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RADIO WORLD

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155-162

LIST OF STATIONS

in U. S., Canada, Cuba, etc.

THE NEW TWINPLEX

A 4-Tube DX Quality Set, Using Reflexed Push-Pull AF

By J. E. ANDERSON

EIGHT DAYS' ADVANCE PROGRAMS

ONE BROOM THAT SWEPT THE ROOF CLEAN

A NEUTRALIZED LOOP ANTENNA

By Frank Freer

WHAT CAUSES WHISTLES IN A SET

The Wonder of Radio!

Crosley owns and operates station WLW, Cincinnati, the first remotely controlled super-power broadcasting station

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$14.50

Add 10 per cent west of Rocky Mountains

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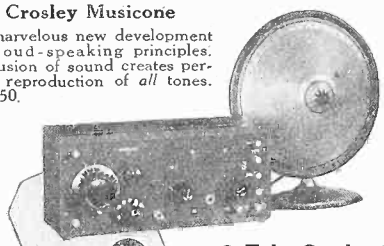

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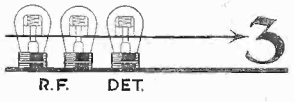

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Vol. VII. No. 6. Whole No. 162. May 2, 1925 15c per copy, $6.00 a year

THE TWINPLEX: *A 4-Tube Push-Pull Reflex of Great Quality*

By J. E. Anderson

WHEN loud speaker volume of the highest quality is the paramount object in a receiver, the use of a stage of push-pull audio frequency amplification is almost a necessity. Yet this type of amplification has not attained the popularity among the radio fans that its advantages merit. There are several possible reasons for this lack of interest, but the main reason, perhaps, is the cost of best quality. Both the first cost and the cost of maintenance of a stage of push-pull are greater than of an ordinary stage, because about twice as many parts are required; and the gain in volume is only about fifty per cent. In an ordinary stage one transformer and one tube are needed, while in the push-pull two equal tubes and two audio frequency transformers of special design are required. The gain in quality, however, is sufficient to make the use of push-pull in a good receiver well worth while.

Result of Two Years' Work

During the past two years the writer has been experimenting with various push-pull circuits with a view of increasing the overall tube efficiency. One of the circuits which has given good results is the Twinplex, in which a method of reflexing the push-pull stage is used to gain sensitivity of the circuit without sacrificing the desirable characteristics of the push-pull stage. The essential feature of the Twinplex is that the two tubes are first used in parallel as a stage of radio-frequency amplification and then in push-pull relation as a stage of quality audio-frequency amplication. Other tubes and parts may be added in different combinations to make a practical receiver to fit various requirements. The latest receiver to be assembled according to this principle will be described here, and a detailed explanation of the principle will be given in connection with it.

Theory of the Circuit

Referring to Fig. 1 the input to the receiver is through the antenna and ground coil L1 (left center). The secondary coil L2, which is tuned with condenser C2, picks up the signal, and the voltage is impressed on the grids of both the tubes which are connected in push-pull (for the audio current). The two by-pass condensers C1 are connected across each half of the push-pull input transformer to facilitate the voltage in getting to the grids. The condensers are not always necessary as there is considerable distributed capacity in the secondary of the transformer. Both the tubes amplify radio-frequency current, which passes through the two by-pass condensers C3 and the plate coil L3. The currents from both tubes are in the same phase and consequently they add up in the coil L3. This coil is coupled to the secondary L4, the input coil to the detector tube, which is tuned with condenser C4. Regeneration in the detector is obtained by means of the tickler coil L5, and facilitated by means of the by-pass condenser C6.

The audio-frequency current from the

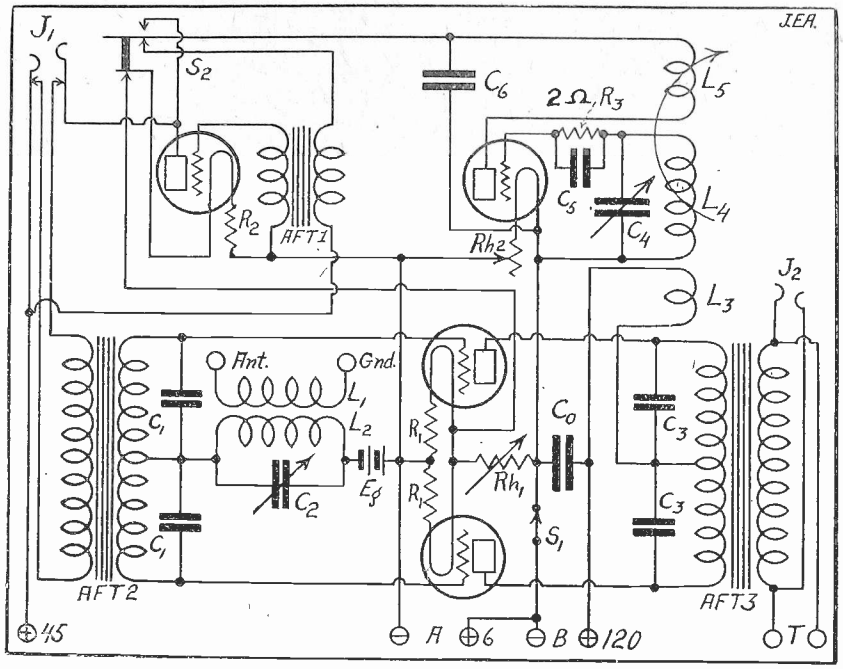

FIG. 1, schematic wiring diagram of J. E. Anderson's Twinplex, where push-pull AF is used for fine quality with great volume. The RF stage is in parallel, being reflexed in the push-pull stages, Mr. Anderson's original idea.

detector is passed either to the primary of the first audio-frequency transformer AFT1 or direct to the primary of the push-pull input transformer AFT2. Then the audio current is amplified by the push-pull stage and the output delivered to the primary of transformer AFT3. It is then delivered to the loud speaker by the secondary of that transformer.

The first radio-frequency transformer L1L2 may be home-made. The primary winding L1 consists of 10 turns and the secondary L2 of 43 turns of No. 22 double silk covered wire wound on a tubing 3" in diameter, 4" high. There is a separation of about ¼" between the two windings. The second radio-frequency transformer L3L4L5 is a commercial, low-loss unit which tunes with a .0005 mfd. condenser.

All the fixed condensers are of the mica dielectric type.

C6 is not absolutely necessary but facilitates oscillation in the detector so that the tube may be operated at a filament voltage far below normal. This saves both the tube and the filament battery consumption. Care should be taken to see that this condenser is connected exactly as shown. This is important since it may either be connected across the primary of the first AFT or across the primary of the second. C_0 also is not absolutely necessary but is desirable because it keeps radio-frequency current out of the batteries and hence helps to reduce stray coupling which might cause oscillation in the first tubes.

In the filament circuit there are three fixed resistances and two rheostats. R1 and R2 are each of 3.3 ohms. They are made of fine resistance wire taken from a 200 ohm rheostat element. This wire has a resistance of 1.1 ohm per inch, so that each of these resistances is 3" long. A separate 30-ohm rheostat is used for the detector tube, while a common 6-ohm rheostat is used for the three amplifier tubes. A switch S1 is provided in the filament circuit for opening and closing the entire circuit.

The plate voltage on the detector and on the first audio amplifier is 45 volts. The same voltage is used on the amplifier as on the detector because the switching arrangement employed is such that this is necessary in order that the voltage on the detector be the same for either of the two positions of the switch S2. The grid bias for the first amplifier is obtained from the voltage drop in the resistance R2. The plate voltage on the plates of the two push-pull tubes may have any value from 45 to 120 volts, provided that the grid bias battery Eg be given the correct value. The proper bias to use for a given plate voltage is that recommended by the manufacturers of the tubes and may be obtained on the circular accompanying the tubes when purchased. If best results are to be expected on loud speaker operation for a push-pull stage, the plate voltage should be over 100, preferably 120 volts.

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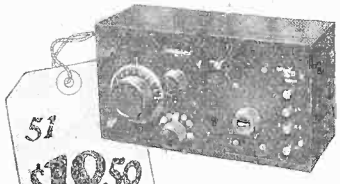

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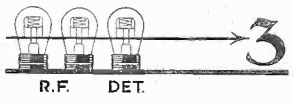

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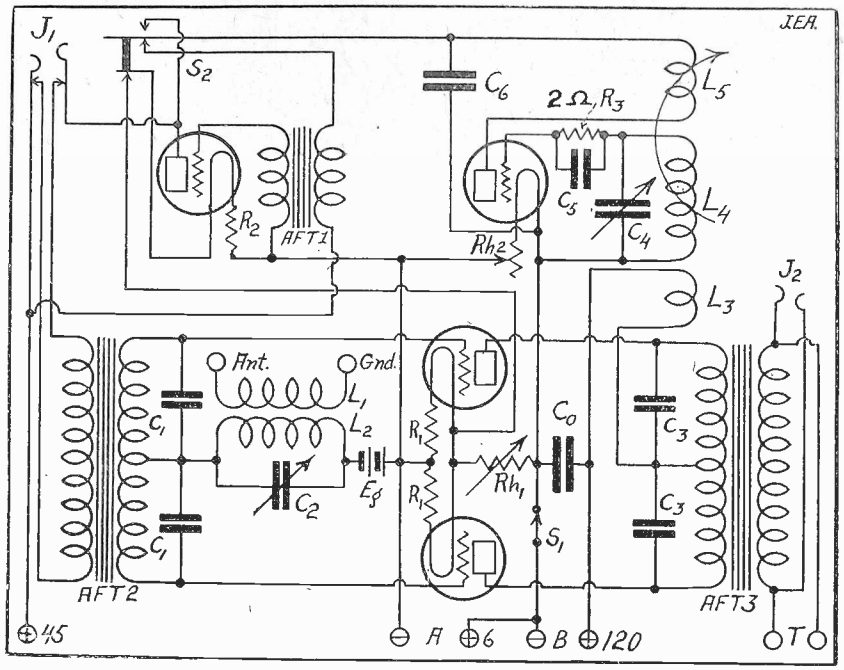

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Anderson Originates a Set

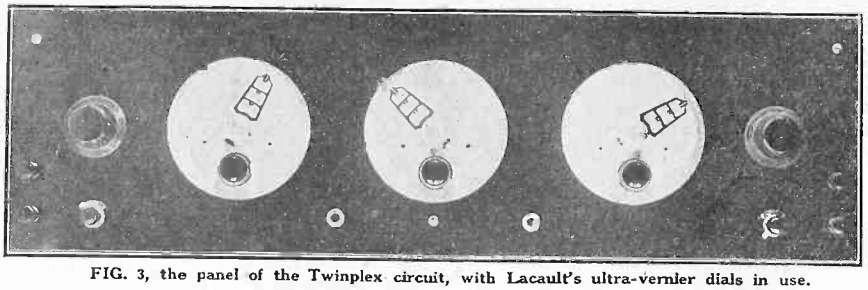


FIG. 3, the panel of the Twinplex circuit, with Lacault's ultra-vernier dials in use.

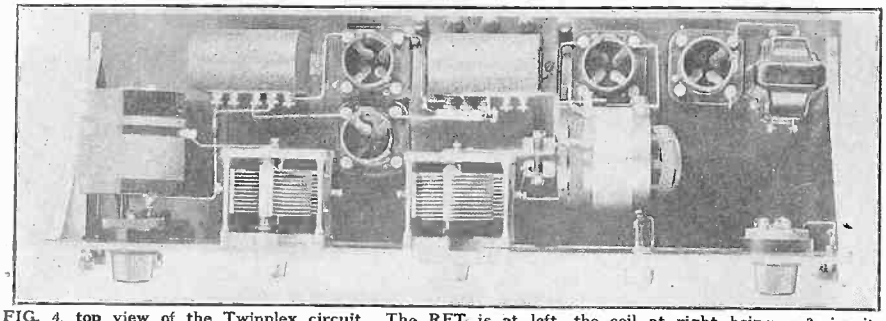


FIG. 4, top view of the Twinplex circuit. The RFT is at left, the coil at right being a 3-circuit coupler, in this instance an Ambassador. The AFT is General Radio No. 285 and the push-pull audio-transformers are those of the Como Apparatus Co. The variable condensers are .0005 Bremer-Tully.

The Twinplex Principle

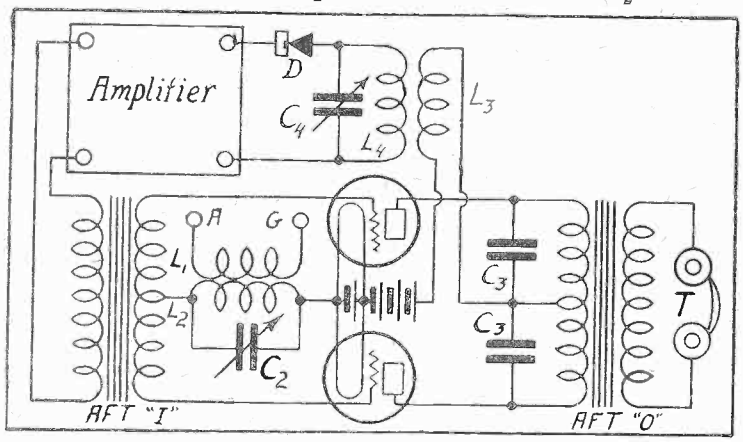


FIG. 2, simplified wiring diagram, illustrating the theory of the Twinplex circuit.

THE essential feature of the Twinplex idea is that the two tubes which are used in push-pull relation for amplifying the audio-frequency current are first used in parallel for amplifying the radio-frequency current. The principle of operation may be seen from the simplified diagram of the circuit, Fig. 2, above. The signal current is transferred from the antenna coil L1 to the secondary coil L2, which is tuned with the condenser C2. The high potential side of the tuned circuit is connected to the midpoint of the secondary of the push-pull input transformer AFT1. For radio frequencies the two halves of the winding are short-circuited, either by the distributed capacity in the winding or by fixed condensers connected across each half for this purpose. The two grids of the tubes are then at the same radio-frequency potential and the input voltage on each is in the same phase. The resulting amplified plate current will therefore also be in the same phase, and the output of each tube will be the same. The radio-frequency current in the plate circuits by-pass the halves of the primary of the push-pull output transformer AFT0 and join in the plate coil L3. This double output is transferred to the secondary coil L4, which is tuned with condenser C4; and then the potential is impressed on the detector D. A crystal detector is shown for simplicity. After detection the signal current may be amplified at audio frequency by an ordinary amplifier if desired, or it may pass directly from the detector to the primary of the push-pull input transformer. Then for the audio frequency signal the two tubes operate in pushpull relation, that is, they operate so that the two grids are always in opposite phase, as are the two plates.

