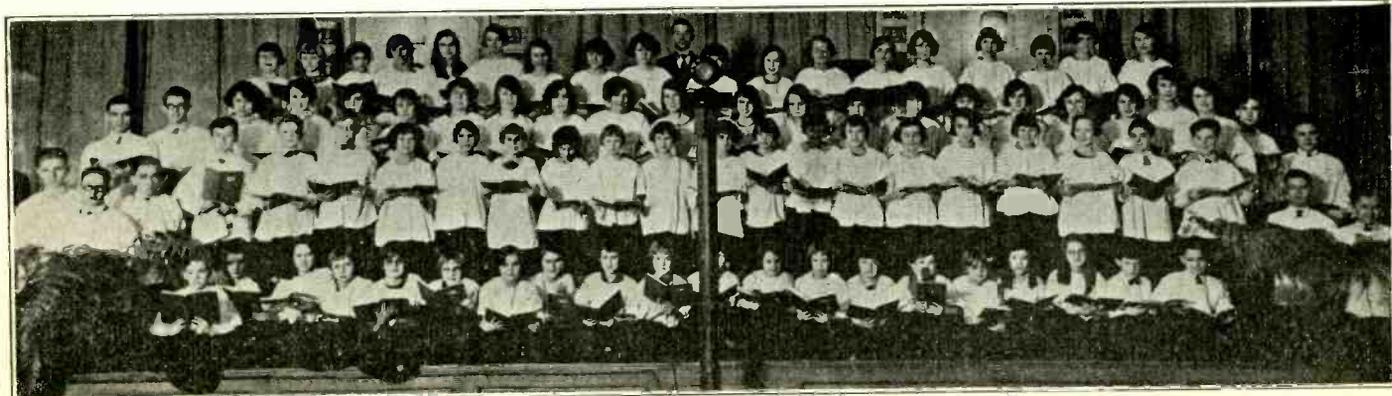
MILLIONS heard President Coolidge's Inaugural address, thanks to multiple broadcasting. WCAP, Washington, D. C., broadcast it direct, by remote control, from Washington. Other stations rebroadcast it. Loudspeakers placed on the steps of the Capitol enabled the huge personal audience to catch every word that the President said. (Kadel & Herbert)



A STAND that provides a convenient rest for a soldering iron can be very easily made out of bus bar. It can be used for either electric or other type iron, but is especially convenient for the iron that has to be heated by some external means, as for instance an alcohol lamp. (Kadel & Herbert)



HERE'S the aerial of WCAP, Washington, D. C. This station that picked up the President's address, broadcast it on its own wave from this antenna and simultaneously transmitted via the land lines to WEA, which in turn transmitted it to a net-work of broadcasting stations throughout the United States by its own land lines. (Kadel & Herbert)

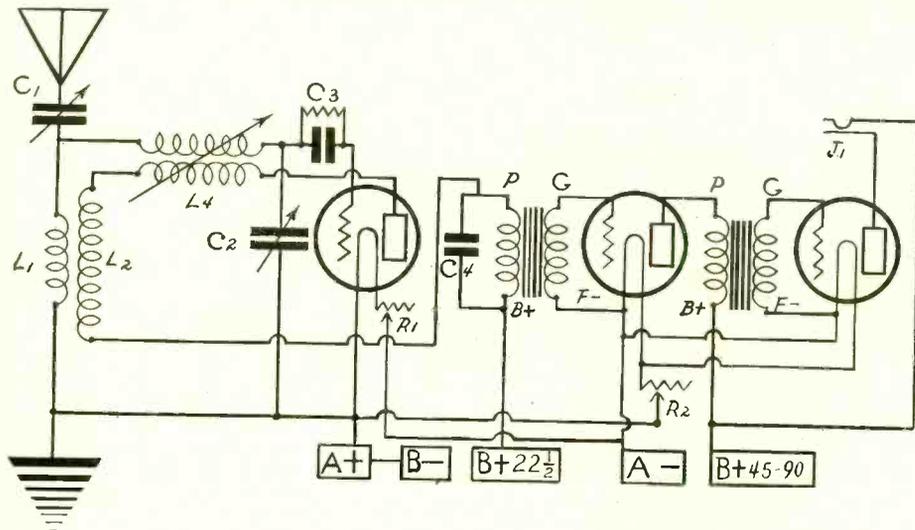


YOUNG People's Choir, First M. E. Church, Atlantic City, N. J., broadcasting from WPG. (Foto Topics)

# The Radio University



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



**FIG. 100—A 3-tube regenerative set of excellent selectivity and very sensitive. On one spiderweb form having a core diameter of approximately 1" first wind the primary L1 of 40 turns with No. 22 DCC wire. Then wind the secondary L2 with the same gauge wire 60 turns. L4 is the split variometer, the rotor being in the plate lead. C1 is 23 plates, C2, 23 plates; C3, a .00025 mfd. grid condenser; C4, a .002 mfd. phone condenser.**

**HOW** can I add a stage of fixed RF to my present regenerative set?—Harry Rose, 201 W. 79th St., New York City.

Fig. 100 is the circuit you request. The output is connected to the present aerial and ground posts of the set. New aerial ground connections are made as shown.

**WHAT** do you consider the best 3-tube set for DX using not more than three tubes? (2) Will the circuit operate a loudspeaker?—L. E. Bates, 3020 Louisiana St., Houston, Tex.

The circuit regenerative receiver using two stages of AF amplification. (2) Yes.

**I CAN GET** distant stations only by holding my hand around the leadin. As soon as I remove my hand I get only local stations. Can you tell me what I can do to equal the effect of my hand on the aerial? I have a 3-circuit regenerative set.—F. J. Van Derwerken, 497 7th Ave., No. Troy, N. Y.

Indications point to your having a poor ground connection. See that there are no breaks in the primary wire.

**I BUILT** the 1-tube set by Peter V. O'Rourke, in the issue of Jan. 24, but cannot get it to oscillate. I tried all sizes of grid leaks and condensers, but to no avail. Can you suggest anything that will clear up this trouble?—P. M. H., Harrisburg, Pa.

You state in your letter that you hear, faintly, the carrier waves of the various stations. This indicates that the set is oscillating. Couple the tickler with the secondary, inductively, leaving the condenser across the tickler. This will make it oscillate and regenerate more powerfully. The

condenser will control the oscillations. Should you find, after coupling, that the tube oscillates to the extent of being uncontrollable, increase the spacing between the plate coil and the secondary, with the condenser plates partly engaged, until oscillation ceases. This is the correct oscillating point. Then, by increasing the capacity of the condenser, you will find that oscillation will increase and can be controlled.

**I BUILT** the Superflex, as described by Abner J. Gelula in the issue of Dec. 27. I am using an indoor aerial in the attic of my home. The set is very selective, but I have not been able to get out-of-town on the loudspeaker. I have received Denver, Beaumont, Tex., Pittsburgh and Buffalo on the headphones. How can I operate this set on the loudspeaker? (2) What is meant by the beginning and end of a coil? Which is which? (3) Can another condenser be used to better control regeneration?—W. C. Unverfeith, 4812 Concord Pl., Chicago, Ill.

Considering that you are using an indoor aerial, it certainly proves the sensitivity of the set if you can get distance at all. You will be surprised over the additional DX this set can bring in if you can install an outdoor aerial, or you may add another step of audio. (2) The beginning of the coil is the terminal of the turn wound first, the end is the terminal of the final turn. (3) Yes, if you care to use another control, although it is not necessary. A 23-plate variable condenser may be used across the plate coil.

**HOW** do you match interfrequency transformers for the Super-Heterodyne?—W. S. Henderson, 5455 N. 11th St., Philadelphia, Pa.

The apparatus used is complicated. However,

the following instructions will allow you to match the transformers fairly well. A high-frequency buzzer is connected to the primary of one of the transformers. Then each of the transformers to be matched is closely coupled with the connected coil and a pair of phones connected to the secondary of the transformer to be matched. You may connect the primary of the untested transformer to the secondary of the IFT connected to the buzzer. If you hear the high-pitched note, that transformer is all right. The proper procedure, however, is to use a 5-watt oscillator.

**I PURCHASED** the parts for the 4-tube Superdyne by mail-order and received a condenser and coils that are different than those pictured in RADIO WORLD. The condenser has one rotor and two stators and is a ball-bearing affair. Is this all right for the Superdyne? (2) The coils are of the basket-weave type. Are these all right? (3) How can I determine the resistance of a rheostat?—H. L. Fuller, Osseo, Mich.

It is the metric and is all right. (2) Yes, indeed. (3) It would be difficult without a Wheatstone Bridge. You may, with a little trouble, compare it with other rheostats of known resistance and then judge approximately its resistance.

**WHAT** is the highest and lowest wavelengths that can be reached by the Freshman Masterpiece? (2) Would a C battery be of benefit in cutting down the drain on the B battery? (3) How is the C battery inserted in the circuit? (4) How does the tuned RF compare with the Neutrodyne in tone, volume and DX?—M. M. Shepard, Adel, Ga.

(1) 200 to 550 meters, approximately. (2) If you buy the commercial set don't monkey with it. (3) Take off the leads on the F posts of the AF transformers. Connect the two F posts together. The minus C connects to this lead, the plus C to the minus A. (4) About the same, if the tuned RF is successfully balanced.

**I HAVE** a 3-tube Reinartz regenerative set equipped with the finest instruments obtainable. When using all three tubes I get a continual howl and whistle. This is not audible except when two tubes are used.—E. N. Sheldon, 120 Brown St., Pittsfield, Mass.

Probably interaction between the AF transformers is the cause. Reverse the primary connections of both AFT and mount AFT at right angles and away from tuning coils. A C battery in circuit may stop the noise. If the transformers have a shielded casing, ground the casings, or the iron cores.

**IN** reference to Bernard's Superdyne, can it be operated on a loop in an attic 25 feet from the ground? (2) Would I be able to get WTAM, WEBH and WGY, 100 miles from Cleveland? (3) Does this set possess greater selectivity than the Neutrodyne and tuned RF sets? (4) If this set can be purchased in kit form, will you tell me where?—Martin Diefenlaugh, 303 E. 10th St., Dover, O.

(1) Yes, for local stations, but it is not advisable. (2) No. (3) At least as great as those named. (4) See advertising columns.

**I AM** interested in the set, Fig. 80, page 12, issue of Jan. 31. Can one amperite serve both AF tubes and which number of same should I use? (2) What size panel is required for this set? (3) What is meant by "L5 is a 50-turn coil in fixed inductive relationship to L3L4?"—Geo. M. Dunmire, Scotland, S. D.

(1) Yes; type D11. (2) 7x21". (3) If you intend using three honeycombs, L5 is the center fixed coil while L3L4 are two coils whose position is variable.