(*Concluded from preceding page*)

cuit of the tube when it is thrown up, and at the same time it sends the plate current from the detector through the primary of the push-pull input transformer, or through the telephones if these are in jack J1.

The object of jack J1 is to provide a listening post for the headset. If the phones are in the jack and the switch S2 is up, the output of the detector alone actuates the telephones. If the switch is thrown down, a stage of audio-frequency amplification is added without removing the headset from the jack.

Jack J2 is the normal listening post for either the headest or the speaker. This is push-pull output, which may or may not have been amplified by the ordinary stage of audio amplification. A pair of binding posts has been connected in parallel with J2. If desired the speaker may be permanently connected to these posts and the jacks used exclusively for the headset. One of the reasons for providing the extra binding posts was to balance the panel layout, as these two posts are symmetrically placed with respect to the antenna and ground binding posts.

Panel and Baseboard

The panel arrangement and the baseboard layout may be seen from the photographs. The panel is of hard rubber and is 7 x 24". The baseboard is also of hard rubber, 7 x 23". The subpanel is raised a little so that its top is flush with the bottom of the two condensers. The switches and jacks and two of the front binding posts are below the baseboard. So is most of the wiring. By-pass condensers C6 and C0 are also most conveniently placed underneath the baseboard. Room has been provided for the grid bias condenser on top of the baseboard back of the first tuning coil. Small size batteries should be used, not the large size which has become known as C batteries.

Part II, the conclusion of J. E. Anderson's notable article on the Twinplex will be published in the May 9 issue. Send 15c for that issue to Circulation Manager, RADIO WORLD, 1493 Broadway, New York City.

Admirer Pays His Respects to Anderson

EDITOR, RADIO WORLD:

I DESIRE to express my appreciation of the most reliable and thorough contributor to the interests of the experimenter in radio receiving apparatus, Mr. J. E. Anderson. I have found in his every article completeness which is the result of experience and careful consideration. I have yet to find an error in his building specifications and directions, and is a great pleasure to follow his directions in building a receiver. I read many of the better radio publications and from my knowledge of articles on construction, and from my slight experience on construction work, may I say that in Mr. Anderson I have found my ideal of a writer and designer of circuits, both simple and complicated. From my point of view, I consider that he has done more to make RADIO WORLD a success than any other person. He combines originality with experience, something so lacking in the usual writer. My opinion is concurred in by many of my friends. JOHN A. MAHON.
Baltimore, Md.

The Causes of Whistles

By M. S. Strock
Assistant Physicist, Bureau of Standards

WHEN you tune your receiving set to a broadcasting station you will often hear whistling sounds in the headphones. These sounds are caused by the reaction between waves coming from two distinct sources. To be technically correct, it should be stated that this effect does not take place between waves in space. Actually it occurs in your receiving circuit.

These whistles in your receiving set may be due to three distinct causes: (1) The radio-frequency currents generated in your receiving set may combine with the radio-frequency currents set up in your receiving circuit by the carrier wave from a broadcasting station. (2) Your receiving set may pick up the whistle from the antenna of some other receiving set. (3) Your receiving set may have radio-frequency currents set up in it by the carrier waves from two broadcasting stations, and these currents will produce a resultant whistling sound.

What the Pitch Is

Before taking up these three different kinds of whistles in detail let us see what general conditions are necessary to produce them. This requires a consideration of the musical pitch of the whistle. Pitch must not be confused with intensity or loudness; it refers to the number of impulses or vibrations in a given length of time. You may have a very loud and a very faint whistle of exactly the same pitch. The pitch of the whistle is always equal to the difference in frequency between the two waves which produce it.

If a wave having a frequency of 606 kilocycles per second reacts with a wave having a frequency of 600 kilocycles, the resulting whistle will have a pitch of 606 minus 600, which is 6 kilocycles or 6,000 impulses per second. If the frequency, which was originally 606 kilocycles, is decreased, the pitch of the whistle becomes lower and lower; when the two frequencies become equal, no whistle is heard. This condition is called zero beat.

Suppose that the 606 kilocycle frequency is increased instead of diminished. In this case, the pitch of the whistle becomes higher and higher until finally it becomes inaudible to the human ear. When this condition is reached, the pitch of the whistle corresponds to about 15,000 impulses per second.

The Whistle Characteristics

Now we will consider the characteristics of whistles as coming from three distinct causes. First, there is the whistle caused by the radio-frequency currents in your own receiving set combining with the wave of the broadcasting station to which you are tuned. This kind of a whistle will only be produced when your receiving set is capable of being adjusted to a generating or oscillating condition. Many receiving circuits will not generate, and consequently can not produce a whistle with the incoming wave. When you hear a whistle in your headphones having a pitch which changes accordingly as you adjust the dials, then you may be sure that it is produced by your own receiving circuit. This set is now acting like a miniature transmitting station, and the sounds which you hear in the phones may be sent out from your antenna in the form of waves which will cause interference to other receiving sets. Some generating receiving sets are so constructed that the whistles which they produce are not radiated. With most sets, however, this is not the case.

The distance from your receiving antenna these whistles will be heard is an extremely variable quantity. Serious interference may be caused at distances of several city blocks, and a sensitive receiving set may pick up your whistles from a distance of many miles. Owners of receiving sets which produce whistles of this kind should make it a point to use great care in their adjustment. It is perhapse too much to suggest that sets of this type should be tuned in such a manner that they will never generate. With many sets of this type this is not easy to do. Nevertheless, care should be used at all times and as soon as the whistle from the carrier wave at the broadcasting station is heard the adjustment of the set should be changed so that it is drawn away from a generating condition.

Sometimes the broadcast listener tunes his set to zero beat with the carrier wave while the broadcast program is being received, then when he tires of the program he "whistles out" by rotating the dials of his set. By waiting until the end of the talk or musical selection this disturbing whistle would not come at such an objectionable time. These whistles could be prevented entirely by first turning back the dial which is causing the set to generate.

Borrowed Whistles

The second kind of whistle which you may hear in your receiving set, that which comes from some other receiving set, is caused by exactly the same conditions. To identify this kind of whistle, make the following tests: First, see if its pitch is independent of any adjustment of your dials; second, see if this whistle varies in pitch. If its pitch remains practically constant for a considerable period of time, then it probably belongs to the third class of whistles described below.

Although this second kind of whistle is caused by exactly the same conditions as the first kind, you are, in this case, on the other side of the fence. You must listen to your neighbor's whistles, but you have no control over them. Sometimes the practice of "getting even" is resorted to, and the person who is being disturbed by some other set comes back at him with a few whistles of his own. If this practice were confined to the guilty parties it might have some justification. Since, however, these whistles are picked up by other receiving sets, the program may be spoiled for other listeners-in. It is far better to suffer in silence from your neighbor's whistles and try to bring the matter to his attention in some other way.

The third kind of whistles, those produced between carrier waves of broadcasting stations, are, like the second kind, beyond your direct control. The easiest way to identify these whistles is to note that they are of practically constant pitch and continue so with possibly very slight fluctuations for a long period of time. As you rotate the dials of your set, the intensity but not the pitch of this whistle will change. You may have the most selective receiving set in the world, but if you tune your circuit to either one of the broadcasting stations which is causing this whistle, you will not be able to eliminate it. It occasionally happens that a whistle answering this description may be caused by a receiving set left unattended in a generating condition for a considerable length of time, but such instances are not common.

A whistle of this third class generally indicates a deviation from the assigned frequency on the part of one or both of the two broadcasting stations which produce it. This is not always the case, however. Owing to the fact that each broadcasting station can not be assigned a different frequency, it often happens that two stations of the same assigned frequency are broadcasting in different parts of the country at the same time. Now it is practically impossible to adjust both these stations to absolutely the same frequency. There will probably be a slight frequency difference between them of a few tenths of a kilocycle, and this difference often results in the production of a very objectionable beat note even though these stations are separated by several hundred miles. Slight deviations of this kind would not cause any trouble with stations of different frequency assignments, because the normal separation of such stations is 10 kilocycles and a deviation of a fraction of a kilocycle of one of these stations is too small to produce an annoying whistle or beat note with some other station of a different frequency assignment.

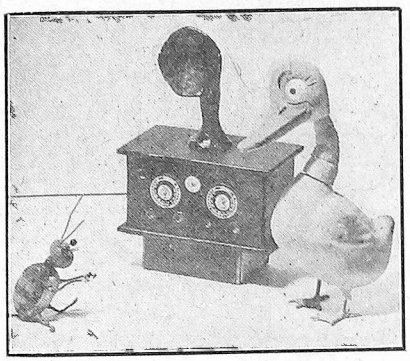
Only One Kind Caused by Set

From the foregoing it is seen that of the three different kinds of whistles which may be heard in a receiving set, only one of these kinds can be caused by the set. In the case of receiving sets which will not generate, this kind of whistle can not be produced, and owners of such sets need have no fears that they are causing interference. When you are disturbed by whistles of the other two types it is best to tune away from them and try to obtain reception from some other station. If these whistles are caused by the improper operation of a generating receiving set, there is always the temptation to get even by whistling back with your own receiving set provided your set will generate. Out of courtesy to other listeners, it is best to refrain from this.

Although whistles are objectionable to broadcast listeners they serve a useful purpose in laboratory measurements. In this role they furnish an extremely accurate means of determining when two radio frequencies are exactly the same or when one radio frequency is an even multiple of the other. The source of one of the radio frequencies is varied until the whistle or beat is heard, and the adjustment is then very carefully continued until zero beat is produced.

The next time you listen in with your receiving set, try to identify these three different kinds of whistles. Remember that the first kind of whistle, that which is produced by your own receiving set adjusted to a generating condition, is under your control.

Expert Advice



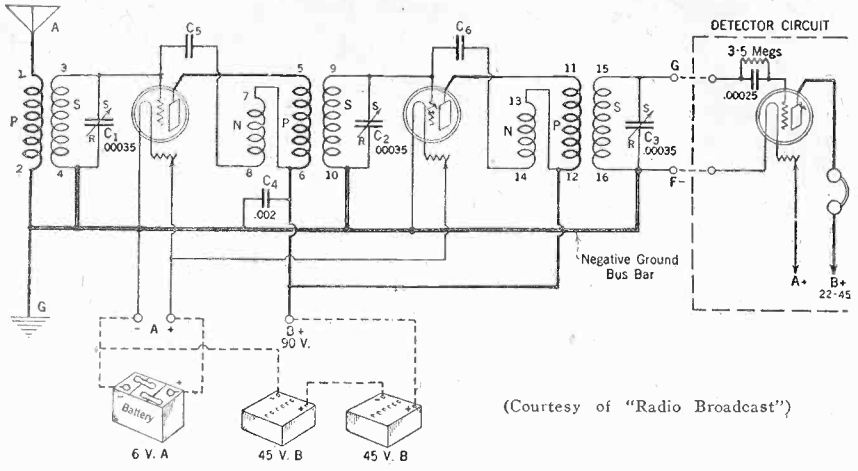
RADIO BUG—How's your set working?

Goose—I haven't got a quack out of it all day.

Bug, Well, what do you expect, without aerial or batteries?

Contemporary Review

Looking the Other Fellow Over



(Courtesy of "Radio Broadcast")

FIG. 5, the schematic circuit diagram of the amplifier whose construction is fully described in the May issue of "Radio Broadcast." The heavy line indicates the brass bus bar strip connections. The coils are of the diamond type. P1, 2 is the aerial-ground coil, S3, 4 the secondary of that coupler. The other primaries are double-wound, one part being the neutralization winding (N7, 8 and N13, 14) and the other part the coupling primary proper (P5, 6 and P11, 12). All secondaries are alike (S3, 4; S9, 10; S15, 16). The coupling to the detector is made by joining G and F— leads to the adjacent wiring. The audio wiring is omitted. C5, C6 are neutralizing condensers (X-L vario-densers).

"RADIO BROADCAST"

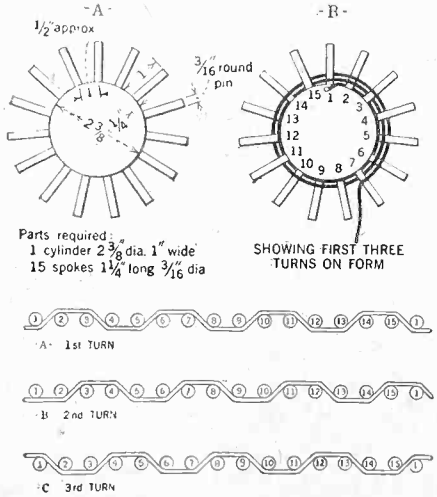
May Issue

JOHN B. BRENNAN describes "How to Build a 2-Stage Radio-Frequency Amplifier," in the interesting May issue of "Radio Broadcast." In a foreword to the article Arthur H. Lynch, editor of "Radio Broadcast," says:

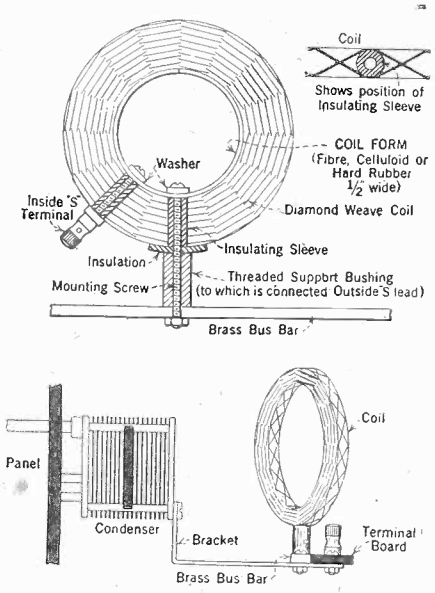
"In these days of high power broadcast stations, the selectivity gained by the use of radio frequency amplification is especially desirable. By completely neutralizing both stages of this amplifier, the full gain from each tube is secured. The simplicity of design and the ease of construction of this unit, in addition to its important feature of non-radiation, should appeal to every constructor."

Mr. Brennan treats his subject in a clear and expert manner, offering the reader the valuable benefit of his own careful experiments with the amplifier. He uses the neutralization method of "Radio Broadcast's" famous Roberts circuit.

The panel, assembly and wiring details



HOW the coils are wound. The form is shown at top left, the winding method at right, further elucidated by the lower sketch



METHOD OF ASSEMBLY OF CONDENSER, ANGLE BRACKET, COIL AND TERMINAL BOARD

FIG. 9 (top) and Fig. 10.

are carefully outlined, particular attention being paid to shortness of leads. Regarding the coils the author says:

"The type of coil used here is termed the diamond weave. To wind these coils it is necessary to have a cylindrical wooden form (a rolling pin of the required size will do) 2⅜ inches in diameter. Around the circumference of this cylinder, at approximately ½" intervals are driven brass or wooden pins 3/14" in diameter, 1¼" long. The coil winding form is illustrated in the sketch Fig. A. No. 22 DCC wire is used throughout the windings. The antenna coupler has only a primary and secondary. The two other coil units have a double-wound primary, constituting the NP coils, and a secondary (S), as illustrated in Fig. 5.

"For the second and third radio-frequency couplers, the primaries must be double-wound to provide the neutralizing winding which is connected to the grid of the tube through the neutralizing condenser. In winding the double primary it is well to have two spools of wire, one preferably colored so as to facilitate identity of connections.

"Six and one half turns of the pair of wires are wound for the primaries of the second and third couplers. This ratio was selected after tests were conducted where 12 and 18 turn primaries were employed.

"The antenna primary consists of a single wire wound for six and a half turns.

"After the primaries are wound, the secondaries are wound directly over them for forty-five turns in the same fashion and in the same direction as the primary. The inside lead or beginning of the secondary is started several spokes away from the end of the primary so that the leads are not too close together in the finished coil.

Binder for Coil

"The coil may be painted with a solution as a binder which has been prepared by dissolving celluloid and acetone "dope" of this nature. The best coils are made without dope and their turns are hold in place by lacing made of ordinary grocer's cord.

"To remove the coil from the form, withdraw all the spokes and then slide the coil off, taking care to prevent it from coming loose. Fig. 9 shows how to insert the mounting screw so that the coil may be fastened to the brass bus bar running the entire length of the receiver.

"The outside turn of the secondary connects to this screw. The brass bus bar constitutes the negative or grounded line of the entire circuit.

"As may be seen from this sketch, the 6/32 mounting screw is securely fastened to the coil by means of washers and nuts. If it is obtainable, a piece of bakelite or fibre tubing 3/16" in diameter may be slipped over the mounting screw to insulate it from the coil winding. The narrow strip of hard rubber or celluloid used as a coil form and inserted after it is wound is also fastened underneath the head of the screw and washer.

"The coil support may be a larger-diametered piece of tubing or a brass rod may be turned down if the machinery is available. But as little metal as possible should be used in the direct field of the coils.

"Brass angle brackets 3 11/16x1½x½" are fastened, as shown in Fig. 10, to the condensers at the places where these screws have just been removed, by replacing the screws securing the brackets at the same time. It is absolutely essential that these screws be exceptionally tight, but not tight enough to turn off the heads, so that a positive electrical

(*Continued on page 28*)

List of Parts

One panel 7x14x3/16".
Three Hammarlund Variable Condensers .00037 mfd.
Two Federal Panel Mounting Sockets.
Two Bradleystats.
Three Sickles Coil Units.
Two X-L Vario-densers.
Three Na-ald Super De-Luxe Dials.
Brass strip.
Mounting screws—wire, etc.
One Double-circuit Carter Jack.

When the coils are home-made the supplies necessary for their winding are as follows:
½ lb. No. 22 DCC wire; Bakelite or metal bushing supports; Washers; Insulation strip, fibre, celluloid, etc.; Screws and nuts.

Testing, Balancing and Tuning the Pressley Set

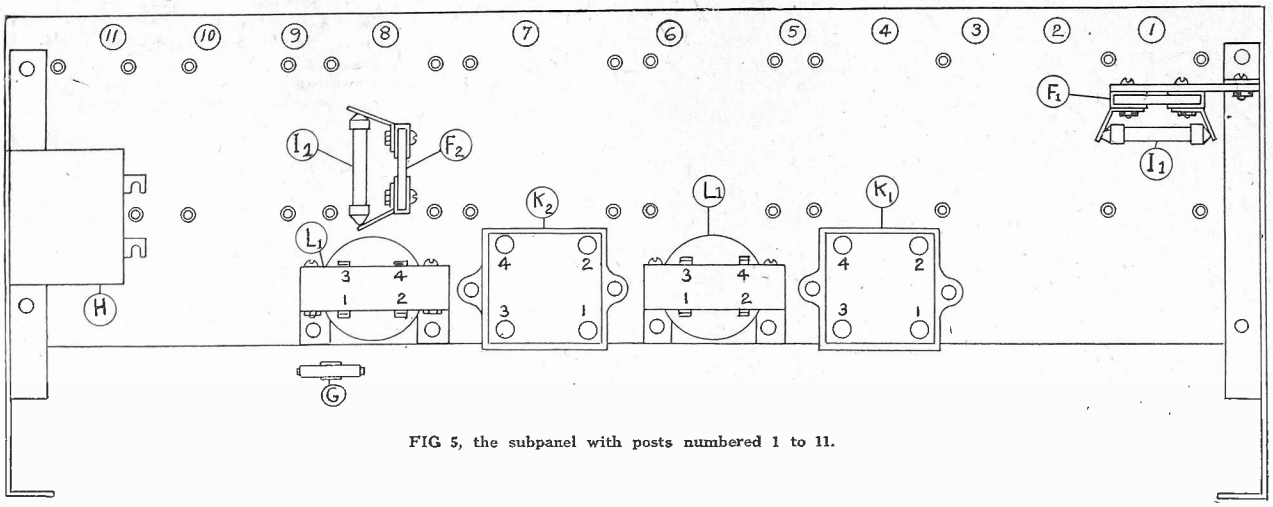


FIG 5, the subpanel with posts numbered 1 to 11.

By Thomas W. Benson

Consulting Engineer

LET us assume that the assembly and wiring of the receiver has been completed and the set is ready to be installed in the cabinet. Determine if any errors have crept into the building of the receiver. Test the set for proper connections. Put jumpers on the terminal posts as shown in Fig. 7. Between the points X and Y connect a 6-volt storage battery. Take a tube that lights and insert it in one socket after another. If there is no short between the B battery lines and the filament wiring the tube will not light.

Now to test for open circuits. Connect 90 volts of B battery between the points X and Y. Hold a moistened finger on post 6 and wetting the finger of the other hand touch it to each of the plate terminals. A shock should be felt at every plate terminal, indicating that the circuits are complete. It will be necessary to insert the phone plug in the last jack to complete the circuit to the plate of the last tube.

To test the grid circuits of the set for "opens," one moistened finger is placed on terminal 7 and the moistened finger of the other hand is touched to the grid terminals of the tube sockets. Here again a slight shock will be felt if the circuits are complete.

The shock at the grid terminals of the first and fifth tube will not be felt if the grid leaks are of a high value and the grid condensers can be shorted with a short piece of wire to make the test. If any shock is felt with these jumpers removed and the grid leaks out of the clips it would indicate the condensers are shorted.

If all the tests show the receiver as being properly wired you can proceed to connect it up in the manner shown in Fig. 8. Be careful to get the proper values of B battery voltage on the posts as marked. Insert the grid leaks in the clips on the grid condensers and insert the tubes and make sure they light when the switch is closed and the rheostats are turned to the "on" position. The loop connected to the aerial posts may be home-made or a Portena loop which is tapped in the center.

The set is now ready for operation but the balancing condenser must first be set to prevent the loop going into oscillation. The best method of doing this is to connect a headset or loud talker in series with the 45-volt tap B battery leads that goes to the plate of the oscillator tube. Turn the filament current into the tube and set the oscillator condenser D at about 50° and when the tuning condenser C is turned a click will be heard. Swing the tuning condenser back and forth across the click point meanwhile adjusting the balancing condenser with a strip of fibre or a hard rubber fountain pen until the click becomes inaudile or until it is weakest. The set is then balanced out and the balancing condenser E may be locked in adjustment. The point of balance will be near the maximum capacity of the condenser.

The set is now ready for operation and tuning in of signals should be now attempted. Plug the phones or talker into the last jack and bring the tubes up to brillancy but do not throw the rheostats all the way on. Turn the switch to the right for short waves and to the left for long waves. Try for the nearest stations first to get the relative positions of the switch and dials for the different wavelengths and the proper filament settings for maximum results. The grid bias on the audio-frequency tubes may have to be changed to get proper operation.

When one has become accustomed to tuning and distant signals are being picked up it is well to vary the size of the grid leaks in an attempt to improve reception. The use of matched tubes is recommended in this receiver to obtain maximum range and volume.

Just a few words of warning. Do not push the tubes by burning them too bright. A slight overload reduces the tube life appreciably while underloading the filament increases the life of the tube. Always have the rheostats in the off position when switching the filament current on so the tube filaments will not be subjected to a sudden flow of current.

The tuning of this receiver is extremely easy when one gets the knack of taking it easy and slow. Make all movements of the dials slowly. Keeping the dials in step, the stations you may miss by rapid tuning can be brought in loud and clear.

[*This concludes the 3-part article on "How to Build the Pressley Super-Heterodyne." Part I was published April* 18, *Part II April* 25.]

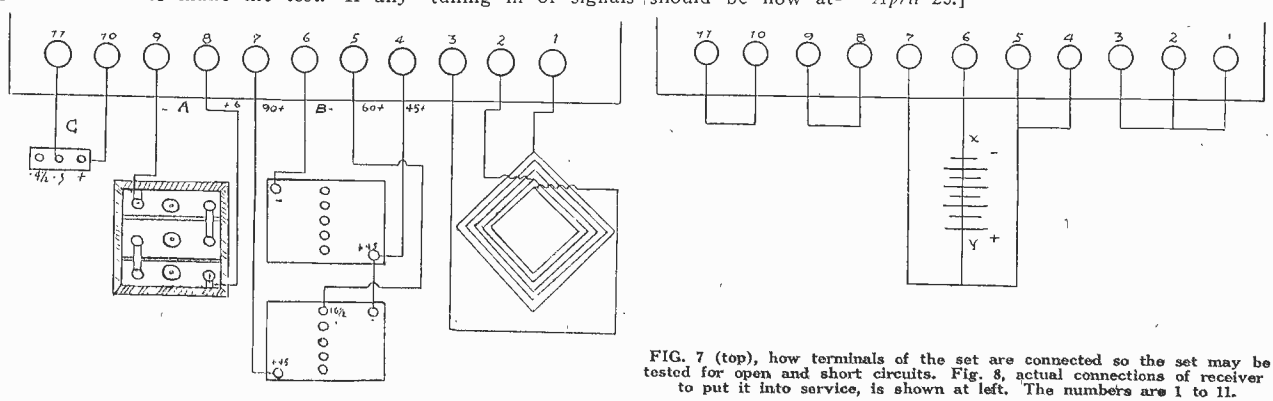


FIG. 7 (top), how terminals of the set are connected so the set may be tested for open and short circuits. Fig. 8, actual connections of receiver to put it into service, is shown at left. The numbers are 1 to 11.