**IN** answer to a previous question of mine, I was instructed to wind 5 or 6 turns around my present plate coil to make the Anderson Superdyne coupling transformer. Should they be spread out or close together? (2) My second audio stage has a loud whistle and a tapping noise in the phones. When I place my finger on the secondary terminal this stops. I tried resistances across the secondary, tried shielding, etc., but to no avail.—Sol Michael, 842 Whitlock Ave., New York City.

(1) Either way will work; preferably spread them out. (2) Try placing lead from plus B to core of AF transformer; placing a lead from the ground on the secondary terminal. Before you do this be sure that the ground does not go to the filament from the aerial and ground coil. (primary).

**IN** reference to the Byit Caldwell circuit in the issue of Nov. 15: Which side of the variable condenser goes to the grid? (2) Can the coils be low-loss?—John Rivers, 202 19th St., E. Moline, Ill.

(1) Stator plates. (2) Yes.

**I HAVE** always associated reflex circuit with crystals, i.e., that reflex circuits require a crystal detector. I note that in Tim Turkey's 3-tube reflex as described in the issue of Feb. 14 there is no crystal. Will you kindly tell me whether one is required or not?—Frank Taylor, care Dallas Gas Co., 2016 Jackson Ave., Dallas, Tex.

No. A tube may be used for detector, as Mr. Turkey outlined.

**DOES** it make any difference in constructing the low-loss coils for the Superdyne that in the first tuner or grid circuit the primary winding

(Continued on page 28)

## Join RADIO WORLD'S University Club

and we will enter your name on our subscription and University lists by special number. Put this number on your queries and they will be answered personally the same day as received.

And Get Free Question and Answer Service for the Coming 52 Weeks.

RADIO WORLD, 1493 Broadway, New York City:

Enclosed find \$6.00 for RADIO WORLD for one year (52 Nos.) and also consider this as an application to join RADIO WORLD'S University Club, which gives me free information in your Radio University Department for the coming year, and a number indicating my membership.

Name .....

Street .....

City and State .....

**EFFICIENT!**

*Will do anything that any five-tube receiver has ever done under the same circumstances.*



**BEAUTIFUL!**

*The outward appearance is of an original, artistic design, usually classed as "handsome."*

RECENTLY REGISTERED THE EUROPEAN STATIONS FIVE EVENINGS IN SUCCESSION!

**FIVE TUBE  
RADIO FREQUENCY  
TYPE 5-A**

THE INTERIOR WORKMANSHIP AND DESIGN WILL PROVE A PLEASANT SURPRISE!

**Specifications**

**LOW LOSS PRINCIPLE ADHERED TO THROUGHOUT:**

**TUBE SOCKETS:** An original Low Loss design.

**COILS:** Of the Low Loss type mounted so as to be out of the electrical field of the condensers.

**CONDENSERS:** Strictly Low Loss. Designed for straight line reading. No piling up of stations on the lower wave lengths.

**AUDIO-TRANSFORMERS:** This item and the variable condensers are manufactured by AIR SERVICE. We know they must be right.

**DIALS:** (Four inches in diameter.) The size of the dials permit a vernier control.

**SUB-BASE:** Mahogany in color and of a high quality of insulating material.

**FRONT PANEL:** Of the new frieze design. Adds to the beauty and general appearance of the receiver.

**CABINET:** Size 7 x 18 solid mahogany, of a high piano finish. Made of selected stock, 3/4 of an inch in thickness. (Note the difference between the quality of mahogany used in this cabinet and that of the type of so-called mahogany used in many cabinets of other makes.)

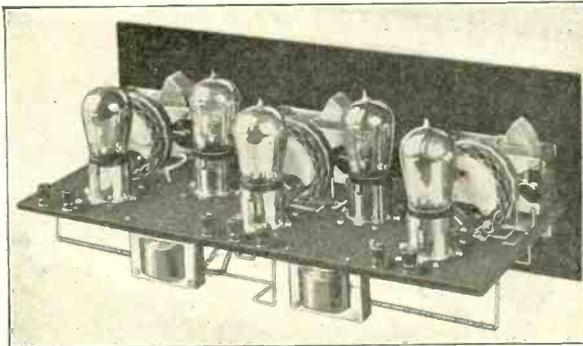
**CIRCUIT DESIGN:** The most advanced type of radio frequency circuit. Unnecessary to fuss with neutralization. Oscillations are controlled by a special knob termed the CLARITROL. This gives complete manipulation for clarity and volume.

**TUNING:** All tuning may be logged and the same station, when on the air, may be brought in at the same dial settings. Even a child can operate it.

**WORKMANSHIP:** It will be a revelation to anyone who would care to remove the set from the cabinet and compare the careful workmanship with that of other receivers selling for more than \$100.00.



**CLARITY—VOLUME**



This receiver has brought in the broadcasting from coast to coast. The most efficient type of receiver ever designed. 7x18 GENUINE MAHOGANY CABINET INCLUDED. (Not an imitation.) (Without tubes.)

**\$50**

**WITHOUT TUBES  
COMPLETELY  
ASSEMBLED**

**YOU CAN PAY  
MORE FOR AN IN-  
FERIOR RECEIVER  
BUT YOU CANNOT  
BUY A BETTER  
ONE AT ANY  
PRICE.**

**All Shipments Made  
Within 24 Hours**

Send us your name and those of your friends. We will place you on our mailing list and send you the PERRY WEEKLY RADIO TALKS. They are free and will be a liberal education in radio in the course of a few weeks.

**MAKE US PROVE OUR CLAIMS SEND NO MONEY. PAY THE POSTMAN**

If, after THREE DAYS, you decide that the receiver is not everything we claim, ship it right back to us.  
WE WILL REFUND YOUR MONEY BY RETURN MAIL.

**DEALERS AND REPRESENTATIVES SEND US YOUR NAMES AND ADDRESSES**

**AMERICAN INTERSTATE RADIO SERVICE**

183-185 GREENWICH STREET

NEW YORK

# RADIO WORLD



TELEPHONES: LACKAWANNA 6076 AND 2063

PUBLISHED EVERY WEDNESDAY

(Dated Saturday of same week)

FROM PUBLICATION OFFICE

**HENNESSY RADIO PUBLICATIONS CORPORATION**  
 ROLAND BURKE HENNESSY, President  
 M. B. HENNESSY, Vice-President  
 FRED S. CLARK, Secretary and Manager  
 1493 BROADWAY, NEW YORK, N. Y.  
 (Punnett Bldg., Times Square and 13rd Street)  
 European Representative: The International News Co.,  
 Brecon Bldg., Chancery Lane, London, Eng. Paris,  
 France. Brentano's 88 Avenue de l'Opera.

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

### SUBSCRIPTION RATES

Fifteen cents a copy, \$6.00 a year, \$3.00 for six months, \$1.50 for three months. Add \$1.00 a year extra for foreign postage, Canada, 50 cents.  
 Receipt by new subscribers of the first copy of RADIO WORLD mailed to them after sending in their order, is automatic acknowledgment of their subscription order. Changes of address should be received at this office two weeks before date of publication. Always give old address also. State whether subscription is new or a renewal.

### ADVERTISING RATES

General Advertising		
1 Page, 7 1/4" x 11"	462 Lines	\$200.00
1/2 Page, 7 1/4" x 5 1/2"	231 Lines	150.00
1/4 Page, 4 1/2" D. C.	115 Lines	75.00
1 Column, 2 1/4" x 11"	154 Lines	100.00
1 Inch		10.00
Per square line		.75
Times Discounts		
52 consecutive issues		20%
26 times consecutively or E. O. W. one year		15%
4 consecutive issues		10%

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### CLASSIFIED ADVERTISEMENTS

Ten cents per word. Minimum, 10 words. Cash with order. Business Opportunities, 50 cents a line; minimum, \$1.00.

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

MARCH 7, 1925

## Sonny Made the Set

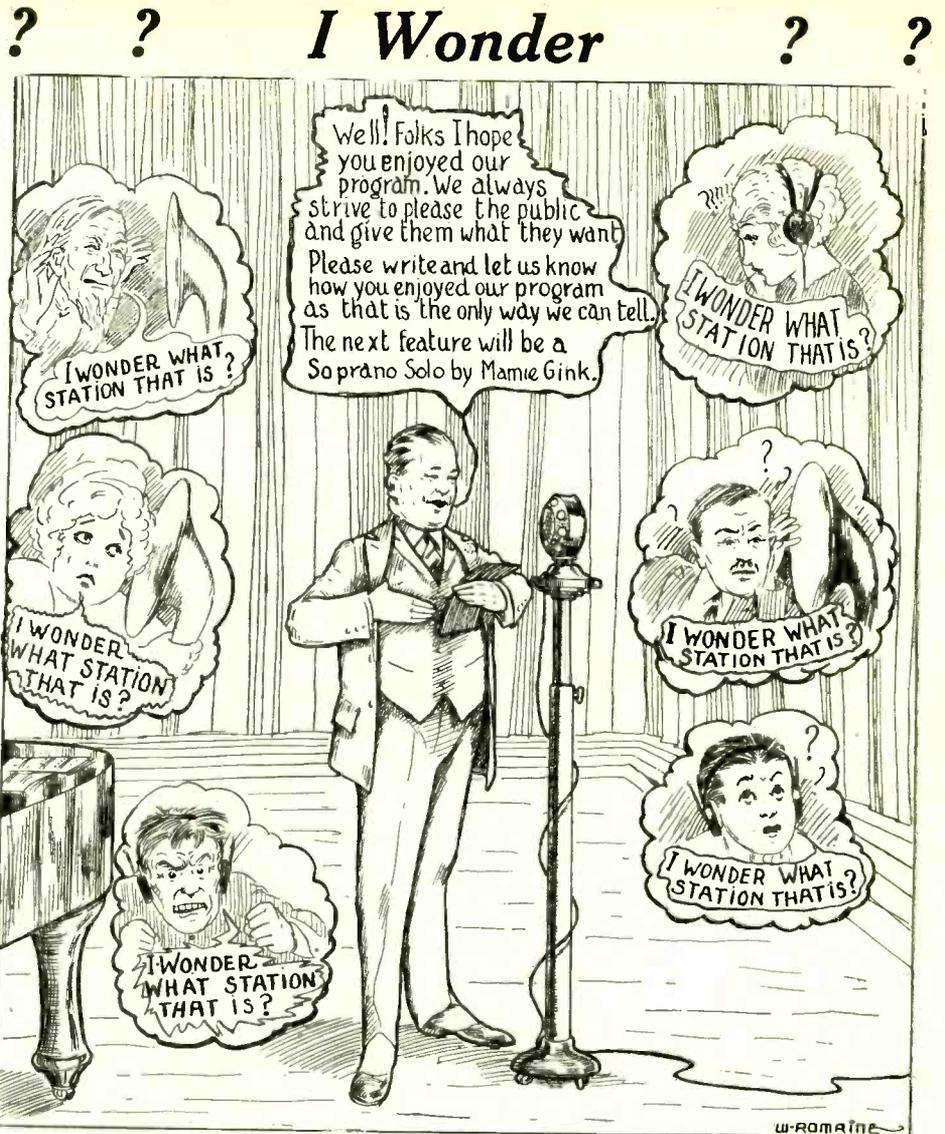


SONNY—Mother, this is music to my ears, if it isn't to yours.