Official List of Stations

Complete, Accurate, Up-to-Date

Corrected and revised (as to United States stations) up to April 22

Station	Owner and Location	Meters
KDKA	Westinghouse E. & M. Co., E. Pittsburgh, Pa.	309
KDLR	Radio Elec. Co., Devils Lake, N. D.	231
KDPM	Westinghouse E. & M. Co., Cleveland, Ohio	250
KDYL	Newhouse Hotel, Salt Lake City, Utah	250
KDZB	F. E. Seifert, Bakersfield, Cal.	210
KFAB	Nebraska Buick Auto Co., Lincoln, Neb.	240
KFAD	McArthur Bros. Merc. Co., Phoenix, Ariz.	360
KFAE	State College, Pullman, Wash.	349
KFAF	Western Radio Corp., Denver, Colo.	278
KFAJ	University of Colorado, Boulder, Colo.	261
KFAN	University of Idaho, Moscow, Idaho.	231
KFAU	Boise High School, Boise, Idaho	275
KFAW	Radio Den, Santa Ana, Cal.	214
KFBB	F. A. Buttrey Co., Havre, Mont.	275
KFBC	W. K. Azbill, San Diego, Cal.	278
KFBE	Horn & Wilson, San Luis Obispo, Cal.	216
KFBG	1st Presbyterian Church, Tacoma, Wash.	250
KFBK	Kimball Upson So., Sacramento, Cal.	248
KFBL	Leese Bros., Everett, Wash.	224
KFBU	Bishop N. S. Thomas, Laramie, Wyo.	270
KFCB	Nielson Radio Co., Phoenix, Ariz.	238
KFCC	1st Congregational Church, Helena, Mont.	248
KFCF	F. A. Moore, Walla Walla, Wash.	256
KFCY	Western Union College, Lemars, Iowa.	252
KFCZ	Centra High School, Omaha, Neb.	258
KFDD	St. Michael's Cathedral, Boise, Idaho.	275
KFDH	University of Arizona, Tuscon, Ariz.	268
KFDJ	Oregon Agricultural College, Corvallis, Ore.	254
KFDM	Magnolia Petroleum Co., Beaumont, Texas.	316
KFDX	1st Baptist Church, Shreveport, La.	250
KFDY	State College of Agriculture, Brookings, S. D.	273
KFDZ	H. O. Iverson, Minneapolis, Minn.	231
KFEC	Meier & Frank Co., Portland, Ore.	248
KFEL	Winner Radio Corp., Denver, Colo.	254
KFEQ	J. L. Scroggin, Oak, Neb.	268
KFER	Auto Elec. Service Co., Ft. Dodge, Ia.	231
KFEY	Bunker Hill & Sullivan, Kellog, Idaho.	233
KFFP	1st Baptist Church, Moberly, Mo.	266
KFFV	Graceland Colege, Lamoni, Iowa	250
KFFY	Louisiana College, Alexandria, La.	275
KFGC	Louisiana State University, Baton Rouge, La.	268
KFGD	College for Women, Chickasha, Okla.	252
KFGH	Leland Stanford Junior University, Stanford University, Cal.	270
KFGQ	Crary Co., Boone, Iowa	226
KFGX	1st Presbyterian Church, Orange, Tex.	250
KFHA	Western State College, Gunnison, Colo.	252
KFHL	Penn College, Oskaloosa, Iowa	240
KFI	E. C. Anthony, Inc., Los Angeles, Cal.	469
KFIF	Benson Institute, Portland, Ore.	248
KFIO	North Central High School, Spokane, Wash.	265
KFIQ	1st Methodist Church, Yakima, Wash.	256
KFIU	Alaska Elec. Co., Juneau, Alaska	226
KFIZ	Daily Commonwealth, Fond du Lac, Wis.	273
KFJB	Marshall Elec. Co., Marshalltown, Ia.	248
KFJF	National Radio Co., Oklahoma City, Okla.	261
KFJI	Liberty Theatre, Astoria, Ore.	246
KFJM	University of N. D., Grand Forks, N. D.	278
KFJR	Ashley C. Dixon & Son, Portland, Ore.	263
KFJX	State Teachers College, Cedar Falls, Ia.	258
KFJY	Tunwall Radio Co., Ft. Dodge, Iowa.	246
KFJZ	W. E. Branch, Ft. Worth, Texas	254
KFKA	State Teachers College, Greeley, Colo.	273
KFKB	Brinkley Jones Hospital, Ass'n, Milford, Kans.	273
KFKQ	Conway Radio Laboratory, Conway, Ark.	250
KFKU	University of Kansas, Lawrence, Kans.	275
KFKX	Westinghouse E. & M. Co., Hastings, Neb.	288
KFLB	Signal Elec. Mfg. Co., Menominee, Mich.	248
KFLP	Everette M. Foster, Cedar Rapids, Ia.	256
KFLR	University of N. M., Albuquerque, N. M.	254
KFLU	Rio Grande Radio Sup. Co., San Benito, Texas	236
KFLV	Swedish Evangelist Church, Rockford, Ill.	229
KFLX	George R. Clough, Galveston, Texas.	240
KFLZ	Atlantic Auto Co., Atlantic, Iowa	273
KFMB	Christian Churches of Little Rock, Little Rock, Ark.	254
KFMQ	University of Ark., Fayetteville, Ark.	300
KFMR	Morningside College, Sioux City, Iowa.	261
KFMT	Dr. G. W. Young, Minneapolis, Minn.	263
KFMW	M. G. Sataren, Houghton, Mich.	266
KFMX	Carleton College, Northfield, Minn.	337
KFNF	Henry Field Seed Co., Shenandoah, Iowa.	266
KFNG	Wooten Radio Shop, Coldwater, Miss.	254
KFNJ	Teachers College, Warrensburg, Mo.	234
KFNL	Union High School, Paso Robles, Cal.	240
KFNV	L. A. Drake, Santa Rosa, Cal.	227
KFNY	Montana Phono Co., Helena, Mont.	248
KFOA	Rhodes Company, Seattle, Wash.	455
KFOC	1st Christian Church, Whittier, Cal.	236
KFOJ	Moberly High School, Moberly, Mo.	246
KFOL	L. M. Schafbuch, Marengo, Iowa	234
KFON	Echophone Radio Shop, Long Beach, Cal.	234
KFOO	Latter Day Saints University, Salt Lake City, Utah	261
KFOR	David City Tire & Elec. Co., David City, Neb.	226
KFOT	College Hill Radio Club, Wichita, Kan.	231
KFOX	Technical High School, Omaha, Neb.	248
KFOY	Beacon Radio Service, St. Pau, Minn.	252
KFPG	Oliver S. Garretson, Los Angeles, Cal.	238
KFPL	C. C. Baxter, Dublin, Texas	252
KFPM	New Furniture Co., Greenville, Texas.	242
KFPR	Forestry Department, Los Angeles, Cal.	231
KFPV	Heintz & Kohlmoos, San Francisco, Cal.	236
KFPW	St. John's Church, Carterville, Mo.	268
KFPX	1st Presbyterian Church, Pine Bluff, Ark.	242
KFPY	Symonds Investment Co., Spokane, Wash.	266
KFQA	The Principia, St. Louis, Mo.	261
KFQB	Searchlight Publishing Co., Ft. Worth, Texas	254
KFQC	Kidd Bros., Taft, Cal.	231
KFQG	Southern Calif. Radio Ass'n, Los Angeles, Cal.	229
KFQH	Radio Service Co., Burlingame, Cal.	231
KFQM	Texas Highway Bulletin, Austin, Tex.	268
KFQP	G. S. Carson, Jr., Iowa City, Ia.	224
KFQR	W. L. Ellis, Oklahoma City, Okla.	210
KFQT	National Guard, Denison, Tex.	252
KFQU	W. Riker, Holy City, Cal.	234
KFQW	F. C. Knierim, North Bend, Wash.	216
KFOY	Farmers State Bank, Belden, Neb.	273
KFQZ	Taft Radio Co., Hollywood, Cal.	226
KFRB	Hall Bros., Beevile, Texas	248
KFRF	W. R. Brown, Alexandria, La.	242
KFRH	The Radio Shop, Grafton, N. D.	268
KFRL	Men's Club, Grand Forks, N. D.	240
KFRM	J. F. Boland, Ft. Sill, Okla.	263
KFRP	Trinity Church, Redlands, Cal.	211
KFRQ	Radio Service Co., Portland, Ore.	213
KFRU	Etherical Studio, Bristow, Okla.	395
KFRW	United Churches, Olympia, Wash.	220
KFRX	J. G. Klemgard, Pullman, Wash.	217
KFRR	College of Agriculture, State College, N. M.	266
KFRZ	The Electric Shop, Hartington, Neb.	222
KFSG	Echo Park Evangelistic Ass'n, Los Angeles, Cal.	278
KFSY	The Van Blaricom Co., Helena, Mont.	248
KFUJ	Hoppert P. and H. Co., Breckenridge, Minn.	242
KFUL	T. Goggan & Bro., Galveston, Tex.	258
KFUM	W. D. Corley, Colorado Springs, Colo.	242
KFUO	Concordia Theo. Seminary, St. Louis, Mo.	545
KFUP	Fitzsimons General Hospital, Denver, Colo.	234
KFUR	H. W. Peery and C. Redfield, Ogden, Utah.	224
KFUS	Louis L. Sherman, Oakland, Cal.	233
KFUT	University of Utah, Salt Lake City, Utah.	261
KFUU	Colburn Radio Laboratories, San Leandro, Cal.	224
KFUV	G. P. Ward, Springfield, Mo.	252
KFUW	E. W. Lewis, Moberly, Mo.	233
KFUY	Irvine H. Bouchard, Butte, Mont.	254
KFUZ	Y. M. C. A., Virginia, Minn.	476
KFVC	G. J. Bensberg, Camden, Ark.	242
KFVD	Chas. & W. J. McWhinnie, San Pedro, Cal.	205
KFVF	Clarence B. Juneau, Hollywood, Cal.	208
KFVH	Herbert Whan, Manhattan, Kans.	219
KFVI	56th Cav. Brigade, Houston, Tex.	248
KFWA	Browning Bros. Co., Ogden, Utah.	214
KFWB	Warner Bros. Pictures, Inc., Hollywood, Cal.	252
KFWC	L. E. Wall & C. S. Myers, Upland, Cal.	211
KGB	The Ledger, Tacoma, Wash.	250
KGO	General Electric Company, Oakland, Cal.	361
KGU	M. A. Mulrony, Honolulu, Hawaii.	360
KGW	The Oregonian, Portland, Ore.	492
KGY	St. Martin's College, Lacey, Wash.	246
KHJ	The Times, Los Angeles, Cal.	405
KHQ	Louis Wasmer, Seattle, Wash.	273
KIAF	Steele Co., Sihtipoc, Minn.	421
KJQ	Gould Light Co., Stockton, Cal.	255
KJBS	J. Brunton & Sons Co., San Francisco, Cal.	236
KJR	Northwest Radio Co., Seattle, Wash.	384
KJS	Bible Institute, Los Angeles, Cal.	294
KLDS	Reorganized Church of Jesus Christ of Latter Day Saints, Independence, Mo.	268
KLS	Warner Bros Radio Co., Oakland, Cal.	242
KLX	Tribune, Oakland, Cal.	508
KLZ	Reynolds Radio Co., Denver, Col.	266
KMJ	San Joaquin Corp., Fresno, Cal.	234
KMO	Love Elec. Co., Tacoma, Wash.	250
KNX	Express, Hollywood, Cal.	337
KOA	General Electric Co., Denver, Col.	322
KOB	College of Agri, State College, N. M.	349
KOCH	Central H. S., Omaha, Neb.	258
KOP	Detroit Police Department, Detroit, Mich.	278
KPO	Hale Brothers, San Francisco, Cal.	429
KPPC	Pasadena Presbyterian Church, Pasadena, Cal.	229
KQP	Radio Club, Hood River, Ore.	270
KQV	Doubleday Hill Elec. Co., Pittsburgh, Pa.	275
KQW	C. P. Herrold, San Jose, Cal.	226
KRE	Gazette, Berkeley,, Cal.	258
KSAC	Kansas State Agricultural College, Manhattan, Kans.	341
KSD	Post Dispatch, St. Louis, Mo.	545
KSL	Radio Service Corp., Salt Lake City, Utah.	300
KTHS	New Arlington Hotel, Hot Springs, Ark.	375
KTW	1st Presbyterian Church, Seattle, Wash.	454
KUO	Examiner, San Francisco, Cal.	246
KUOM	State University of Montana, Missoula, Mont.	245
KWG	Portable Wireless Tel. Co., Stockton, Cal.	248
KYQ	Electric Shop, Honolulu	270
KYW	Westinghouse E. & M. Co., Chicago, Ill.	535
KZKZ	Electric Supply Co., Manila, P. I.	270
KZM	Western Radio Inst., Oakland, Cal.	241
KZRQ	Far Eastern Radio, Inc., Manila, P. I.	222
WAAB	V. Jensen, New Orleans, La.	273
WAAC	Tulane University, New Orleans, La.	275
WAAD	Ohio Mech. Institute, Cincinnati, Ohio	259
WAAF	Drovers Journal, Chicago, Ill.	278
WAAM	I. R. Nelson Co., Newark, N. J.	263
WAAW	Omaha Grain Exchange, Omaha, Neb.	384
WABA	Lake Forest University, Lake Forest, Ill.	227
WABB	Harrisburg Sporting Goods Co., Harrisburg, Pa.	266
WABI	Bangor Ry. & Elec. Co., Bangor, Me.	240
WABL	Agricultural College, Storrs, Conn.	275
WABM	F. E. Doherty Radio Co., Saginaw, Mich.	261
WABN	Ott Radio, Inc., La Crosse, Wis.	244
WABO	Lake Avenue Baptist Church, Rochester, N. Y.	278
WABQ	Haverford College Radio Club, Haverford, Pa.	261
WABR	Scott High School, Toledo, O.	263
WABU	Victor Talking Machine Co., Camden, N. J.	226
WABW	College of Wooster, Wooster, O.	207
WABX	H. B. Joy, Mt. Clemens, Mich.	254
WABY	John Magaldi, Philadelphia, Pa.	242
WABZ	Coliseum Place Baptist Church, New Orleans, La.	275
WADC	Allen Theatre, Akron, Ohio	258
WAFD	A. B. Parfet Co., Port Huron, Mich.	258
WAHG	A. H. Grebe Co., Richmond Hill, N. Y.	316
WAIT	A. H. Waite & Co., Taunton, Mass.	229
WAMD	Hubbard & Co., Minneapolis, Minn.	244
WARG	American Radio Res. Corp., Medford Hillside, Mass.	261
WBAA	Purdue University, West Lafayette, Ind.	273
WBAK	State Police, Harrisburg, Pa.	276
WBAN	Wireless Phone Corp., Paterson, N. J.	244
WBAO	James Millikin University, Decatur, Ill.	263
WBAP	Star Telegram, Fort Worth, Tex.	476
WBAR	Kopp Radio Co., Sisiht, Wis.	406
WBAV	Erner Hopkins Co., Columbus, O.	294
WBAX	J. H. Stenger, Jr., Wilkes-Barre, Pa.	256
WBBA	Plymouth Congregational Church, Newark, O.	226
WBBG	I. Vermilya, Mattapoisett, Mass.	248
WBBH	J. Irving Bell, Port Huron, Mich.	205
WBBL	Grace Covenant Presbyterian Church, Richmond, Va.	229
WBBM	H. L. Atlass, Chicago, Ill.	226
WBBP	Petoskey High School, Petoskey, Mich.	238
WBBR	Peoples Pulpit Ass'n, Rossville, N. Y.	273
WBBS	1st Baptist Church, New Orleans, La.	252
WBBU	Jenks Motor Sales Co., Monmouth, Ill.	224
WBBV	Johnstown Radio Co., Johnstown, Pa.	248
WBBW	Ruffner City High School, Norfolk, Va.	222
WBBY	Washington Light Infantry, Charleston, S. C.	268
WBBZ	N. B. Watson, Indianapolis, Ind.	238
WBCN	Southtown Economist, Chicago, Ill.	266
WBDC	Baxter Laundry Co., Grand Rapids, Mich	256
WBES	Bliss Electrical School, Takoma Park, Md.	222
WBOQ	A. H. Grebe & Co., Richmond Hill, N. Y.	236
WBR	State Police, Butler, Pa.	203
WBRE	Baltimore Radio Ex., Wilkes-Barre, Pa.	231
WBS	D. W. May, Inc., Newark, N. J.	252
WBT	Southern Radio Co., Charlotte, N. C.	275
WBZ	Westinghouse E. & M. Co., Springfield, Mass.	333
WCAD	St. Lawrence University, Canton, N. Y.	263
WCAE	Kaufman & Baer, Pittsburgh, Pa.	461