## Care Necessary in Adding RF Stage

UNLESS a radio-frequency amplifier is built correctly the signal delivered from the detector will be less in volume than if a detector alone were used.

Some five-tube sets, using two stages of radio-frequency, deliver a signal of little volume because of this condition. Because of the extra tuning condensers and coils such a set may be selective, but it is not as efficient as a good three-tube set.



## Scrambled Like Eggs, Signals From Europe Are Renaturalized

THE fight against static and atmospheric disturbances has led to the building of a central receiving station at Riverhead, L. I., with a receiving system consisting of two antennae ten miles long.

This system, known as the Beverage-Rice method of reception, eliminates practically all static and intercepts on one antenna the signals from all the European stations. These waves are then automatically separated in more than a dozen receiving sets and sent by wire lines to the operating room in New York.

In an address before the American Institute of Electrical Engineers at Cleveland, E. F. W. Alexanderson, chief consulting engineer of the Radio Corporation of America, said:

"There is only one kind of disturbance that this system does not practically eliminate, and that is a thunderstorm in the neighborhood of the station right on the line from which the signals come. To insure service even in this contingency, a similar large antenna system has been built at Belfast, Me., which would be immune to a thunderstorm on Long Island, whereas a station on Long Island would be only slightly affected by a thunderstorm in Maine. But the problem was, how to get the signal down from Maine to Long Island.

"The signals from Europe are picked out of the ether in Maine, scrambled together and sent out by a single transmitter. This

composite signal is then received on Long Island and unscrambled into a dozen signals, which are fed into the long-wave receiving sets, where they go through the usual process of detection and transmission to New York. The signals so reproduced are exact replicas of the original signals, so that the operators in New York do not know whether they have received the original signals or the scrambled and unscrambled signals via Belfast, Me."

## Battery Voltage Drop Causes Fading

FADING of distant stations may be caused at the receiving end through a slight drop in the voltage of the A or B battery. This condition may be recognized by tuning when the signal begins to fail, indicating battery trouble if the signal can be brought back immediately. There are other causes of fading, many of them not understood.

## A Tip About the Aerial

IN erecting an outdoor aerial it is important to keep the wire well away from other wires carrying current. It is dangerous to attach an aerial to a pole on which lightning transformers are mounted, or to run it over or under electric wires.

# Radio Helps the Theatres

BROADCASTING parts of performances from theatres in England has prompted the British Broadcasting Company to make an official statement of policy in regard to theatrical programs sent into the air.

The statement in The Radio Times, the official organ of the Broadcasting Company, reads:

"We wish to make it clear, first of all, that we are not falling back on the theatres to help complete our programs. We have an abundance of good program ma-

terial which we do not propose to displace or dislocate. Moreover, on the dramatic side, the possibilities of our medium are partly offset by limitations, notably the necessity to dispense with the assistance of the eye. The vast majority of theatrical performances depend on effects which can only be appreciated through the eye.

"It follows, therefore, that the proportion of theatrical performances which can be broadcast as integral items of our program is extremely small. The bulk of our dramatic work involves the creation of a new technique, and one which we believe will in no way prejudice the interests of the theatre industry.

"On the other hand, however, we have found it possible, without dislocating our programs, to introduce listeners to theatrical performances of merit. We are doing this by broadcasting from theatres single acts or selections. Judging from the correspondence we have received, there is no doubt whatever that listeners welcome these introductions to theatrical performances. Nor is there any doubt that the plays themselves have benefited very considerably from our efforts. It was proved that at least a thousand bookings were definitely due to the broadcasting of one act of a play. A musical comedy, selections from which were broadcast, has been playing to full houses ever since—a marked improvement on the pre-broadcast position.

"We shall continue to give these occasional introductions to theatrical programs.

"The managers of some of the theatres whose plays we introduced to listeners are being attacked and boycotted by certain theatrical associations, principally those which control theatres and music halls outside London."

## NEW REFLEX TUBES



**\$1.50**

CANADA 35c EXTRA

All Tubes Guaranteed.

Mail Orders Solicited.

**DENNING RADIO MFG.**

455 SPRINGFIELD AVE.  
NEWARK, N. J.

## EVEREADY Radio Batteries

-they last longer



### THE "GOODE" TWO - O - ONE

# A

Le Ton d'argent

Guaranteed



BY MAIL ONLY

**\$2.00**

Postpaid

### QUARTER AMPERE AMPLIFIER-DETECTOR RADIO TUBE

GUARANTEED SATISFACTORY

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

ONE—"Goode" Detector-Amplifier ..... **\$2.00**

THREE—"Goode" Detector-Amplifiers ..... **\$5.50**

(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, New York draft, or personal check to

**The Goode Tube Corporation**  
Incorporated Dept. B.  
OWENSBORO KENTUCKY

## INDEPENDENT



NEW TUBES ALL TYPES OF HIGH CONDUCTANCE AND LOW IMPEDANCE. ALL MATCHED VOLUME. EACH **\$1.59**

3 for Four Dollars  
5 for Seven Dollars  
Matched Characteristics

REPAIRED OR EXCHANGED **\$1.39**  
5 FOR \$6.00  
Matched Characteristics

QUICK DELIVERIES  
EVERY TUBE CARRIES A MONEY BACK GUARANTEE

Dealers—Agents—Wanted Everywhere

**RADIO TUBE OUTLET**

207 Market St. Newark, N. J.  
Exclusive Distributors for Associated Manufacturers



## The PRINCE of RADIO RECEIVERS

### BILTMORE MASTER R.F. Model T5.

**A \$150.00 Receiver Selling for Only \$68.00**

Here is as fine a five-tube receiver as was ever made. Fine in appearance, workmanship, materials and results.

The circuit is the Biltmore improved Radio frequency type. All materials are the finest which it is possible to obtain. The variable condensers and R. F. Transformers are low loss especially designed.

The cabinet is heavy mahogany hand rubbed. The panel is mahogany and all metal parts are highly nickel plated.

The results match the appearance of the Receiver. Its extreme sensitiveness, matchless selectivity and perfect tone have made for the Biltmore a host of highly enthusiastic owners. "Absolutely the best Receiver which can be had at any price" is an example of the hundreds of testimonial letters in our files.

**Model T 5, Price.....\$68.00**

For Sale by all the better Radio Dealers.

Write for descriptive literature Dept. D.

## The Biltmore Radio Company.

BOSTON 30 MASS.

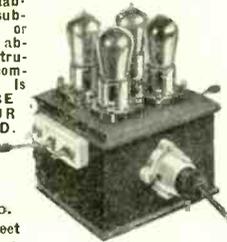
THE GENUINE LOUDSPEAKER  
**\$2.00 Vacuum Tubes \$2.00**  
 C. O. D., JUST PAY POSTMAN  
 MONEY BACK GUARANTEE  
**JAMES H. KONKLE**  
 192 Market Street Newark, N. J.



This 5-tube tuned radio frequency set has been termed the "Champion of Them All" Wonderful proposition to dealers.  
**AMEREX ELECTRIC CORP.**  
 282-E GREENWICH STREET NEW YORK

**A NEW SERVICE**

The BROWN TUBE RECEIVER rejuvenates worn down tubes in 10 1/2 minutes. An opportunity for you to immediately establish a profitable and substantial business, full or part time. This new absolutely guaranteed instrument priced at \$25.00 complete. The first cost is the last cost. BE THE FIRST IN YOUR NEIGHBORHOOD.



Send NOW for particulars.  
 Thos. Brown Co.  
 513-519 Orange Street  
 Newark, N. J., U. S. A.

**KITS**

To Build Your Own Receiver

- Roberts—2 tube, Parts.....\$31.44
- Roberts—4 tube, Parts..... 48.35
- Rasla—1 tube, Parts..... 23.78
- Rasla—2 tube, Parts..... 31.43

GENUINE ERLA KITS IN FACTORY SEALED CONTAINERS

Write for Our 100-Page Catalog  
**LIBERTY MAIL ORDER HOUSE**  
 F682, 106 Liberty St., New York, N. Y.

**New Broadcasters**

WASHINGTON. SIX new class A stations were licensed by the Department of Commerce during the past week while one station was transferred from class C to B. The new stations follow:

Call	Stations	Meters	Watts
KFVF	—Clarence B. Juneau, 8091 Santa Monica St., Hollywood, Cal.	208.2	10
WAMD	—Hubbard & Co., 1336 Nicolet Ave., Minneapolis, Minn.	244	100
WAFD	—Albert B. Parfet Co., 1432 Military St., Port Huron, Mich.	233	250
WHBD	—Chas. W. Howard, 110 Chillicothe St., Bellefontaine, Ohio	222	20
WHBC	—Rev. E. P. Graham, 627 McKinley Ave., Canton, O.	254	10
WRAK	—Economy Light Co., 1105 Ludington St., Escanaba, Mich.	256	100
TRANSFER FROM CLASS C TO CLASS B			
WKAQ	—Radio Corp. of Porto Rico, San Juan, Porto Rico	340.7	500

**Magnetic Microphone Used at WGY**

AT WGY has been developed the magnetic microphone or pick-up, which is fastened to the frame of the piano and gives the fine reproduction of piano tones for which the station is known. WGY adopted the multiple tuned type of antenna, and this is now in use by all stations of the company. The condenser microphone did not originate at WGY, but it has undergone marked development there in the past two years. WGY was the first broadcasting station to use

**AMBASSADOR**

Convert your 3 Tube Ambassador into a 4 Tube Radio Frequency Circuit. Complete Kit **\$10.00**



All parts necessary, including Panel, Ambassador R. F. Coil, Condenser, Socket, Rheostat, Dial, Binding Post and Simplified Blueprint.

"AT BARBLEY'S—OF COURSE"

**50c** For a Blueprint which shows you in a surprisingly simplified way how to convert (no ripping of old set)—you merely add a unit. **50c**

Sets Built, Inspected and Repaired.

Mail orders promptly filled.  
**"Bob" Barbley's Radio Service**  
 Dept. R.W., 135 LIBERTY STREET, NEW YORK  
 Write for price list of Ambassador kits made of all Ambassador parts.

the water-cooled tube now in common use.



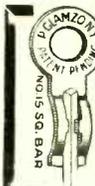
**RADIO FANS—**

Each station's dial settings at a glance. But only one at a time. No eye strain—no confusion—compact—practical. Send 10c in coin or stamps for our Radio Station Recorder.

**E. R. Products Co.**  
 133 Lehigh Ave., Newark, N. J.

**JOFFE-GOLBERT CO.**

Distributors of Gilfillan Neutrodyne Somerset Receivers Marlow Sets Kardon Sets Radio Furniture Radio Accessories  
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**LITTLE WONDER! SOLDERLESS LUG**

Holds Bus Wire Like Clip! Connect or Disconnect Wires Without Disturbing Terminals! Price, 10 for 5c. Ask your dealer. Distributors Wanted.  
 Mfd. by PAUL GLAMZO  
 203 Lafayette St. New York

**HERCULES AERIAL MAST**



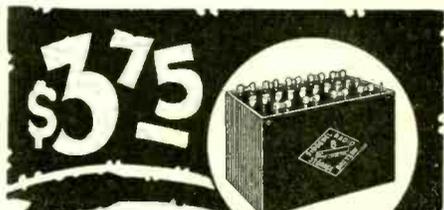
20 Ft. Mast \$10  
 40 Ft. Mast \$25  
 60 Ft. Mast \$45  
 All steel construction, complete with guy wires and masthead pulley. We pay freight.  
 S. W. HULL & CO., Dept. E3  
 2048 E. 79th St., Cleveland, O.

Write for literature and FREE Blueprint



Famous for Quality and Service  
**Amplatron Tubes**

Bonded to Give Service—\$4. List Price—\$4. Send in your old and burnt out Tubes—any model—at \$2.50. Dealers and Jobbers—Write for Discounts.  
**Pennant Radio Laboratories**  
 Dept. R.W., 23 Central Ave., Newark, N. J.



**SPECIAL**

On August 13, 1924, the United States Patent Office issued patents for the protection and manufacture of the world's greatest storage "B" battery. The new battery gives an extra long service and lasts much over five years—gives good, clear and loud reception and gets distance very well.  
**A New Kind of Plate**  
 The battery is absolutely noiseless and gives over 3,000 milli ampere hours of service per charge. The new plate is graphite treated, size 2 1/4 x 1 1/2 inches, and can be recharged in a few hours from any charger lamp socket or farm outfit. Five batteries cost only five cents per charge.  
**Container Is Genuine Hard Rubber**  
 The new battery is built in a one piece, unbreakable, neat, hard rubber container as illustrated, with vent caps large enough for hydrometer reading. Each battery is called a unit of 22 1/2 volts. Add units for higher voltages.  
**Most for Your Money**  
 This is the largest size battery for your money. Built under patents, thus you get the very best. The battery can be bought assembled or knockdown. Units come with full directions printed very clear. Units can be assembled by any one in a few minutes' time. Don't waste more money on dry batteries—send today for the new patented battery. A set of them will last indefinitely.  
 Price Assembled..... \$4.50  
 Price Knock down..... 3.75  
 A.C. Rectifiers..... .75  
**SIDBENEL RADIO MFG. CO.**  
 Licensed Manufacturer  
 29 WEST MT. EDEN AVE. NEW YORK CITY  
 BIG CATALOG ON REQUEST

**THE Summit TOROIDAL RADIO FREQUENCY TRANSFORMER**

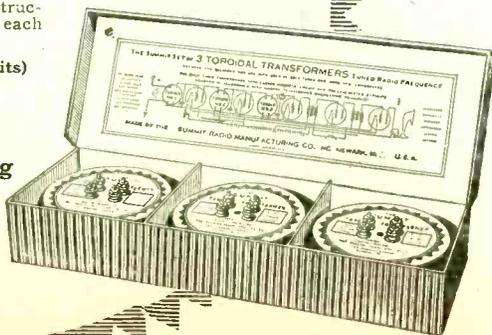
USED in exactly the same manner as the open radio frequency coils—they are self balanced and self neutralized. They have no stray fields nor leakages, nor can they feed back, thus assuring the radio set builder of correct operation without howling or squealing.

One builder using these Transformers in the SUMMIT circuit received 54 stations in two nights, traveling West to Denver and South to Mexico City. This circuit with instructions for building enclosed with each set of Transformers.

List Price (Set of 3 mated units) \$10.00

Distributors and Jobbers Wanted

**Summit Radio M'fg Co., Inc.**  
 Dept. 27  
 481 Broad Street  
 Newark, N. J.



Pat. Applied For

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

COMPLETE 1924 INDEX OF RADIO WORLD appeared in RADIO WORLD dated Oct. 18, 1924, and Jan. 10, 1925. 15c per copy. RADIO WORLD, 1493 Broadway, N. Y.

**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:**

IT gives me great pleasure to write that I constructed the loud speaker described by Herbert E. Hayden in the February 14 issue of the RADIO WORLD and have no kick



MRS. C. P. OLESON and the Hayden speaker her husband made.

at all. Results are fine. Instead of \$5 the speaker (exclusive of unit) cost me about 25 cents. Beat that cost. The young lady who looks so satisfied is my wife. Acknowledge the introduction with a low bow.

C. P. OLESON,  
Box 344, McGregor, Iowa.

**Variometer Gives Fine Tuning Variation**

THE variometer is made of two coils, one stationary and the other movable. The movable coil, called the rotor, is mounted to turn on an axis inside the fixed coil, called the stator. A terminal of each coil are connected, and the other two form the leads to the set. Turning the rotor completely around

**Wave Length Changes Don't Worry Radio Fans Using "Find-Me-Quick" Radio Chart!**

Always up to date without additional cost, self-indexed, accurate, complete and permanent data CONSTANTLY IN FULL VIEW OF OPERATOR. Indispensable for any kind of Radio Set. Invaluable when completed. PRICE 50c, postpaid, printed on heavy, white ledger linen paper, size 23x11 inches. Elimination Wave-Length Tabulator with 600 classified Broadcasting Stations GIVEN WITH EACH CHART. Copyrights 1925. Patent Pending. Foreign Rights Reserved.

EDITORS write: RADIO NEWS: "... should prove of value to fans who wish to keep an accurate record of the RADIO JOURNAL: "... In a word, they have hit upon a way to make a national game out of logging the DX." RADIO DOINGS: "... feel sure that its users will find it of great help in logging stations." Published by RADIO CHART BUREAU, 2nd Floor, Patterson Bldg., FRESNO, CALIFORNIA. Dealers' Liberal Discount, from 1 dozen on. C. O. D. A most appropriate gift for your best Radio friend.

Radio Chart Bureau, Patterson Bldg., Fresno, Calif.  
Radio Set Used.....  
Send postpaid..... "Find-Me-Quick" Radio Charts and Tabulators, for which I enclose \$..... (R. W.)  
\$..... in bill, coin or money order.  
Name.....  
Address.....  
City..... State.....

varies the electrical length of the coil between minimum and maximum.

This instrument is used to tune the receiver and may be substituted for the fixed coil and variable condenser.

Usually a variometer is connected in the plate circuit of the vacuum tube to control regeneration.

The variometer may be connected between

the secondary and the grid of the detector tube, replacing the variable condenser. Using another variometer in the plate lead a circuit of this type is called a two-variometer receiver.

Tuning with a variometer is an efficient means of operating the set because wave-length changes can be made in extremely fine variation.

**ALEXANDER RADIO ELECTRIC CO., INC.**  
1003 PINE ST. ST. LOUIS, MO.  
PLEASE SEND ME FREE YOUR NEW RADIO CATALOG

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ADDRESS.....  
CITY.....  
Fill Out and Mail

**"Bruno" RADIO PARTS**  
are Quality Products that assure satisfaction.  
BRUNO RADIO CORPORATION  
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**Best R. F. 5 Tube Hookup**  
Uses same panel, same layout, same (but fewer) parts than Neutrodyne. Gives selectivity and pleasing volume from Coast to Coast. Hundreds have changed their Neuts to this. Only extra part, 22 feet real gold sheathed bus wire, lithographed circuit and complete data, prepaid, for \$5.00. Nothing else to buy. Satisfaction guaranteed. Data about circuit—10c. 48 page parts catalog for stamp. We accept stamps same as cash.  
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**CLEARATONE Radio Tubes**  
Types 11-12-199-200-201A \$1.50  
Built to the Most Rigid Specifications  
METER TESTED  
Satisfaction Guaranteed  
Mail Orders Carefully Filled  
RADIO TUBE LABORATORIES  
296 Broadway, New York City

**MAHOGANITE and BLACK RADION PANELS**  
DIALS, KNOBS, TUBING, SOCKETS  
RADION LOUD SPEAKER HORNS, ETC.

"THAT SPECIAL SIZE" FOR YOUR PHONOGRAPH, PORTABLE OR SUPER

ALL STOCK SIZES  
WHOLESALE RETAIL  
Send for Complete Price List  
New York Hard Rubber Turning Co.  
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**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 37.  
DX INSTRUMENT COMPANY  
HARRISBURG, PA.

**ZENITH RADIO**  
Tunes straight through the locals, gets distance. Brings in more stations—clearly and with volume—in a given length of time than any other set. Direct comparisons invited. Zenith receiving sets cost more, but they do more.—The exclusive choice of MacMillan for his North Polar Expedition.  
Zenith Radio Corporation  
332 S. Michigan Avenue, Chicago

**RADIO WORLD'S S-U-P-E-R-D-Y-N-E Experts Specialists**

We have helped hundreds to success with RADIO WORLD hookups, especially SUPERDYNE—LET US HELP YOU. We are ready with kits and complete parts for BERNARD'S new 4-Tube SUPERDYNE, the premier circuit of 1925. All parts of highest quality—see our guarantee in past issues of RADIO WORLD.

Complete Parts for  
**BERNARD'S 4-TUBE SUPERDYNE**  
As Specified and checked by Herman Bernard

One Superdyne Coupler; One Matched Radio-Frequency Transformer.....	\$7.50	One Bradleystat.....	\$1.65
One Bruno Ultra Vario Condenser No. 19.....	7.50	One Bradley Push-Pull Battery Switch.....	.60
Two 4" Black Accurature Dials, ea.....	2.95	One 7x24" Black Radion Panel.....	2.85
One Federal No. 65 Audio-Frequency Transformer.....	4.95	One Tri-Jack.....	.90
One Federal No. 65A Audio-Frequency Transformer.....	4.95	Two Silver Eureka Dial Pointers, ea.....	.20
Four Federal Sockets.....	ea. .90	Two Lengths of Spaghetti.....	.20
One .00025 Mfd. Dubilier Grid Condenser.....	.35	One Terminal Block.....	.60
One Variable Bradleyleak.....	1.65	Wire, Screws, etc.....	1.00

**\$42.50**

**OUR OWN LOW-LOSS COILS**  
Correctly wound to cover entire broadcast Range. A Laboratory development, after long experimentation, by our Engineers, which has produced a coil which is Low-Loss in every detail, price complete **\$7.50**  
(This coil is endorsed by Mr. Herman Bernard of RADIO WORLD)

**WALLACE RADIO COMPANY, Inc.**  
135 LIBERTY STREET, NEW YORK CITY  
SUPERDYNE ADVICE FREE IF NOT LISTED ABOVE, WRITE FOR IT  
**RESULTS GUARANTEED MAIL ORDERS SOLICITED**

**SOLVED!**  
**—THE "B" BATTERY PROBLEM**  
 Throw away your "B" Batteries and in install a Kellogg Trans-B-former. It gives you "B" Battery current direct from your electric light socket at the trifling cost of one-fifth of a cent per hour. Gives better reception—no interferences. Write for details.  
**Kellogg Switchboard & Supply Co.**  
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 1066 West Adams Street Chicago, Ill.