Station	Owner and Location	Meters
WCAG	C. R. Randall, New Orleans, La.	268
WCAH	Entrekin Electric Co., Columbus, O.	266
WCAJ	Nebraska Wesleyan University, University Place, Neb.	275
WCAL	St. Olaf College, Northfield, Minn.	337
WCAO	Sanders & Stayman, Baltimore, Md.	275
WCAP	C. & P. Tel. Co., Washington, D. C.	469
WCAR	Southern Radio Corp., San Antonio, Texas.	263
WCAT	School of Mines, Rapids City, S. D.	240
WCAU	Durham & Co., Philadelphia, Pa.	278
WCAX	University of Vermont, Burlington, Vt.	250
WCAY	Civic Broadcasting Ass'n, Milwaukee, Wis.	266
WCAZ	Carthage College, Carthage, Ill.	246
WCBA	Queen City Radio, Allentown, Pa.	254
WCBC	University of Michigan, Ann Arbor, Mich.	229
WCBD	W. G. Voliva, Zion, Ill.	345
WCBE	Uhalt Radio Co., New Orleans, La.	263
WCBG	H. S. Williams, Mayleld, Ky.	268
WCBH	University of Mississippi, Oxford, Miss.	242
WCBI	Nicoll, Duncan & Rush, Bemis, Tenn.	240
WCBJ	J. C. Mans, Jennings, La.	244
WCBL	Northern Radio Mfg. Co., Houlton, Me.	266
WCBM	Hotel Chateau, Baltimore, Md.	229
WCBQ	1st Baptist Church, Nashville, Tenn.	242
WCBR	C. H. Messter (Portable), Providence, R. I.	205
WCBU	Arnold Wireless Co., Arnold, Pa.	220
WCBY	Forks Electrical Shop, Buck Hill Falls, Pa.	231
WCBZ	Coppotelli Bros., Chicago Heights, Ill.	248
WCCO	Washburn Crosby Co., Minneapolis, Minn.	416
WCEE	C. E. Erbstein, Elgin, Ill.	275
WCK	Stix Baer & Fuller Co., St. Louis, Mo.	273
WCM	Texas Market Department, Austin, Texas.	268
WCSO	Wittenberg College, Springleld, Ohio	248
WCTS	C. T. Sherer Co., Worcester, Mass.	268
WCUW	Clark University, Worcester, Mass.	238
WCX	Detroit Free Press, Detroit, Mich.	517
WDAE	Tampa Daily News, Tampa, Fla.	273
WDAF	Kansas City Star, Kansas City, Mo.	366
WDAG	J. L. Martin, Amarillo, Tex.	263
WDAH	Trinity Methodist Church, El Paso, Texas	268
WDAY	Radio Equipment Corp., Fargo, N. D.	244
WDBC	Kirk, Johnson & Co., Lancaster, Pa.	258
WDBD	H. E. Burns, Martinsburg, W. Va.	254
WDBE	Gilham-Schoen Elec. Co., Atlanta, Ga.	278
WDBF	R. G. Phillips, Youngstown, O.	222
WDBJ	Richardson Wayland Elec. Co., Roanoke, Va.	229
WDBK	M. F. Broz, Furn., Cleveland, O.	227
WDBL	Department ofMarkets, Stevens Point, Wis.	278
WDBO	Rollins College, Winter Park, Fla.	240
WDBP	State Normal School, Superior, Wis.	261
WDBQ	Morton Radio Supply Co., Salem, N. J.	234
WDBR	Tremont Temple Baptist Church, Boston, Mass.	261
WDBS	S. M. K. Radio Corp., Dayton, O.	275
WDBT	Taylor's Book Store, Hattiesburg, Miss.	236
WDBW	Radio Den, Columbia, Tenn.	268
WDBX	Dyckman Radio Shop, New York, N. Y.	233
WDBY	North Shore Congregational Church, Chicago, Ill.	258
WDBZ	Boy Scouts of America, Kingston, N. Y.	233
WDM	Church of the Covenant, Washington, D. C.	270
WDOD	Chattanooga Radio Co., Chattanooga, Tenn.	256
WDRC	Doolittle Radio Corp., New Haven, Conn.	268
WDWF	D. W. Flint Cranston, R. I.	286
WDZ	J. L. Bush, Tuscola, Ill.	278
WEAA	F. D. Fallain, Flint, Mich.	234
WEAF	A. T. & T. Co., New York, N. Y.	492
WEAH	Wichita Board of Trade, Wichita, Kans.	268
WEAI	Cornell University, Ithaca, N. Y.	254
WEAJ	University of South Dakota, Vermillion, S. D.	278
WEAM	Borough of North Plainfield, N. Plainfield, N. J.	261
WEAN	Shepard Co., Providence, R. I.	270
WEAO	Ohio State University, Columbus, O.	294
WEAP	Mobile Radio Co., Mobile, Ala.	263
WEAR	Goodyear T. and R. Co., Cleveland, O.	389
WEAU	Davidson Bros. Co., Sioux City, Ia.	275
WEAY	Iris Theatre, Houston, Texas.	360
WEBA	The Electric Shop, Highland Park, N. J.	233
WEBC	W. C. Bridges, Superior, Wisc.	242
WEBD	Elec. Equipment & Service Co., Anderson, Ind.	246
WEBE	Roy W. Waller, Cambridge, Ohio.	234
WEBH	Edgewater Beach Hotel, Chicago, Ill.	370
WEBJ	Third Avenue R. R. Co., New York, N. Y.	273
WEBK	Rrand Rapids Radio Co., Grand Rapids, Mich.	242
WEBL	Radio Corp. of Ama. (Portable)	226
WEBM	Radio Corp. of Ama., Portable Mobile Station	226
WEBP	E. B. Peddicord, New Orleans, La.	280
WEBQ	Tate Radio Co., Harrisburg, Ill.	226
WEBR	H. H. Howell, Buffalo, N. Y.	240
WEBT	Dayton High School, Dayton, Ohio.	256
WEBW	Beloit College, Beloit, Wisc.	268
WEBY	Hobart Radio Co., Roslindale, Mass.	226
WEBZ	Savannah Radio Corp., Savannah, Ga.	234
WEEI	Edison Electric Illuminating Co., Boston, Mass.	476
WEMC	Emm. Missionary College, Berrien Springs, Mich.	286
WENR	All-Amer. Radio Corp., Chicago, Ill.	266
WEW	St. Louis University, St. Louis, Mo.	248
WFAA	Dallas News & Journal, Dallas, Texas	476
WFAM	The Times, St. Cloud, Minn.	273
WFAV	University of Nebr., Lincoln, Nebr.	275
WFBB	Eureka College, Eureka, Ill.	240
WFBC	1st Baptist Church, Knoxville, Tenn.	250
WFBD	Gethsemane Baptist Church, Philadelphia, Pa.	234
WFBE	J. V. De Walle, Seymour, Ind.	226
WFBG	W. F. Gable Co., Altoona, Pa.	278
WFBH	Concourse Radio Corp., New York, N. Y.	273
WFBI	Galvin Radio Supply Co., Camden, N. J.	236
WFBJ	St. Johns University, Collegeville, Minn.	236
WFBK	Dartmouth College, Hanover, N. H.	256
WFBL	Onondaga Hotel, Syracuse, N. Y.	252
WFBM	Merchants Lighting Co., Indianapolis, Ind.	268
WFBN	Radio Sales & Service Co., Bridgewater, Mass.	226
WFBQ	Wynne Radio Co., Raleigh, N. C.	252
WFBR	Maryland National Guard, Baltimore, Md.	254
WFBT	Civic League, Pitman, N. J.	231
WFBY	Signal Corps, Ft. Ben Harrison, Ind.	258
WFBZ	Knox College, Galesburg, Ill.	254
WFI	Strawbridge & Clothier, Philadelphia, Pa.	395
WGAL	Lancaster Elec. Supply Co., Lancaster, Pa.	248
WGAQ	W. G. Patterson, Shreveport, La.	263
WGAZ	The Tribune, South Bend, Ind.	275
WGBA	Jones Elec. & Radio Co., Baltimore, Md.	254
WGBB	H. H. Carman, Freeport, N. Y.	244
WGBC	1st Baptist Church, Memphis, Tenn.	266
WGBF	The Finke Furniture Co., Evansville, Ind.	217
WGBG	Breitenbach's Radio Shop, Thrifton, Va.	226
WGBH	Fall River Herald Pub. Co. (New England States Portable)	210
WGBI	Frank S. Megargee, Scranton, Pa.	240
WGBK	L. W. Campbell, Johnstown, Pa.	248
WGBL	Elyria Radio Assn., Elyria, Ohio.	227
WGBM	T. N. Saaty, Providence, R. I.	234
WGBN	Hub Radio Shop, La Salle, Ill.	256
WGBO	Dr. Roses Artan, San Juan, P. R.	275
WGBQ	Stout Institute, Menomonie, Wis.	234
WGBR	Marshfield Broadcasting Association, Marshfield, Wis.	229
WGBS	Gimbel Brothers, New York, N. Y.	316
WGBT	Furman University, Greenville, S. C.	236
WGBW	Valley Theatre, Spring Valley, Ill.	213
WGBX	University of Maine, Orono, Maine.	252
WGBY	Progress Sales Co., New Lebanon, Ohio	219
WGN	The Tribune, Chicago, Ill.	370
WGR	Federal Telephone Mfg. Co., Buffalo, N. Y.	319
WGST	Ga. School of Tech., Atlanta, Ga.	270
WGY	General Elec. Co., Schenectady, N. Y.	380
WHA	University of Wisconsin, Madison, Wis.	535
WHAD	Marquette University, Milwaukee, Wis.	275
WHAG	University of Cincinnati, Cincinnati, Ohio	233
WHAM	University of Rochester, Rochester, N. Y.	278
WHAP	Wm. H. Taylor Finance Corp., Brooklyn, N. Y.	240
WHAR	F. P. Cooks Sons, Atlantic City, N. J.	275
WHAS	The Courier Journal-Times, Louisville, Ky.	400
WHAV	Wilmington Elc. Spec. Co., Wilmington, Del.	266
WHAZ	Rensselaer Polytechnic Institute, Troy, N. Y.	380
WHB	Sweeney School Co., Kansas City, Mo.	366
WHBA	Shaffer Music House, Oil City, Pa.	250
WHBB	Hebal's Store, Stevens Point, Wis.	240
WHBC	Rev. E. P. Graham, Canton, Ohio.	254
WHBD	Charles W. Howard, Bellefontaine, Ohio	222
WHBF	Beardsley Specialty Co., Rock Island, Ill.	222
WHBG	John S. Skane, Harrisburg, Pa.	231
WHBH	Culver Military Academy, Culver, Ind.	222
WHBI	Chesaning Electric Co., Chesaning, Mich.	227
WHBJ	Laver Auto Co., Ft. Wayne, Ind.	234
WHBK	Franklin St. Garage, Ellsworth, Me.	231
WHBL	J. H. Slusser, Logansport, Ind.	220
WHBM	C. L. Carroll (Portable), Chicago, Ill.	233
WHBN	1st Ave. Methodist Church, St. Petersburg, Fla.	258
WHBO	Y. M. C. A., Providence, R. I.	231
WHBP	Johnstown Auto Co., Johnstown, Pa.	256
WHBQ	St. John's M. E. Church, Memphis, Tenn.	233
WHBR	Scientific E. & M. Co., Cincinnati, O.	216
WHBS	E. W. Loche, Mechanicsburg, Ohio.	208
WHBT	Thos. W. Tizzard, Jr., Downers Grove, Ill.	207
WHBU	B. L. Bing's Sons, Anderson, Ind.	219
WHBV	Ray's Radio Shop, Columbus, Ga.	244
WHBW	D. R. Kienzle, Philadelphia, Pa.	216
WHBX	J. W. Bowser, Punxutawney, Pa.	213
WHBY	St. Norbert's Coll., West DePere, Wis.	250
WHDI	Wm. Hood Dunwoody Ind. Inst., Minneapolis, Minn.	278
WHEC	Hickson Elec. Co., Rochester, N. Y.	258
WHK	Radiovox Company, Cleveland, Ohio.	273
WHN	George Schubel, New York, N. Y.	361
WHO	Bankers Life Co., Des Moines, Ia.	526
WIAD	H. R. Miller, Philadelphia, Pa.	250
WIAK	Journal Stockton Co., Omaha, Nebr.	278
WIAS	Home Elc. Co., Burlington, Iowa.	254
WIBA	Capital Times, Madison, Wis.	236
WIBC	L. M. Tate Post, V. F. W., St. Petersburg, Fla.	222
WIBE	Martinsburg Broadcasting Co., Martinsburg, West Va.	210
WIBD	XL Radio Ser., Joliet, Ill.	200
WIBF	S. P. Miller, Wheatland, Wis.	231
WIBG	St. Paul's P. E. Church, Elkins Park, Pa.	222
WIBO	Nelson Bros., Chicago, Ill.	226
WIL	Benson Radio Co., St. Louis, Mo.	273
WIP	Gimbel Brothers, Philadelphia, Pa.	508
WJAD	Jackson's Radio Elec. Co., Waco, Tex.	353
WJAG	Norfolk Daily News, Norfolk, Nebr.	270
WJAK	Rev. C. L. White, Greentown, Ind.	254
WJAM	D. M. Perham, Cedar Rapids, Ia.	258
WJAR	The Outlet Co., Providence, R. I.	306
WJAS	Pittsburgh Radio Supply House, Pittsburgh, Pa.	275
WJAZ	Zenith Radio Corp., Chicago, Ill.	268
WJD	Dennison University, Granville, Ohio.	217.3
WJJD	Loyal Order of Moose, Mooseheart, Ill.	303
WJY	Radio Corp. of Ama., New York, N. Y.	405
WJZ	Radio Corp. of Ama., New York, N. Y.	454
WKAA	H. F. Paar, Cedar Rapids, Iowa.	278
WKAP	D. W. Flint, Cranston, R. I.	234
WKAQ	Radio Corp. of Porto Rico, San Juan, P. R.	341
WKAR	Mich. Agricultural College, Lansing, Mich.	285
WKAV	Laconia Radio Club, Laconia, N. H.	210
WKBE	K. & B. Electric Co., Webster, Mass.	231
WKRC	Kodel Radio Corp., Cincinnati, O.	326
WKY	WKY Radio Shop, Oklahoma City, Okla.	275
WLAL	1st Presbyterian Church, Tulsa, Okla.	250
WLAP	W. V. Jordan, Louisville, Ky.	275
WLAX	Greencastle Commun. Broad. Sta., Greencastle, Ind.	231
WLB	University of Minneapolis, Minneapolis, Minn.	278
WLBL	Wisconsin Department of Markets, Stevens Point, Wis.	278
WLIT	Lit Brothers, Philadelphia, Pa.	395
WLS	Sears Roebuck Co., Chicago, Ill.	345
WLW	Crosley Radio Corp., Cincinnati, O.	422
WMAC	C. B. Meredith, Cazenovia, N. Y.	275
WMAF	Round Hills Radio Corp., Dartmouth, Mass.	360
WMAK	Norton Laboratory, Lockport, N. Y.	266
WMAN	1st Baptist Church, Columbus, Ohio	278
WMAQ	Chicago Daily News, Chicago, Ill.	448
WMAY	Kings Highway Presbyterian Church, St. Louis, Mo.	248
WMAZ	Mercer University, Macon, Ga.	261
WMBB	Trianon Ball Room, Chicago, Ill.	250
WMBF	Fleetwood Hotel, Miami Beach, Fla.	384
WMC	The Commercial Appeal, Memphis, Tenn.	500
WMCA	Hotel McAlpin, N. Y. C.	341
WMU	Doubleday, Hill Elec. Co., Washington, D. C.	261
WNAC	Shepard Stores, Boston, Mass.	280
WNAD	University of Okla., Norman, Okla.	254
WNAL	Omaha Central High School, Omaha, Nebr.	258
WNAP	Wittenberg College, Springfield, O.	248
WNAR	1st Christian Church, Butler, Mo.	231
WNAT	Lenning Bros. Co., Philadelphia, Pa.	250
WNAX	Dakota Radio App. Co., Yankton, S. D.	244
WNJ	Radio Shop, Newark, N. J.	233
WNYC	Municipal Station, New York, N. Y.	526
WOAC	Page Organ Co., Lima, Ohio.	261
WOAF	Tyler Commercial College, Tyler, Texas	360
WOAI	South East Equipment So., San Antonio, Texas.	395
WOAN	Vaughan Con. of Music, Lawrenceburg, Tenn.	283
WOAW	Woodmen of the World, Omaha, Neb.	526
WOAX	F. J. Wolff, Trenton, N. J.	240
WOC	Palmer School of Chiro, Davinport, Ia.	484
WOCL	Hotel Jamestown, Jamestown, N. Y.	275
WOI	Iowa State College, Ames, Iowa.	270
WOO	John Wanamaker, Philadelphia, Pa.	508
WOQ	Unity School of Christianity, Kansas City, Mo.	278
WOR	L. Bamberger & Co., Newark, N. J.	405
WORD	Peoples Pulpit Assn., Batavia, Ill.	278
WOS	Mo. State Marketing Bureau, Jefferson City, Mo.	441
WOWL	Owl Battery Co., New Orleans, La.	270
WPAK	N. D. Agricultural College, Agricultural College, N. D.	275
WPAZ	Dr. John R. Koch, Charleston, W. Va.	268
WPG	Municipality, Atantic City, N. J.	300
WPSC	Penn State College, State College, Pa.	261
WQAA	H. A. Beale, Jr., Parkersburg, Pa.	220
WQAC	Gish Radio Service, Amarillo, Texas	234
WQAE	Moore Radio News Station, Springfield, Vermont	246
WQAM	Electric Equipment Co., Miami, Fla.	268
WQAN	The Scranton Times, Scranton, Pa.	250
WQAO	Calvary Baptist Church, New York, N. Y.	360
WQAS	Prince Walter Co., Lowell, Mass.	252
WQJ	Calumet Rainbo Broadcasting Co., Chicago, Ill.	448
WRAA	Rice Institute, Houston, Texas.	256
WRAF	Radio Club, Inc., Laporte, Ind.	224
WRAK	Economy Light Co., Escanaba, Mich.	256
WRAL	Northern States Power Co., St. Croix Falls, Wisc.	248
WRAM	Lombard College, Galesburg, Ill.	244
WRAN	Black Hawk Elc. Co., Waterloo, Ia.	236
WRAV	Antioch College, Yellow Springs, O.	263
WRAW	Avenue Radio Shop, Reading, Pa.	238
WRAX	Flexon's Garage, Gloucester City, N. J.	268
WRBC	Immanuel Lutheran Church, Valparaiso, Ind.	278
WRC	Radio Corp. of Ama., Washington, D. C.	469
WREO	Reo Motor Co., Lansing, Mich.	286

(*Concluded on next page*)

Station	Owner and Location	Meters
WRHF	Radio Hospital Fund, Washington, D. C.	256
WRK	Doron Bros. Elec. Co., Hamilton, O.	270
WRM	University of Illinois, Urbana, Ill.	273
WRR	Dallas Police and Fire Dept., Dallas, Texas	261
WRW	Tarrytown Research Laboratory, Tarrytown, N. Y.	273
WSAB	S. E. Mo. State Teachers' College, Cape Girardeau, Mo.	275
WSAC	Clemson Agricultural College, Clemson College, S. C.	337
WSAD	J. A. Foster Co., Providence, R. I.	256
WSAG	Gospel Tabernacle, St. Petersburg, Fla.	266
WSAI	U. S. Playing Card Co., Cincinnati, O.	326
WSAJ	Grove City College, Grove City, Pa.	229
WSAN	Allentown Call, Allentown, Pa.	229
WSAP	City Temple, New York, N. Y.	263
WSAR	Doughty & Welch Elec. Co., Fall River, Mass.	254
WSAX	Chicago Radio Laboratory, Chicago, Ill.	268
WSAZ	Chase Electric Shop, Pomeroy, Ohio.	244
WSB	The Atlanta Journal, Atlanta, Ga.	428
WSL	J. & M. Elec. Co., Utica, N. Y.	242
WSMB	Saenger Amuse. Co., New Orleans, La.	319
WSOE	School of Engineering, Milwaukee, Wisc.	246
WSRF	Harden Sales & Service Co., Broadlands, Ill.	233
WSRO	Radio Co., Hamilton, Ohio.	252
WSUI	State University of Iowa, Iowa City, Iowa	484
WSY	Alabama Polytechnic Institute, Auburn, Ala.	250
WTAB	Fall River Daily Herald, Fall River, Mass.	266
WTAC	Penna. Traffic Co., Johnstown, Pa.	268
WTAF	L. J. Gallo, New Orleans, La.	273
WTAL	Toledo Radio & Elc. Co., Toledo, O.	252
WTAM	Willard Storage Battery Co., Cleveland, Ohio	389
WTAP	Cambridge Radio Elec. Co., Cambridge, Ill.	242
WTAQ	S. Van Gordon & Son, Osseo, Wis.	254
WTAR	Reliance Radio & Elec. Co., Norfolk, Va.	261
WTAS	Charles E. Erbstein, Elgin, Ill.	303
WTAT	Edison Elec. Ill. Co. (Portable), Boston, Mass.	244
WTAU	Ruegg Battery & Elec. Co., Tecumseh, Neb.	242
WTAW	Agricultural & Mech. College, College Station, Tex.	270
WTAX	Williams Hardware Mfg. Co., Streator, Ill.	231
WTAY	Oak Leaves Broadcasting Assn., Oak Park, Ill.	250
WTAZ	T. J. McGuire, Lambertville, N. J.	261
WTAS	Flint, Sr., H. S., Flint, Mich.	219
WTG	Kansas State Agricultural College, Manhattan, Kas.	273
WTIC	Travelers Insurance Co., Hartford, Conn.	347
WWAD	Wright & Wright, Inc., Philadelphia, Pa.	250
WWAE	Alama Ballroom, Joliet, Ill.	242
WWAO	College of Mines, Houghton, Mich.	244
WWI	Ford Motor Co., Dearborn, Mich.	266
WWJ	Detroit News, Detroit, Mich.	517
WWL	Loyola University, New Orleans, La.	275

CANADIAN STATIONS

Station	Owner and Location	Meters
CFAC	Calgary Herald, Calgary, Alberta	430
CFCA	Star Pub. & Printing Co., Toronto, Ont.	400
CFCD	Marconi, Vancouver, B. C.	440
CFCE	Marconi, Halifax, N. S.	440
CFCF	Marconi, Montreal, Que.	440
CFCH	Abitibi Power & Paper Co., Ioquois Falls, Ont.	400
CFCJ	La Cie de L'Evenment, Quebec, Que.	410
CFCK	Radio Supply Co., Edmonton, Alberta	410
CFCL	Centennial Methodist Church, Vancouver, B. C.	400
CFCN	W. W. Grant Radio, Ltd., Calgary, Alberta	440
CFCO	Semmelbaack-Dickson, Ltd., Bellevue, Que.	450
CFCQ	Radio Specialties, Ltd., Vancouver, B. C.	450
CFCR	Laurentide Air Service, Sudbury, Ont.	410
CFCW	Radio Shop, London, Ont.	420
CFDC	Sparks Co., Nanaimo, B. C.	430
CFHC	Henry Birks & Sons, Ltd., Calgary, Alberta	440
CFPC	International Radio Development Co., Ft. Frances, Ont.	400
CFQC	The Electric Shop, Saskatoon, Sask.	400
CFRC	Queens University, Kingston, Ont.	450
CFTC	Bell Telephone Co., Toronto, Ont.	410
CFUC	University of Montreal, Montreal, Que.	400
CGAC	G. Melrose Bell, Calgary, Alberta.	430
CGAC	G. Melrose Bell, Vancouver, B. C.	430
CHAC	Radio Engineers, Halifax, N. S.	400
CHBC	Alberta Publishing Co., Calgary, Alberta	410
CHCB	Marconi, Toronto, Ont.	440
CHCD	Canadian Wireless & Elec. Co., Quebec, Que.	410
CHCE	Western Canada Radio Supply, Ltd., Victoria, B. C.	400
CHCF	G. Melrose Bell, Winnipeg, Manitoba	430
CHCL	Vancouver Merchants Exchange, Vancouver, B. C.	440
CHCM	Riley & McCormick, Ltd., Calgary, Alberta	440
CHCO	London Radio Shoppe, London, Ont.	410
CHCQ	Western Radio Co., Calgary, Alberta	400
CHCS	Hamilton Spectator Bldg., Hamilton, Ont.	410
CHVC	Metropolitan Motors, Toronto, Ont.	410
CHXC	J. R. Booth, Jr., Ottawa, Ont.	435
CHYC	Northern Electric Co., Montreal, Que.	410
CJBC	Depuis Freres, Montreal, Que.	420
CJCA	Edmonton Journal, Edmonton, Alberta	450
CJCB	J. G. Bennett, Nelson, B. C.	400
CJCD	T. Eaton Co., Toronto, Ont.	410
CJCE	Sprott Shaw Radio Co., Vancouver, B. C.	420
CJCF	The News Record, Ltd., Kitchener, Ont.	420
CJCG	Manitoba Free Press, Winnipeg, Manitoba	410
CJCI	Maritime Radio Corp., St. John, N. B.	400
CJCN	Simons Agnew & Co., Toronto, Ont.	410
CJCS	Eastern Tel. & Tel. Co., Halifax, N. S.	410
CJCX	Percival Wesley Shackleton, Olds, Alberta	400
CJGC	Free Press Printing Co. London, Ont.	430
CJNC	Tribune Newspaper Co., Winnipeg, Manitoba	400
CJSC	Evening Telegram, Toronto, Ont.	430
CKAC	LaPress Publishing Co., Montreal, Que.	425
CKCD	Daily Province, Vancouver, B. C.	410
CKCE	Canadian Independent Tel. Co., Toronto, Ont.	450
CKCK	Leader Publishing Co., Regina, Sask.	420
CKCR	Jones Elec. Co., St. John, N. B.	400
CKCS	Bell Telephone Co., Montreal, Que.	400
CKCX	P. Burns & Co., Ltd., Calgary, Alberta	440
CKOC	Wentworth Radio Supply Co., Hamilton, Ont.	410
CKOC	Radio Supply Co., Ltd., London, Ont.	410
CKZC	Salton Radio Engineering Co., Winnipeg, Manitoba	420
CKY	Manitoba Telephone System, Winnipeg, Manitoba	450
CNRA	Canadian National Railway, Moncton, N. B.	313
CNRC	Canadian National Railway, Calgary, Alberta	440
CNRE	Canadian National Railway, Edmonton, Alberta	440
CNRM	Canadian National Railway, Montreal, Que.	341
CNRO	Canadian National Railway, Ottawa, Ont.	435
CNRR	Canadian National Railway, Regina, Sask.	420
CNRS	Canadian National Railway, Saskatoon. Sask.	400
CNRT	Canadian National Railway, Toronto, Ont.	400
CNRW	Canadian National Railway, Winnipeg, Manitoba	450

MEXICAN STATIONS

Station	Owner and Location	Meters
CYA	Partido Liberal Avanzado. Mexico City	540
CYB	E. Buen Tono, Mexico City	380
CYD	Mexico City	350
CYL	El Universal and the House of Radio, Mexico City	510
CYO	Constantino Tarnova, Jr., Monterey	280
CYR	Rosseter & Co., Mazatlan	440
CYX	Excelsior, Mexico City	350
CYZ	Mexico Radio League, Mexico City	400
CZA	Government Station, Mexico City	510
1J	F. C. Steffens, Mexico City	250
CYC	Government Station	...
CYG	Government Station	...