**Radio Sets and Parts**  
 Sold Retail at Wholesale Prices  
**MASPETH RADIO CO.**  
 76 Zaidler Ave. Maspeth, L. I.  
**WRITE FOR PRICE LIST**

**TEN TIMES TESTED**  
**Towers**  
 Scientific Phones  
 \$2.95

**THE ASTON CARD INDEX**  
 RECORD YOUR RADIO STATIONS  
 Copyright 1924 by S. T. Aston & Son  
 Telephone Franklin 2159  
**\$3.00**  
 Complete Postpaid  
 100 Cards, Mahogany Finish or Oak Cabinet, and Index Dividers. A Useful Accessory to Any Set. Give Name of Set and Sketch of Dial Arrangement. Postpaid on Receipt of Cash or Money Order. Dealers Write for Terms.  
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**One Pull** on the Jones MULTI-PLUG instantly disconnects antenna, 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.  
**Bracket mounting type, complete, \$4.50.**  
**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

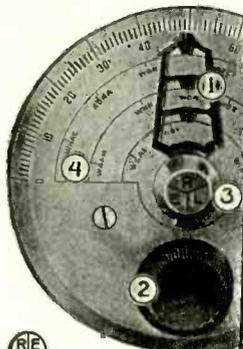
**Announcing Taught by N. Y. University**  
 "ANNOUNCING" has become so much of a profession that New York University has established a new course to give announcers the proper training. It is being offered by the Extramural Division, of which Professor James E. Lough is Dean.  
 Although announcers and lecturers have some problems in common with the platform speaker, such as audience psychology, those who "take the air" for their addresses must give special attention to voice training. The experience of New York University's "Air College" has been that the voice, rather than the subject, is more potent in attracting the radio audience.  
 Students will study the technique of good radio delivery, the construction and rhetoric of the radio speech, and the specialized vocabulary necessary for the radio speaker. Four college credits will be given to those who complete the course.  
 The course will be given in the laboratories of the National Radio Voice Service at University Heights. One feature of the laboratory equipment is a voice recording outfit, which sends back to the student his voice as it sounds to his radio audience. Students will spend much of their time speaking over the microphone under normal studio conditions.

**Benson's Super-Heterodyne**  
 (Concluded from page 8)  
 similar to the usual two-control Super-Heterodyne. The dial on the left controls the oscillator the other the wavelength selector. They will read very nearly alike but there will be two points at which any station can be heard on the oscillator dial. One point is usually clearer than the other and should be used.  
 There are several tests to determine if the set is working properly. The set will howl or whistle when the catwhisker is removed from the crystal. This is correct, but occasionally the signals will come in louder with the catwhisker raised. In this case reduce the biasing on the tubes. If an audio howl is noticed it may be due to an open grid return wire or capacity coupling between transformers. Try grounding the negative battery terminal and shunting the audio-transformer primaries with .001 mfd. fixed condensers. Radio-frequency howls that change when the radio-frequency transformers are touched may be eliminated by reversing leads on the transformers.  
 This set is extremely selective and gives tremendous volume, due to the great audio-amplification, while the range is all that could be wished for. It possesses all the advantages of both the reflex and the Super-Heterodyne and when working properly will surpass anything of its power consumption and number of tubes.

**LOW-LOSS CONDENSER**  
 DUAL RATIO GROUNDED ROTOR  
**UNITED SCIENTIFIC LAB. INC.**  
 PLAIN Improved Type VERNIER RHEOSTATS AND POTENTIOMETERS  
 United Scientific Laboratories, Inc.  
 92-4 East 10th Street New York City

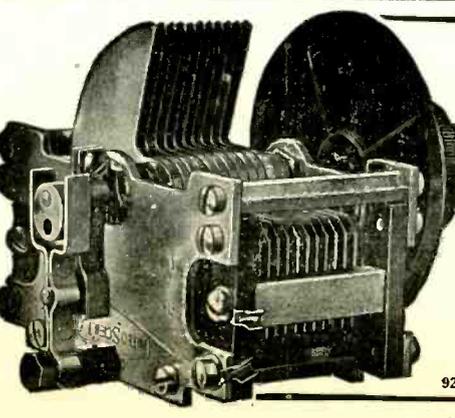
**ACME POWR-BEE**  
 Better Than "B" Battery  
**NO HUM NO NOISE**  
 Reduces the cost of radio. At your dealers or write  
**THE ACME ENGINEERING CO.**  
 Dept. 8 LOUISVILLE, KY.  
 Dealers write for big sales proposition

**BUY RADIO BY MAIL**  
 SEND 10c TO-DAY FOR  
**OUR NEW CATALOG**  
**SIMPLEX RADIO SALES CO.**  
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**Direct Tuning!**  
  
 Pencil record a station on the dial—thereafter simply turn the finger to your pencil-mark to get that station instantly. Eliminates fumbling, guessing.  
 1. This alignment is the gauge for penciled station records.  
 2. Operates vernier for hair-splitting adjustment.  
 3. Takes standard condenser shaft lengths—easy to mount.  
 4. Penciled station records easily erased from silvered dial. Designed by R. E. Lacaute, inventor of the famous Ultradyne circuit. This monogram seal (R.E.L.) is your assurance of Lacaute's design. Retail at \$2.50  
**ULTRA-VERNIER TUNING CONTROL**  
**PHENIX RADIO CORPORATION**  
 9 Ceckman Street New York City

**FRESHMAN MASTERPIECE**  
 A 5-Tube, Tuned Radio Frequency Receiver that represents the greatest value ever offered in \$60 a radio set.....  
 Write for particulars.  
**CHAS. FRESHMAN CO., INC.**  
 FRESHMAN BUILDING  
 240-248 W. 40th ST., NEW YORK

The LARGEST RADIO STORES in AMERICA  
**Hook-ups!**  
 All the latest and best kits in our new **RADIO CATALOG**  
**FREE**  
 NO other Radio Catalog includes such a complete assortment of the best and latest Knock-Down Kits, Parts and Accessories. You need this book—Write for your FREE copy today!  
 We Save You Money!  
 Our business is to buy up manufacturers' and government surplus stocks, rubber and dealer bankrupt stocks—but only brand-new, fully guaranteed, nationally advertised apparatus. Our catalogue crammed with bargains.  
**CHICAGO CENTRAL SALVAGE STOCK STORES**  
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**LOW-LOSS CONDENSER**  
 DUAL RATIO GROUNDED ROTOR  
**UNITED SCIENTIFIC LAB. INC.**  
 PLAIN Improved Type VERNIER RHEOSTATS AND POTENTIOMETERS  
 United Scientific Laboratories, Inc.  
 92-4 East 10th Street New York City

# Index to February Issues

## FEBRUARY 7

The Bluebird Reflex, by Lieut. Peter V. O'Rourke. A 2-tube set, one stage of tuned RF, crystal detector, one reflexed audio stage, one free audio stage. Loudspeaker service. Volume, selectivity, DX. Schematic and picture diagrams. How to Make a Speaker for \$5, excluding cost of the unit. By Herbert E. Hayden. The Tuning and Operating Theory of the 1925 Model Superdyne, by Herman Bernard.

## FEBRUARY 14

Tim Turkey's 3-Tube Reflex; one stage of tuned RF, tube detector, one reflexed AF stage, one free AF stage. Great on DX, very selective, ample volume. Schematic and picture diagrams. How to Make a Honeycomb Radio-Frequency Transformer, by Herbert E. Hayden. A Super-Sensitive Receiver, by Charles H. M. White, Consulting Engineer. A 5-tube loop set, with only the three tubes ahead of the audio shown. Two stages of tuned RF and regenerative detector. Set is neutralized. Questions on the 1925 Model Superdyne answered by Herman Bernard. The Factors that Put a Coil in the Low-Loss Aristocracy, by Abner J. Gelula. Official Report of the Eclipse as it Affected Radio, by Dr. Alfred N. Goldsmith.

## FEBRUARY 21

The Simplest 1-Tube Reflex, especially written for the novice by Feodor Roipatkin. Schematic and picture diagrams. One stage of tuned RF and crystal detector. Sensitive, selective, good earphone volume and considerable DX (distance reception). A Set for Professional Folk, by Lieut. Peter V. O'Rourke. One stage of tuned RF, tube detector and two transformer-coupled AF stages. A quality set that appeals to doctors, dentists, teachers, lawyers, etc. Schematic and picture diagrams. A Honeycomb Crystal Set, by Raymond B. Wailes. One variable condenser and three honeycomb coils. Picture diagram and photo. The 1925 Model Superdyne with Dry Cells, by Herman Bernard.

How to Operate the Freshman Masterpiece, by Brewster Lee. Valuable discussion by an expert of the tuning of this set for best results. New Device Blocks Radiation, by Sidney E. Finkelstein. Discussion of invention announced by Roy A. Weagant, Chief Engineer, De Forest Co. Diagram of 3-tube circuit and constructional text.

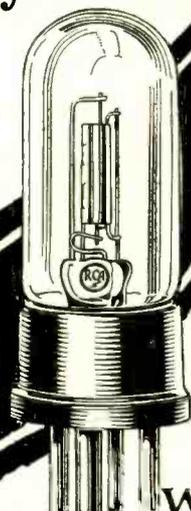
Solution of various construction problems shown photographically in two-page display of RADIO WORLD staff photos.

## FEBRUARY 28

A Super-Heterodyne that Does the Most Possible with 6 Tubes. Part I of a 2-part article by Thos. W. Benson. The incoming wave is heterodyned to 600 meters, instead of 6,000 or 10,000. Thus broadcast range "intermediate" transformers may be used. The set successfully embodies three reflexed audio stages in the three "intermediate" stages. The set comprises oscillator tube, modulator tube, filter tube, crystal detector and three reflexed audio-intermediate RF stages. The 3-Tube Neutrodyne, by Lieut. Peter V. O'Rourke. The inverse duplex method of reflexing is used to obtain two tuned RF and two audio stages, the third tube being the detector. This is not a set for novices to attempt. How to Avoid Putting the Grid Leak in the Wrong Place by Herbert E. Hayden. Three Resistance Stages of AF Added to the 3-Circuit Tuner, making a 4-tube quality DX set. By Albert Edwin Sonn, Radio Engineer. How to Make Sure that Your Superdyne is

Neutralizing, by Herman Bernard. Aerial Rules You Should Obey. AF, RF and Batteries also discussed in this article for beginners, by Abner J. Gelula.

*Buy Cautiously*  
— by name



**WD-11 Radiotron**  
REG. U. S. PAT. OFF.

**FREE**



To Each Purchaser of a World Battery

A 24-Volt "B" Storage Battery positively given FREE with each purchase of a WORLD "A" Storage Battery. The WORLD Battery is famous for its guaranteed quality and service. Backed by years of Successful Manufacture and Thousands of Satisfied Users. You save 50%.

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

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

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

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

**WORLD BATTERY COMPANY**  
3219 So. Wabash Ave. Dept. 17 CHICAGO, ILL.

This FREE "B" Storage Battery takes the place of dry cell "B" batteries. Can be recharged and will last indefinitely. To be sold retail for \$6.00. It is the only battery of its kind equipped with solid rubber case — and insurance against acid and leakage. Take advantage of this remarkable introductory offer NOW. (To those who prefer it, we will send FREE a handsome nickel finish Auto Spotlite, instead of the "B" Battery. Be sure to specify which is wanted.)

**GIVEN FREE**

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



**S. HAMMER RADIO CO.**  
303 Atkins Avenue Brooklyn, N. Y.

Complete Parts for  
**BERNARD'S 4-TUBE SUPERDYNE**

Exactly as specified and checked over by Herman Bernard

- 1 Set Eastern Low Loss Superdyne Coils
- 1 Bruno Ultra Vario-Condenser No. 19
- 2 Accuratune Dials
- 2 Prease Audio Transformers
- 4 Amso Sockets
- 1 .0025 Mfd. Dubilier Grid Condenser
- 1 Variable Bradley Leak
- 1 Bradleystat
- 1 "A" Battery Switch
- 1 7x24 GENUINE BAKELITE PANEL, Drilled and Engraved
- 1 Patent Single Jack
- 1 Veneered Baseboard
- 1 Terminal Block with Binding Posts
- Diagram, Bus-Bar, Wires, Screws, etc.

**KIT COMPLETE**  
Nothing Else to Buy to Assemble ..... **\$39.50**

Wired Complete in Genuine Mahogany Cabinet ..... **\$55.00**

**At the Lowest Prices**

- 8 Tube New Cockaday Super-heterodyne Reflex Receiver **KIT**
- 5 Tube New Cockaday 4-Circuit Tuner with Resistance Coupled Amplifier **KIT**

Write for Our **RADIO CATALOG**

Orders over \$5.00 Shipped Prepaid. Money Order or C.O.D. One-third must accompany all C.O.D. orders. Not Insured unless insurance charge is included.

**NOW \$3.50 C.O.D.**



Direct from factory to you

**THE RABAT SENIOR**  
4200 MIL. AMPS. CAPACITY

**FOR A LIMITED TIME ONLY**

You can purchase for \$3.50 a 12 cell 24 volt RABAT SENIOR battery. Saving \$6.70 through direct buying. The Jobber and Dealers profit now is yours. 24 cell 48 volt size \$7.00.

**Rabat Senior Batteries**  
are neat, powerful, noiseless and will harmonize with any Radio Set. Separate cells and patented rubber cork prevent current leakage and clear glass tubes give vision of the condition of battery. Heavy duty plates 3-16" x 1 1/2" x 2 1/2" with staggered ribbed grid form the backbone of this sturdy battery. Shipped completely charged ready for instant use. And you can save \$6.10 by ordering now.

**RABAT JUNIOR BATTERY \$2.15 c. o. d.**  
(12 CELLS 24 VOLTS 2200 M. A. CAPACITY)  
Incomparable in price and performance. Designed to satisfactorily operate sets equipped with 3 tubes or less. Constructed of the same high grade materials as used in our Senior battery. Shipped dry, uncharged. Order today and save \$1.81.

Rabat batteries can be recharged at home at a very low cost.

**Rabat Super-Charger \$3.00 c. o. d.**  
Is specially designed to satisfactorily recharge any make of storage "B" battery. Shipped complete ready to use, including lamp socket, attachment plug and cord. You save \$1.00 by ordering direct.

**SEND NO MONEY**

Buy yours today, advising quantity and type wanted. After examining and approving, these wonderful batteries, then pay the Excitement the small C.O.D. charges.

The Rabat guarantee is back of all our products. DON'T WAIT, ORDER TODAY and save the middleman's profit.

**THE RADIO RABAT COMPANY**  
1766 St. Clair Avenue Cleveland, Ohio

**The DAVEN**  
RESISTANCE COUPLED  
AMPLIFIER KIT

For those who build their own, and insist on quality amplification, there's nothing to equal Resistance Coupling. The

**DAVEN AMPLIFIER KIT**

comes with full instructions for assembly. Easy to build—efficient in operation. (Without sockets and condensers.)

Supplied in either 3 or 4 stages. Sold Everywhere.

Ask your dealer for the "RESISTOR MANUAL." It's full of information on Resistance Coupling. Price, 25c.

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"Resistor Specialists"  
Newark New Jersey



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Will help you increase sales! Send for FREE catalog giving contents and prices on classified mailing lists of our best prospective customers: National, State, Local, Individuals, Professions, Business Firms.

**99% Guaranteed 5¢ each**  
by return of 5¢ each

**ROSS-Gould Co.** 107 N. St. Louis

# Programs

(Continued from page 14)  
Hallpyrd string trio, 8, joint variety program.  
9, Victor hour. 10, Goodrich Silvertown orch.  
WEEL, Boston, 303 (E. S. T.)—2 P. M., Eleanor

## YOUR CRYSTAL SET

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

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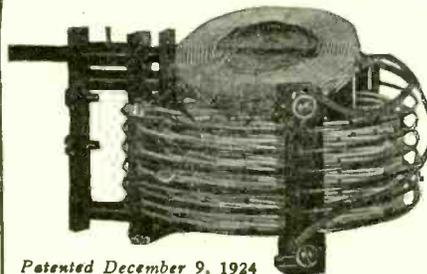
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## Friday, March 13

WEMC, Berrien Springs, Mich., 286 (C. S. T.)—9 P. M., Radio Lighthouse Choir. 9:20, program of negro spirituals by Mrs. Sidney A. Smith.

WHAS, Louisville, Ky., 400 (C. S. T.)—4 P. M., selections from the Louisville Conservatory of Music; selections played on the Alamo Theatre organ; police bulletins; weather; readings; late news. 4:55, local livestock, produce and grain market reports. 5, time. 7:30, concert under the auspices of Kingswood Holiness College.

WWJ, Detroit, Mich., 353 (C. S. T.)—8 A. M., setting-up exercises. 9:30, "Tonight's Dinner" and a special talk. 9:45, Public Health Service bulletin. 10:25, weather. 11:55, time. 12:05 P. M., Hotel Statler orch. 3, News orch. 3:50, weather. 3:55, market reports. 6, dinner concert. 8, concert from New York.

WPG, Atlantic City, N. J., 296 (E. S. T.)—7 P. M., Hotel Traymore Dinner music. 9, Ambassador Hotel concert orch. 10:45, Tau Epsilon Chi Sorority dance.

KGW, Portland, Ore., 492 (P. S. T.)—11:30 A. M., weather. 12:30 P. M., Rose City Trio. 5, children's program. 7:15, market, weather, news bulletins, and police reports. 8, lecture by University of Oregon. 10:30, Hoot Owls.

WREO, Lansing, Mich., 286 (C. S. T.)—1 P. M., special orch. 10, weather.

KTHS, Hot Springs, 375 (C. S. T.)—8:30 P. M., specialty selections, violin and yodeling. 9, Meyer Davis-New Arlington orch.

KOA, Denver, Colo., 323 (M. S. T.)—12:20 P. M., Rialto organ recital. 1, N. Y. stock reports; live stock; fruit and vegetable report; weather. 3, half hour matinee for housewives. 6, N. Y. stock reports; live stock; vegetables and news bulletins. 6:40, Book of Knowledge program. 8, Fred Schmitt and his orch. 8:10, studio program.

WLW, Cincinnati, O., 423 (C. S. T.)—10:45 A. M., weather and business reports. 11:55, time. 12, physical exercises. 12:15 P. M., dance program by the Ahaus Brunswick Shop orch. 1:30, business reports and stock quotations.

WGBS, New York City, 316 (E. S. T.)—6:30 P. M., Herman Bernard, managing editor of RADIO WORLD, "Radio Hookups, Questions and Answers." Mr. Bernard is on the air at this station every Friday at 6:30 P. M.

WGN, Chicago, 370 (C. S. T.)—9:31 A. M., time. 9:35, stock and farm quotations. 10, wheat. 10:30, wheat and cable reports. 11, wheat, weather, dairy reports. 11:30, wheat, grain and livestock receipts. 11:56, time. 12, wheat, board of trade. 12:10 P. M., board of trade quotations; hog sales. 12:35, Tea Room orch. 1, wheat. 1:05, Tea Room orch. 1:35, readings. 1:40, Drake concert ensemble and Blackstone string quintet. 2:30, musical recital. 3, miscellaneous entertainment. 5, stock exchange and market. 5:30, Skeezi time for children. 5:57, time.

WEEL, Boston, 303 (E. S. T.)—2 P. M., Gene

Wetmore and his Society orch. 6:30, Big Brother Club. 7:25, musicale. 8, program courtesy Neapolitan Ice Cream Company. 8:30, debate between Boston University and Dartmouth College.

WMAQ, Chicago, 448 (C. S. T.)—12:25 P. M., Y. M. C. A. forum. 4:30, pupils of Bush conservatory.  
(Concluded on next page)



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# Broadcast Music Lessons, Educator Advises

IF THE public, particularly parents and their children, desire the Board of

Education to broadcast music from the educational standpoint, "we will give serious consideration to the request," said George J. Ryan, president of the New York City Board of Education.

The Board of Education has invited the United States School of Music, Mr. Ryan said, to assist in what may prove an interesting and profitable experiment with the radio.

"Already some of the colleges are instituting universities of the air," he added, "and why is it not possible to give music instruction by radio?"

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### If The Cherry Tree Incident Had Happened Today

"GEORGIE, did you chop down that nice cherry tree?"  
"Sure I did. The thing interfered with my radio aerial."—N. Y. "Sun."