CUBAN STATIONS

Station	Owner and Location	Meters
PWX	Cuban Telephone Co., Habana	400
2AB	Alberte S. Bustamente, Habana	240
2CX	Frederick W. Borton, Habana	320
2DW	Pedro Zayas, Habana	300
2DY	Frederick W. Borton, Habana	260
2EV	Westinghouse Electric Co., Habana	200
2HC	Heraldo de Cuba, Habana	275
2HS	Julio Power, Habana	180
2JQ	Raul Perez Falcon, Habana	150
2KD	E. Sanchez Fuentes, Habana	350
2KP	Alvaro Daza, Habana	200
2LC	Luis Casas, Habana	250
2MG	Manuel G. Salas, Habana	280
2MN	Fausto Simon, Habana	270
2OK	Maria Garcia Velez, Habana	360
2OL	Oscar Collado, Habana	290
2TW	Roberto E. Ramirez, Habana	230
2WW	Amadeo Saenz, Habana	210
5EV	Leopoldo V. Figuerca, Colon	360
6AZ	Valentin Ullivarri, Cienfuegos	200
6BY	Jose Ganduxe, Cienfuegos	300
6CX	Antonio T. Figuerca, Cienfuegos	170
6DW	Eduardo Terry, Cienfuegos	225
6EV	Josefa Alvarez, Caibarien	225
6KJ	Frank H. Jones, Tuinucu	275
6KW	Frank H. Jones. Tuinucu	340
7AZ	Pedro Nogueros, Camaguey	225
7BY	Salvador Rionda, Camaguey	350
8AZ	Alfredo Broocks, Santiago	240
8BY	Alberto Ravelo, Santiago	250
8DW	Pedro C. Andus, Santiago	275
8EV	Eduardo Mateo, Santiago	180
8FU	Andres Vinnet, Sanitago	225
8GT	Juan F. Chibas, Santiago	260

STATION SLOGANS

KDKA—Pittsburgh, Pa.—"The World's Pioneer Broadcaster."
KFAF—Denver, Colo.—"The Voice from the Rockies."
KFKX—Hastings, Nebr.—"The Empress of the Air."
KGW—Portland, Oreg.—"The Lumber Capital of America and the Gateway to Mount Tacoma."
KLX—Oakland, Calif.—"Where Rail and Water Meet."
KNX—Hollywood, Calif.—"The Voice of Hollywood."
KOA—Denver, Colo.—"The Rocky Mountain Broadcasting Station."
KYW—Chicago, Ill.—"The Twenty-four-hour Station."
WBBR—Rossville, N. Y.—"The Watchtower Station."
WBT—Charlotte, N. C.—"Queen City of the South."
WCAD—Canton, N. Y.—"The Voice of the North Country."
WCBD—Zion, Ill.—"Where God Rules, Man Prospers."
WCBZ—Chicago Heights, Ill.—"Where the Lincoln and Dixie Highways Meet."
WDBH—Worcester, Mass.—"The Voice from the Heart of the Commonwealth."
WEAF—New York, N. Y.—"The Voice to the Millions."
WEAR—Cleveland, Ohio—"The Wave from Lake Erie."
WEBH—Chicago, Ill.—"The Voice of the Great Lakes."
WEEI—Boston, Mass.—"The Friendly Voice."
WEMC—Berrien Springs, Mich.—"The Radio Lighthouse."
WFAA—Dallas, Tex.—"Working for All Alike."
WFBG—Altoona, Pa.—"The Original Gateway to the West."
WGI—Medford Hillside, Mass.—"Amrad, the Voice of the Air."
WGR—Buffalo, N. Y.—"The Key City of Industry."
WHAZ—Troy, N. Y.—"Transcontinental and International Station."
WHB—Kansas City, Mo.—"The Heart of America."
WHN—New York, N. Y.—"The Voice of the Great White City."
WIP—Philadelphia, Pa.—"Watch Its Progress."
WJAR—Providence, R. I.—"The Southern Gateway to New England."
WJJD—Mooseheart, Ill.—"The Call of the Moose."
WKAQ—San Juan, Porto Rico—"The Island of Enchantment, Where the World's Best Coffee Grows."
WLBL—Stevens Point, Wis.—"Wisconsin, the Land of Beautiful Lakes."
WLS—Chicago, Ill.—"Home of the World's Largest Store."
WDAF—So. Dartmouth, Dass.—"The Voice from Way Down East."
WMC—Memphis, Tenn.—"Memphis Down in Dixie."
WMH—Cincinnati, Ohio—"The Station on the Hill."
WNYC—New York, N. Y.—"Municipal Broadcasting Station of the City of New York."
WOAW—Omaha, Nebr.—"The City Surrounded by the United States."
WOC—Davenport, Iowa—"Where the West Begins and in the State Where the Tall Corn Grows."
WOS—Jefferson City, Mo.—"Watch Our State."
WPAB—State College, Pa.—"The Voice of the Nittany Lion."
WPG—Atlantic City, N. J.—"World's Playground."
WRC—Washington, D. C.—"The Voice of the Capital."
WSB—Atlanta, Ga.—"The Voice of the South."
WTAM—Cleveland, Ohio—"The Voice of the Storage Battery."
WTAS—Elgin, Ill.—"Willie, Tommie, Annie and Sammie."
WTAY—Oak Park, Ill.—"Something for Everybody."
CFCH—Iroquois Falls, Ontario—"The Call of the North."
CFCN—Calgary, Alberta—"Voice of the Prairies."
CJCA—Edmonton, Alberta—"The Sunniest Spot in Sunny Alberta."
CKCK—Regina, Saskatchewan—"The Queen City of the West."
CKOC—Hamilton, Ontario—"In the Garden of Canada."
CKY—Winnipeg, Manitoba—"Manitoba's Own Station."

BROADCAST PROGRAMS

(Wavelengths in meters; Eastern, Central, Mountain and Pacific Standard Time specified.)
[E. S. T. stands for Eastern Standard Time; P. S. T., Pacific Standard Time; M. S. T., Mountain Standard Time; C. S. T., Central Standard Time. Where D. S. is added it signifies Daylight Saving Time, which is one hour later than Standard Time in any time division.]

FRIDAY, MAY 1

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.

WMC, Memphis, Tenn., 499.7 (E. S. T.)—7:30 P. M., radio talk. 8:30, Britling's Cafeteria orch. 11, midnight frolic by Bob Miller.

WHO, Des Moines, Iowa, 526 (C. S. T.)—7:30 P. M., special "May Day" program. 11, dance program.

WDAF, Kansas City, Kansas, 365.6 (C. S. T.)—3:30 P. M., The Star's radio trio. 5:50, market-gram, weather, time and road report. 6, school. 8, midwestern zone elimination of the national high school oratorical contest, broadcast from Ivanhoe temple. 11:45 P. M., to 1 A. M., (Night-hawk Frolic)—The "Merry Old Chief" and the Plantation Players, Hotel Muehlebach.

WIP, Philadelphia, Pa., 509 (E. S. T.)—7 A. M., setting-up exercises. 10, the daily menu and intimate talk to housewives. 1 P. M., Gimbel Tea Room Orch. 1:30, weather. 3, "Helpful Hints to Housewives." 5:15, artist recital by the Frank Oglesby Studios. 6, weather. 6:05, popular numbers by Joe Burke. 6:15, Harold Knight's Singing Orch. 6:45, livestock and produce market reports. 7, Uncle Wip's bedtime story.

WOI, Ames, Iowa, 270 (C. S. T.)—9:30 A. M., weather. 12:30 P. M., college chimes, weather, livestock markets, Professor C. H. Diggs. 9, weather.

WEMC, Berrien Springs, Mich., 285.5 (C. S. T.—9 P. M., Radio Lighthouse Choir; Sunday School Lesson Roundtable.

WWJ, Detroit, Mich., 352.7 (E. S. T.)—8 A. M., setting-up exercises. 9:30, "Tonight's Dinner" and a special talk by the Woman's Editor. 10:25, weather. 11:55, time. 12 M., Good Friday services. 3 P. M., The Detroit News orch. 3:50, weather. 3:55, market reports and baseball scores. 6, dinner concert. 8, The Detroit News orch. 9, Jean Goldkette's Victor Recording orch.

WEAF, New York City, 492 (E. S. T.)—6:00 A. M., physical exercises. 11, musical program; health talk; market and weather reports. 4 P. M., Ruth B. Heilmen, soprano; talk by American Museum of Natural History. 6, Waldorf-Astoria orch.; Gustav Langenus, clarinet sextet; Helen Morris, soprano; "Sir Hobgoblin Takes a Ride," by Blanche Elizabeth Wade; "The Happiness Candy Boys"; "Spear & Co. Home Entertainers"; "The Glorient Girls"; Meyer Davis Lido Venice orch.

WEEI, Boston, Mass., 476 (E. S. T.)—6:45 A. M., setting-up exercises. 7:45, morning watch from Estey Organ Studio by Boston Y. M. C. A. 2 P. M., Norm's Serenaders. 3:15, Greater Boston Federation of Churches program. 5:30, Boy's Band. 6:25, American Child Health Asso. talk. 6:30, Big Brother Club. 7:15, "Bringing the Forest to the People," by Harris A. Reynolds. 7:30, program courtesy Whiting Milk Company. 8, Neapolitan Ice Cream Program; Rotary Club Hour. 9, Howe's Valeteria Entertainers. 9:30, Breck's garden talk.

WGR, Buffalo, N. Y., 319 (E. S. T.)—10:45 A. M., Gold Medal Radio Cooking Course by Betty Crocker. 7:50 P. M., "Rooms for Men and Boys," by Clarence N. Kierst. 8, "Thais," by Massenet; educational opera entertainment, by Eleanor D. Baker. 9, ball room; joint charities banquet. 10, American Hawaiian Quartette and Temple Male Quartette.

WLW, Cincinnati, O., 422.3 (E. S. T.)—10:45 A. M., weather, business reports. 11:55, time. 12:15 P. M., Ahaus Brunswick orch. 1:30, stock quotations.

WMAQ, Chicago, Ill., 447.5 (C. S. T.)—12:25 P. M., Y. M. C. A. forum. 1, Radio Farm School, "Special Farm Service Day." 4, fashion talk by Jean Mowat. 4:30, pupils of Bush Conservatory. 5, the Lullaby Lady, Mrs. Gene Burton, Davenport. 6, organ recital from Chicago Theatre. 6:30, Hotel LaSalle orch. 6:50, Family Altar League. 8, weekly Wide-Awake club program directed by Mrs. Frances M. Ford. 8:30, musical geography, Mr. and Mrs. Marx E. Oberndorfer. 9, Christian Endeavor topics. 9:15, Bellman and De Svenske chorus.

WGY, Schenectady, N. Y., 379.5 (E. S. T.)—1, P. M., music; one-act play, "The Old Peabody Pew," WGY Matinee Players. 5:30, International Sunday School Lesson. 6, Albany Strand Theatre orch. 6:30, health talk. 6:40, drama, "The Boomerang," WGY Players; music by WGY orch. 9:30, Viola Hailes, lyric soprano and WGY orch.

KGW, Portland, Oregon, 491.5 (P. S. T.)—11:30 A. M., weather. 12:30 P. M., Rose City Trio. 5, children's programme. 6, St. Francis choir directed by Catherine Covach Fredrich. 7:15, market, weather, news bulletins and police reports. 10:30, Hoot Owls.

KOB, State College, New Mexico, 346.6 (M. S. T.)—7:30 P. M., Popular Science Course, Lesson No. 16, by Dr. D. S. Robbins, "Timber Turf and Tumbling Waters," by Quincy Randles, Forest Service.

KFAE, College of Washington, 348.6 (P. S. T.)—7:30 P. M., Children's Night—"Nutrition and Its Relation to Child Health," Prof. Lila Hunt; "The Child in the Home," Dean A. A. Cleveland; "Books on Child Welfare and Education," Alice Lindsey Webb; "Washington Agriculture for May," R. M. Turner.

KPO, San Francisco, Cal., 429.5 (C. S. T.)—7 A. M., daily dozen. 10, "What is Playing at the Local Theatres." 12 M., time. 12:05 P. M., talk from the Commonwealth Club Luncheon, at the Palace Hotel. 1, Rudy Seiger's orch. 4:30, Rudy Seiger's orch. 5:30, market reports. 6:30, "What is Playing at the Local Theatres." 7, concert from the Palace Hotel. 8, Palace Hotel concert.

KTHS, Hot Springs, Ark., 374.8 (C. S. T.)—8:30 P. M., piano specialties by Phil Baxter. 9, Meyer Davis orch.

At Station

WOR

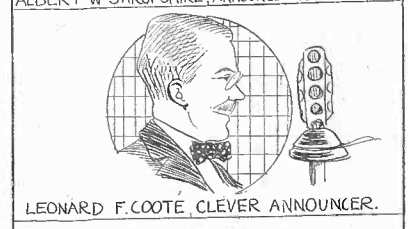
(Newark, N. J., 405 Meters)

with Irving Hoffman

RADIO WORLD *Cartoonist*

JOSEPH M. BARNETT, ANNOUNCER, IS A ACCOMPLISHED SINGER.

ALBERT W. SHROPSHIRE, ANNOUNCER AND ENGINEER.



LEONARD F. COOTE, CLEVER ANNOUNCER.

JAMES W. GERARD, FORMER AMBASSADOR TO GERMANY, SPOKE ON "EUROPE OF TODAY."

MILT HAGEN, COMPOSER, WHO PRESENTS VAUDEVILLE HEADLINERS WEEKLY.

JUDITH ROTH, SOPRANO, A BIG HIT ON MILT HAGEN'S PROGRAM.

DR. SIGMUND SPAETH, MUSIC CRITIC, HAD HIS WEEKLY STUDIO PARTY.

SATURDAY, MAY 2

WIP, Philadelphia, Pa., 509 (E. S. T.)—7 A. M., setting-up exercises. 10, The Daily Menu and Intimate Talk to Housewives by Mrs. Anna B. Scott. 1 P. M., organ recital. 1:30, weather. 3, The Plectrum Orch. 6, weather. 6:05, popular numbers by Charles Higgins. 6:15, dinner music by the Benjamin Franklin Concert Orch. 6:45, livestock and produce market reports. 7, Uncle Wip's Bedtime Story and Roll Call. 8, "Control of Growth in Plants and Animals," a talk by Arno Viehoever, Ph.D. 8:15, Banquet by the Evening School of the University of Pennsylvania. 10:05, "Speech Defects and How to Prevent Them," a talk by Mr. Peppard of the Orthopaedic Hospital. 10:15, The Angelus Hour. Program to be announced later. 11:05, organ recital.

WWJ, Detroit, Mich., 352.7 (E. S. T.)—8 A. M., setting-up exercises. 9:30, "Tonight's Dinner" and a special talk by the Woman's Editor. 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, market reports and baseball scores.