## Programs

(Concluded from preceding page)

atory. 5, fashion talk by Jan Mowat. 6, organ recital. 6:30, Hotel LaSalle orch. 8, weekly Wide-Awake club. 8:30, musical geography. 9, F. J. Bridgeman. 9:15, musical program, Mr. and Mrs. Tregillus.

WGR, Buffalo, N. Y., 319 (E. S. T.)—10:45 A. M., Gold Medal home service. 6:30 P. M., Buffalo Trust hour. 8, recital by Doris Wetmore and Marjorie Freeman. 9, B. Fischer and Company's dance orch. 10, Larkin string orch.

### Saturday, March 14

WHAS, Louisville, Ky., 400 (C. S. T.)—4 P. M., selections from the Louisville Conservatory of music; selections played on the Alamo organ; police bulletins; weather; readings; late news. 4:55, local livestock, produce and grain market. 5, time. 7:30, concert by the Sylvian trio; late news; time.

WWJ, Detroit, Mich., 353 (C. S. T.)—8 A. M., setting-up exercises. 9:30, "Tonight's Dinner" and a special talk. 9:45, Public Health Service bulletin. 10:25, weather. 11:55, time. 12:05 P. M., Jules Klein's Hotel Statler orch. 3, News orch. 3:50, weather. 3:55, markets.

WPG, Atlantic City, N. J., 296 (E. S. T.)—9 P. M., concert Hotel Traymore Ensemble. 10:30, dance music Chalfonte-Haddon Hall orch.

KGW, Portland, Ore., 492 (P. S. T.)—11:30 A. M., weather. 12:30 P. M., Rose City Trio. 10, Colburn's Melody Men of the Hotel Portland, and solos.

WREO, Lansing, Mich., 286 (C. S. T.)—10 P. M., Frank Logan and his orch. 10, weather. KTHS, Hot Springs, 375 (C. S. T.)—8:30 P. M., country concert, by singers. 9:45, dance program by the Meyer Davis orch.

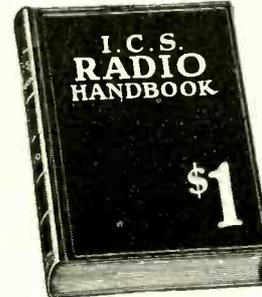
KOA, Denver, Colo., 323 (M. S. T.)—12:20 P. M., Rialto organ recital. 1, final reading, N. Y. stock

reports; live stock and weather. 9 to midnight, dance music program by Joe Mann and his Rainbow-Lane orch.

WLW, Cincinnati, O., 423 (C. S. T.)—10:45 A. M., weather and business reports. 11, time. 1:30 P. M., stock quotations and business reports. 2:30, Music Hall program. 6, Selinsky Instrumental Quintet.

WMAQ, Chicago, 448 (C. S. T.)—6 P. M., "Daddy," program. 8, Russell Pratt and Fred Daw. 8:30, Radio photologue, "Russia." 9, Chicago theatre revue.

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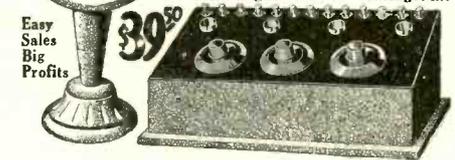
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1483 BROADWAY NEW YORK CITY

## Radio University

(Continued from page 18)

of 15 turns was placed at the lower end of the combination and the secondary wound vertically above the winding, as a continuation of the primary. Should the primary winding be placed at the top of the coil form, so that the tickler may rotate? (2) What is the best lead in which to connect the filament rheostat? (3) For 201A amplifiers and the 200 detectors, from which pole should the grid return be taken?—V. R. Schmidt, Palestine, Tex.

(1) The tickler must be variable. Placement of primary is all right at lower end. (2) For 201A rheostat should be in the minus lead, grid return taken from the minus filament. For 200s, rheostat preferably in positive lead, grid return to the negative filament.

CONSIDERING in the tickler of the Superdyne that A is the beginning of the tickler and B the end, which goes to the primary of the coupling transformer? (2) What should the dial read when the coils are running parallel? (3) Are condensers supposed to be at any certain

angle for best results? (4) What should the condenser read dial when plates are all the way in? (5) What should be the distance between primary and secondary of the RF transformer? (6) In Anderson's Superdyne (Nov. 22 and 29 issues) he has but one negative post. Is this A— or B—?—Robert J. Berglund, Univ. No. 10,046, 1520 16th Ave., Rockford, Ill.

(1) B, the end of the tickler, goes to the end of the RFT. (2) 100 or 180, according to the type dial you have. (3) No. (4) 100 or 180, according to the type dial you have. (5) As close as possible. (6) Common minus (B— and A—).

THE Harkness Counterflex calls for: First coil, 10 and 60 turns; second, 25 and 55 turns, with 17-plate condenser. How should the coils be wound for a 23-plate condenser?—H. Q. Ten Eyck, 215 W. Goepp St., Bethlehem, Pa.

First coil, 10 and 50 turns; second, 25 and 48 turns.

WHAT size honeycomb coil may I use to substitute for the coil in O'Rourke's 1-tube set of Dec. 13?—B. F. Goggan, Jr., Henderson, Tex.

A 50-turn honeycomb coil.

I AM building the 2-tube Transcontinental set, issue of Jan. 31. Can I use the 2-stage amplifier described in the issue of Feb. 7? (2) Is a potentiometer used in place of a rheostat on the amplifier?—Ernest Palmer, 410 Elizabeth Ave., Linden, N. J.

(1) Yes. (2) No potentiometer is used in the AF amplifier.

IN reference to Charles H. M. White's article on "A Super-Sensitive Set," issue of Feb. 14: Why are no transformers used? (2) What kind of tubes are Sodian Tubes? (3) May 201A tubes be used throughout?—Chas. D. Dennish, 65 Lafayette Ave., Trenton, N. J.

(1) There are two RF transformers in this circuit. Perhaps you have reference to AF transformers. You may add standard AF amplification to this set with very good results. (2) The Sodian tube is manufactured by the Connecticut Tel. & Tel. Co., of Meriden, Conn. The tube may be used only for detection. It is a very good detector, draws 25 ampere and takes a negative grid return. (3) Yes. Wire the grid return to the positive for this tube when used as detector.

I HAVE a Crosley 2-tube set. I cannot get below 280 meters. How can I get lower? (2) Where may I procure a transmitting license?—Arnold Austin, Milnor, N. Dak.

(1) Shorten the aerial ground. If this is not convenient or possible, you may place a 43-plate variable condenser in series with the aerial or ground. (2) From the Radio Inspector of your district, care Custom House.

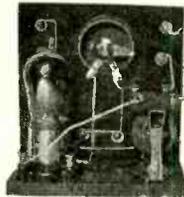
WHERE can I obtain literature on the Phusiformer Set?—Wm. Van Houte, Twisp, Wash.

Write to the Cosmopolitan Radio Co., 15 W. 18th St., New York City.

CAN a C battery be connected in the Superdyne

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and if so, how should it be connected?—John Horsager, Berlin, N. D.

Yes: disconnect the lead from the two negative filament F posts on the AF transformers. Connect the two F posts together. The negative C battery goes to the F on the audio-frequency

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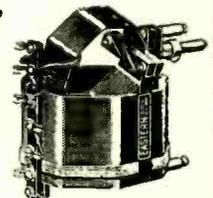
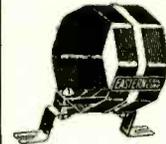
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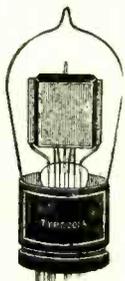
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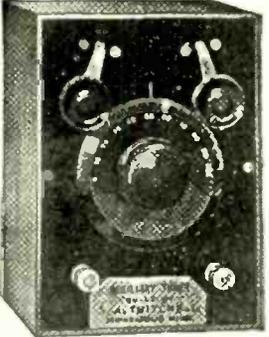
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**SUPERDYNE THEORY AND TUNING** discussed by Herman Bernard in the Feb. 7 issue of RADIO WORLD. Send 15c for a copy or start subscription with that number. RADIO WORLD, 1498 Broadway, New York City.

### Answers to Queries

(Concluded from preceding page)

transformer. Positive C goes to the negative A battery.

IS the plate coil on the 1924 Superdyne wound in the same direction as the aperiodic primary? (2) Can I use a 200 for detector and 201A for amplification?—J. Winn Smith, Box 12, Rockport, Ind.

(1) No, it is usually reverse-wound. (2) Yes; this is a fine combination.

I HAVE a single-circuit variocoupler whose rotor stands about half way out of the stator. If I rewind this instrument, could I use it for the Bernard Superdyne?—E. M. Cummings, Olathe, Kan.

Yes, for the three-circuit vario-coupler. The number of turns depends on the diameter of the tubings. See January 17 issue for full particulars.

HOW can I use a loop for local reception on the Superdyne so that by a switching arrangement I may use either the loop or aerial and ground?—B. H. Corbin, 964 Ashbury St., San Francisco, Cal.

You may use the loop on a plug and jack system. Place a double-circuit jack on the panel. The upper, outside prong of the jack goes to the grid of the first tube. The lower, outside prong goes to the negative filament. The upper inside prong goes to the beginning of the secondary, the remaining prong to the end of the secondary. Of course, before you begin wiring the jack, the lead between the beginning of the secondary winding to the grid and the end of the secondary to the negative filament must be removed.

I HAVE a 2-tube receiving set that creates much annoyance as it operates by spells.—H. L. Fuller, Osseo, Mich.

Indications point to too much voltage on the plate, an insufficient gridleak or poor tube.

IN the Superdyne if I use Acme transformers, what ratio should I use? (2) I have a 6-volt 90-amp. storage battery. Will this operate four tubes? (3) In the middle of the panel of one of the Superdynes there is a switch. Can you tell me what it is for?—Richard Nicholson, 2709 Mt. Elliot Ave., Detroit, Mich.

(1) 3½-to-1 will work well for both stages. (2) Yes. (3) For cutting off filament current.

IN reference to the Superdyne circuit, I find that the set works as well, if not better, without a gridleak. Is this as it should be? (2) I get interference from KDKA on waves below 326, but not when operating above 326. Can you tell me why?—Jno. G. Hopkins, Coal Center, Pa.

(1) Yes; this is often true when a UV200, C300 or Sodian D21 is used as detector. (2) To be correctly tuned to a station, you must be right in the middle of the wave. Considering this, stations of a high wavelength will cause more interference when you are on the higher side of this station to which you are listening, and vice versa. A wavetrap will help in eliminating undesirable reception.

I WISH to build a 5-tube Neutrodyne and will use Bremer-Tully low-loss neutroformers; 13-plate condensers are specified for these RFTs. Can I use 23-plate condensers that I now possess?—Fred W. Schoepf, 3433 Butler St., Pittsburgh, Pa.

Not without taking turns off the RFT, which you should not attempt with B.-T. Coils.

IN reference to the 1-tube set described by Abner J. Gelula in the issue of Jan. 17, are both coils wound on at once or is L2 wound first and L1 over it? (2) What is meant by the two turns of cord intervening between turns?—C. K. Leslie, 2115 Ashby Ave., Berkeley, Cal.

(1) The coils are wound spiderweb, L1 is wound first, then wind two turns of cord, then L2. (2) After L1 has been wound, wind two turns of ordinary cord on the form as you would wind

(Concluded on next page)

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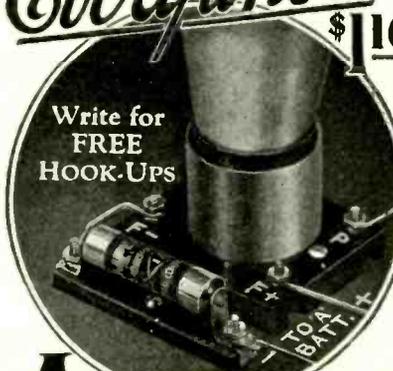
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## Plan to Invade British Homes in Search of Unlicensed Sets Stirs Public

LONDON. THERE are more than 2,500,000 "radio pirates" in England, the post office estimates in advocating Parliamentary

action to punish those who have sets but no Government license.

If the post office has its way, possession of an unlicensed radio receiver will be punishable by twelve months' imprisonment or a fine of \$500.

There are many objections to the proposed bill, especially to one clause which would give the police the right to search the house of any one suspected of violating the law. Should this clause be enacted, its opponents say, the old tradition that every Englishman's home is his castle would have to be modified.

### ANSWERS TO QUESTIONS

(Concluded from preceding page)

two turns of wire. This is to obtain the proper spacing between turns.

\*\*\*

I HAVE a 3-circuit set with an untuned primary of 15-turns, secondary 40 turns and 23-plate condenser across it. The above is wound on a 4" cylinder form, with No. 22 DCC wire. Can you tell me why I cannot tune out WOAX, 2 miles from my home?—Alfred H. Pick, 1204 Anderson St., Trenton, N. J.

Remove 7 turns from the untuned primary winding. This may decrease volume slightly but increase selectivity. However, two miles is indeed a short distance and the set itself may not be selective enough even with smaller primary.

\*\*\*

HOW can I improve the selectivity of the DX Wiz published in Nov. 29 issue, and also tune

below 326 meters?—L. F. Young, 434 23d Ave., Milwaukee, Wis.

Take the coil L1 just as it is and where it is. The beginning (top) is connected to aerial. Tap at the fourth or fifth turn, by scraping off insulation, and connect A— and ground to this tap. This is the lead that goes to the condenser rotor. The end of the winding goes to grid and stator. Note that L1 is preserved as a continuous winding and merely tapped.

\*\*\*

WHAT is the difference between two stages of tuned radio-frequency and two stages of transformer radio-frequency? (2) Will two stages of radio frequency add much value to a set?—A. Oberender, 367 Seventy-fifth Street, Brooklyn, N. Y.

The frequency involved in the different wavelengths depends upon the length of the wave and the speed with which it travels. A transformer to work efficiently on all waves must be designed to meet the electrical requirements of all frequencies. Fixed radio-frequency transformers do not receive all wavelengths equally well. There is a peak with a narrow band on each side which favors stations operating on certain wavelengths. On either side of this band the efficiency is reduced. The advantage of tuned radio-frequency transformers is that they can be adjusted to receive all wavelengths equally good. Incidentally, this condition does not exist in audio-frequency transformers. They do not deal with high-frequency currents. By virtue of their position after the detector only currents rectified to low frequency reach the audio transformers. If an audio transformer is designed to handle frequencies within the audible band, roughly from 200 to 5,000 vibrations a second, it will work well with any set no matter how high or low the wavelength and the original frequency of the signal. (2) Yes; radio-frequency amplifiers will increase the range of the set. These amplifiers intensify weak impulses from distant stations and give them power enough to actuate the detector, otherwise they would not be heard. Another advantage of radio-frequency amplification is sharper tuning.

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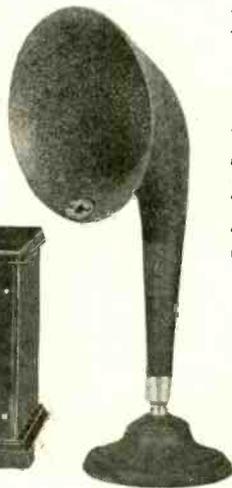
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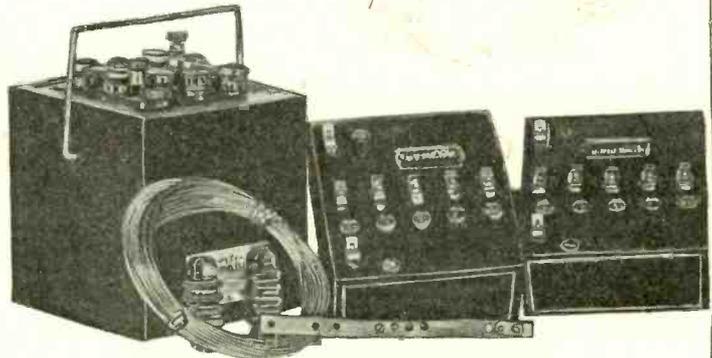
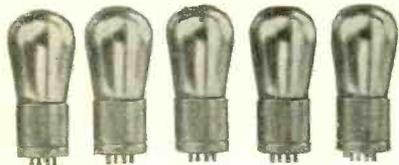
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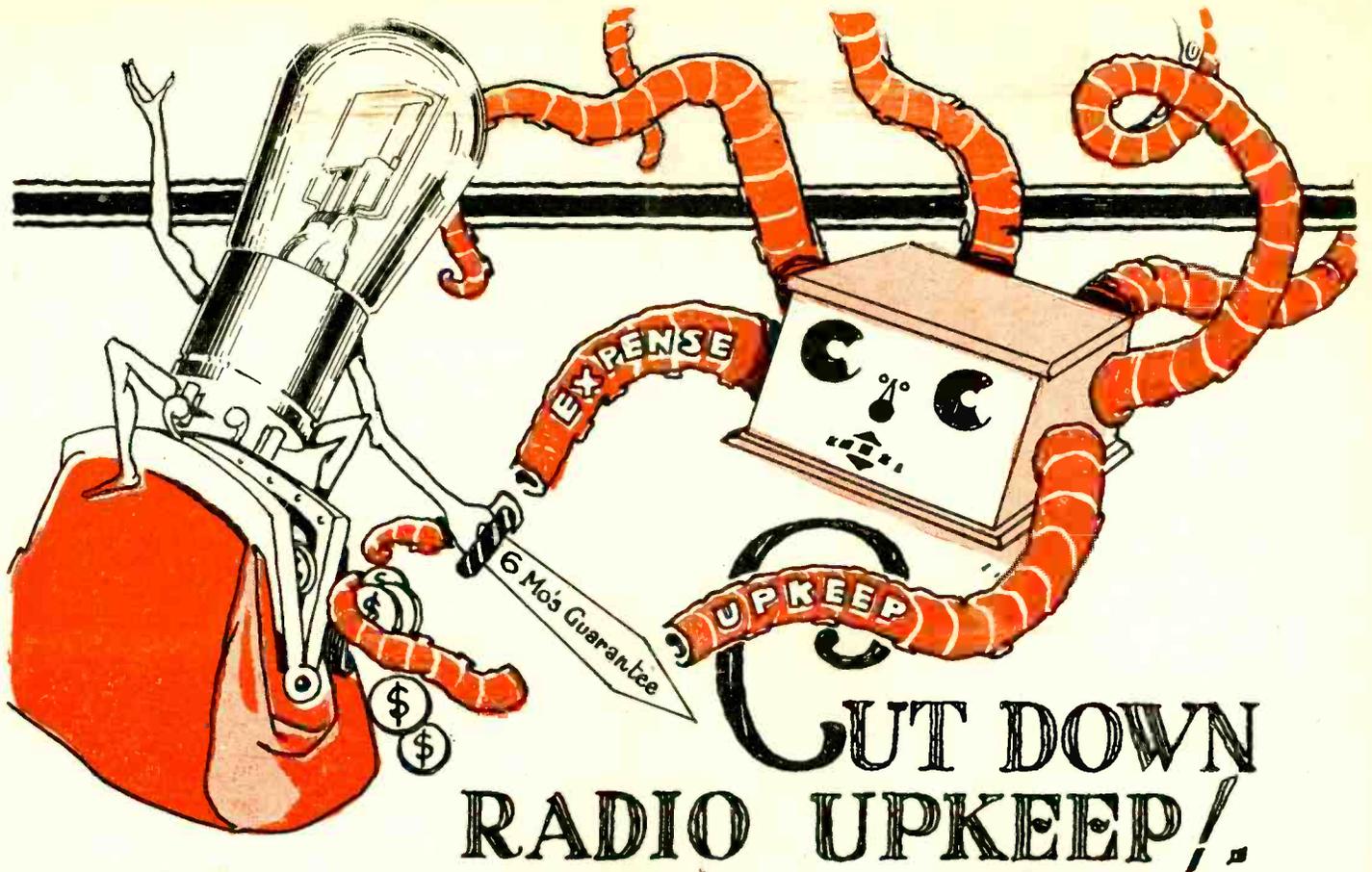
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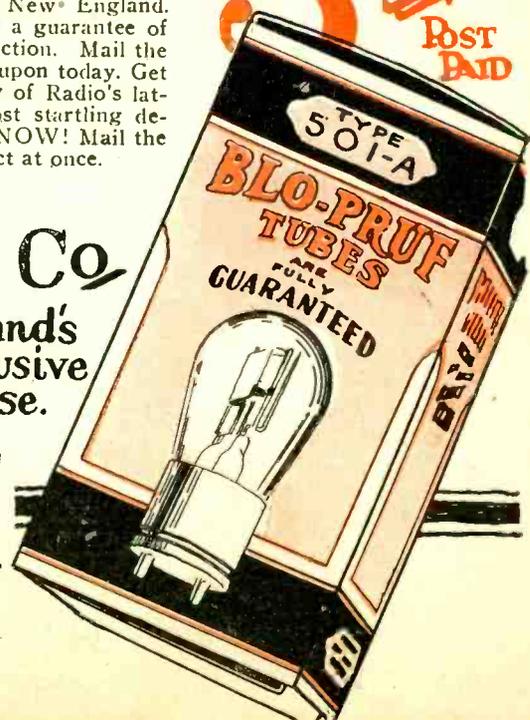


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