WBBR, New York City, 272.6 (E. S. T.)—8 P. M., paino solos, Mrs. Hans Haag. 8:15 Mrs. L. M. Brown, soprano. 8:20, Bible questions and answers. 8:45, Mrs. L. M. Brown. 8:50, Mrs. Hans Haag.

WEAF, New York City, 492 (E. S. T.)—6:45 A. M., physical exercises. 6 P. M., Waldorf-Astoria Orch.; Belle Rutland, soprano; Jos. B. Free, bass baritone; Karla Kleibe, violinist; Arion male chorus; Robert Fallin and Oscar Race; Vincent Lopez Orch.

WOAW, Omaha, Neb., 526 (C. S. T.)—5:45 P. M., public news period. 6, dramatic hour. 6:30, to be announced. 7, Art Landry Orch. 7:30, weekly address under auspices of the Omaha Chamber of Commerce. 9, Omaha Printing Co. program. 10:45, Nightingale Orch. 11:15, Arthur Hays and his organ jubilee at World Theatre.

WLW, Cincinnati, O., 472.3 (E. S. T.)—8 A. M., setting-up exercises. 10:45, weather, business reports. 11:55, time. 1:30 P. M., business reports. 6, dinner hour concert.

WFAA, Dallas, Texas., 475.9 (C. S. T.)—12:30 P. M., address, Epps G. Knight, business man and philosopher. 6, Vesper recital by Frank Davenport and his orch. 8:30, varied recital by Employees Club of the Dallas Trust and Savings Bank. 11, Adolphus Hotel Orch.

WOO, Philadelphia, Pa., 508.2 (E. S. T.)—11 A. M., grand organ. 11:30 weather. 12 M., Golden's Crystal Tea Room Orch. 12:55 P. M., time. 4:40, police reports. 4:45 grand organ and trumpets. 10:55, time. 11:02, weather.

WOC, Davenport, Iowa, 484 (C. S. T.)—12:57 P. M., time. 1, weather and closing quotations on grain, livestock and dairy products. 5:45, chimes concert. 6, baseball scores, police and miscellaneous bulletins. 6:30, Sandman's visit. 6:50, discussion of the International Sunday School Lesson. 9, musical program, arranged by Olga E. Edlen, of Moline, Ill. 11, Louis Connor and LeClaire Hotel Orch.

WMC, Memphis, Tenn, 499.7 (E. S. T.)—7:30 P. M., news flashes and markets. 8:30, program by U. of T. Doctors.

WGBS, New York City, 316 (E. S. T.)—10 A. M., timely talks with Terese. 10:10, Eleanor Schorer and her Kiddie Klub program. 10:40, Mario Santangelo, violinist, accompanied by Catherine Guirrery. 1:30 P. M., Muriel Muth and Al Goodhart. 2, Everett Hirshfield. 3, interview with Florence Nash, stage star, by Terese. 3:10, Ross Peardon, baritone. 3:20, talk by Asst. District Attorney Rose Rothenberg. 3:30, Ross Peardon, 3:40, Lee Brown, talk. 3:50, Ross Peardon. 6, Uncle Geebee. 6:30, Piccadilly Four. 7, John Regan, sports talk. 7:10, Piccadilly Four. 7:30, Ritz-Carlton Hotel concert orch. 8:30, Mischa Goodman, violin recital. 9, recital by Irwin E. Hassell, pianist, and Joseph Pavloff, baritone. 9:45, Vaughan de Leath, popular radio entertainer. 10:15, Albert Masrop. 10:30, the Verlaine Ensemble. 11:15, Georgie Dolan, popular songs. 11:30, Bob Emerick, radio pianist.

WLIT, Philadelphia, Pa., 395 (E. S. T.)—12:02 P. M., daily Almanac and special announcements. 12:05, organ recital. 2, Arcadia orch. 4:30, dance music. 5:45, baseball scores and sporting results. 7:30, Dream Daddy with the boys and girls. 8, conclusion of program.

WJZ, New York City, 455 (E. S. T.)—1 P. M., Erdody's Park Lane orch. 4, the Crescendo Mandolin Club. 4:30, Sherry's tea music. 5:30, State and Federal agricultural reports; farm and home market reports; foreign exchange quotations; Evening Post news. 7, Freddie Rich orch. 8, Wurlitzer musicale. 9, debate. 9:30, U. S. Marine Band, Washington. 10:30, Waldorf-Astoria orch.

WAHG, Richmond Hill, N. Y., 316 (E. S. T.)—11:55 A. M., time, weather. 12 M., Glenn C. Smith's Paramount orch.

WRC, Washington, D. C., 469 (E. S. T.)—4:30 P. M., Meyer Davis Le Paradis Band. 6:45, children's hour. 7, Hotel Washington-Irving Boernstein orch. 7:45, Bible talk. 8, Wurlitzer musicale with Station WJZ. 8:30, "The Develop-

ment of the United States Capitol Building," by Charles S. Fairman, art curator of the U. S. Capitol. 10, Vincent Lopez Hotel Mayflower orch. 10:30, "Crandall's Saturday Nighters." 12, Sidney Seidenman's Colonial Room orch.

WCCO, St. Paul, Minn., 416.4 (C. S. T.)—9:30 A. M., news bulletins. 9:40, weather and market reports. 10, market reports. 10:30, weather and market reports. 10:45, Gold Medal Home Service talk. 11:30, market reports. 12:30, market reports. 2:30, matinee musical, Jordan High School orch. 6, Dick Long's Nankin Cafe orch. 7, silent hour. 8, "Fireside Philosophies," Rev. Roy L. Smith, pastor Simpson M. E. Church. 8:30, musical program, Mrs. Gertrude O'Neil Ganley, reader. 10, Joe Peyer's St. Paul Athletic Club orch.

WNYC, New York City, 529 (E. S. T.)—2:30 P. M., music—program from Exposition of Inventions, Engineering Societies Building. 2:45, William Lansing, Jr., Engineer in Charge of Port Planning, Department of Docks, "Modernization of the North River." 3:15, soloist. 3:30, "Inventions in Subway Construction," Robert Ridgewood, Chief Engineer, Board of Transportation. 7, The Chateau Four. 7:25, baseball results. 7:30, police alarms. 7:35, "Progress of the City of New York," by Mayor John F. Hylan. 7:50, The Chateau Four. 8:05, "Advertising the City of New York." by Wm. Wirt Mills, Commissioner, Department of Plant and Structures. 8:20, Agnes Dodson, soprano. 8:30, Helen Rouss, harpist. 8:45, U. S. Department of Agriculture. 9, Agnes Dodson, soprano. 9:15, Helen Ruoss, harpist. 9:30, Police Quartet. 10, testimonial dinner to C. P. Franciscus, National President of the United National Association of Post Office Clerks, by direct wire from Hotel Astor. 10:30, police alarms and weather.

WAAM, Newark, N. J., 263 (E. S. T.)—7 P. M., sports, Major Tate. 7:15, Edwin Walter Becker, baritone. 7:30, Sadie Applebaum, piano. 7:45, Al Marshall's Entertainers. 8:10, James K. Muirhead, harmonica player. 8:30, Crescent Trio. 9, Winfield Scott Minstrels of the Jr. O. U. A. M. of Elizabeth, N. J. 10, James K. Muirhead, harmonica player. 10:15, novelty Entertainers. 10:30, dance orch.

WHN, New York City, 360 (E. S. T.)—2:15 P. M., William B. Krigger, baritone. 2:30, Andy Razaf, tenor. 2:45, Starlight Ramblers. 3:45, Harold Gottlieb, accordion, violin and piano solos. 4, Olga Erika, Danish soprano. 4:10, Bernard Share, violinist, and Saul Taufield, accompanist. 4:25, Leroy Montesanto, tenor. 4:35, Samuel Shankman, pianist. 4:45, Shirley Selvin, harpist. 5, Broadway Melody Boys—dance music. 6:30, Olcott Vail, violinist. 7, marathon baseball returns. 7:05, Hotel Aamac dance orch. 7:30, Hotel Carlton Terrace orch. 8, Jimmy Clarke and his White Way Entertainers. 8:30, Strand Roof orch. 9, Margaret Leary, soprano. 9:15, Christopher Meehan, tenor. 9:30, Fitzpatrick Brothers, old time medleys. 9:45, Isabelle Henderson, soprano. 10, signing off for DX fans.

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.

KDKA, Pittsburgh, Pa., 309 (E. S. T.)—9:45, A. M., Stockman reports; general review and agricultural items. 11:55, time. 12 M., weather; Stockman reports. 1:30 P. M., Daugherty's orch. 6, Westinghouse Band. 8, baseball scores. 7:30, Winble, the Wanderer; weather. 7:45, "Last Minute Helps to the Bible School Teacher," Carman Cover Johnson. 8, The Senior Meeting of the Pittsburgh Sun Radio Sphinx Club. 8:30, Westinghouse Band. 9:55, time, weather forecast, baseball scores, weather reports for National Balloon race.

KGW, Portland, Ore., 491.5 (P. S. T.)—11:30 A. M., weather. 12:30 P. M., concert by Rose City Trio. 6, Portland Hotel Orch. 10, Multnomah Hotel Strollers.

KPO, San Francisco, Cal., 429.5 (P. S. T.)—7 A. M., Daily Dozen. 10:30, theatre announcement. 12 M., time; reading of the Scripture. 1 P. M., Fairmont Hotel Orch. 2:20, matinee. 3:30, Palace Hotel concert. 5:30, market reports. 5:35, Loew's Warfield Theatre. 6:25, Cabiria Restaurant Orch. 8, Art Weidner's Orch.

KYW, Chicago, Ill., 536 (C. S. T.)—6:30 A. M., morning exercises. 9:30 news, financial and commercial markets. 10:30, forecasts, national balloon races. 11:35, table talk by Mrs. Anna J. Peterson. 1:30 P. M., "Saturday Frolic." 6.02, news, financial and final markets. 6:35, children's bedtime story. 7, Jaska DeBabary's orch.; Paul Whiteman's "Collegians." 8, musical program. 9, flying forecasts; "Congress Classics." 12, "Congress Carnival."

KHJ, Los Angeles, Cal., 405.2 (P. S. T.)—10 A. M., class in broadcasting. 12:30 P. M., news items and music. 2:30, Pacific States Electric Company concert. 6, Art Hickman's concert orch. 6:30, children's program. 7:30, Y. M. C. A. program. 8, Pacific Electric Railway program. 10, Art Hickman's orch.

KSD, Weekly Program, Week of April 27, Central Standard Time, 545.1—7 P. M., music direct from Grand Central Theatre. 8:30, dance music direct from the City Club.

SUNDAY, MAY 3

WBBR, New York City, 272.6 (E. S. T.)—10 A. M., Watchtower orch. 10:10, Mrs. L. M. Brown, soprano. 10:0, Watchtower orch. 10:35, Bible lecture, "God's Rest Day, a Period of Seven Thousand years," Mr. R. H. Barber. 11:05, Mrs. L. M. Brown, soprano. 11:15, Watchtower orch. 9P. M., Choral Singers. 9:10, Watchtower String Quartet. 9:20, Choral Singers. 9:30, Bible lecture, "The Masterpiece of God's Creation," Mr. R. H. Barber. 10, Choral Singers. 10:10, Watchtower String Quartet. 10:20, Choral Singers.

WWJ, Detroit, Mich., 352.7 (E. S. T.)— 11 A. M., services at St Paul's Episcopal Cathedral. 2 P. M., the Detroit News Orch. 7:20, "Roxy and His Gang," from the Capitol Theatre, 9:15, organ recital.

WGN, Chicago, Ill., 370 (C. S. T.)—11 A. M., Uncle Walt reads the funnies. 11:45, Balaban & Katz theatre concert. 2 P. M., Edwin Stanley Seder. 2:30, Tribune concert. 3:30, recital of Chicago Musical College. 9, WGN singers; Drake concert ensemble.

WOAI, San Antonio, Tex., 394.5 (C. S. T.)—11 A. M., services of First Presbyterian Church. 7:30 P. M., services of Central Christian Church, sermon by Dr. Hugh McLellan, pastor. 9:30, The WOAI entertainers will present "The Bohemian Girl," by Balfe.

WOAW, Omaha, Neb., 526 (C. S. T.,—9 A. M., radio chapel service. 1:30 P. M., matinee program, Avoca, Ia. 2:30, matinee program, Gresham, Neb. 9, musical chapel service, Cross Lutheran Church.

WCBD, Zion, Ill., 344.6 (C. S. T.)—8 P. M., the Brass Quartet and the Celestial Bell Quartet.

WFAA, Dallas, Texas, 475.9 (C. S. T.)—6 P. M., Radio Bible Class. 8, service at the First Baptist Church. 9:30, Cline's Collegians.

WOO, Philadelphia, Pa., 508.2 (E. S. T.—2:30 P. M., Bethany Sunday School. 6, sacred recital on the Wanamaker grand organ. 7:30, evening services from Bethany Presbyterian Church.

WHAS, Louisville, Ky., 399.8 (C. S. T.)—9:57 A. M., organ music. 10, church service. 4 P. M., organ recital by George Latimer. 4:30 Choral Evensong service.

WCAE, Pittsburgh, Pa., 461.3 (E. S. T.—10:45 A. M., services from Rodef Shalom temple. 3 P. M., People's Radio church services. 4, Piano recital by Prof. Otto Kalteis. 6:30, dinner concert.

WIP, Philadelphia, Pa., 509 (E. S. T.)—10:45 A. M., morning service, broadcast direct from the Holy Trinity Church, Rittenhouse Square, Philadelphia. 3:15 P. M., program to be announced later.

WOI, Ames, Iowa, 270 (C. S. T.)—10:45 A. M., College Chimes. 11, chapel services.

WDAF, Kansas City, Kansas, 365.6 (C. S. T.)—4 P. M., baseball scores; oratorio, "Stabat Mater." 5, international Sunday school lesson.

WEMC, Berrien Springs, Mich., 285.5 (C. S. T.)—11 A. M., Studio Chapel Services. 8:15 P. M., Studio Chapel Services; Radio Lighthouse Choir.

WGR, Buffalo, N. Y., 319 (E. S. T.)—3 P. M., Vesper Services. 4, organ recital by John F. Gunderman, Jr. 7:15, pre-service organ recital. 7:30, evening service, Central Pres. Church.

WEAF, New York City, 492 (E. S. T.)—3 P. M., "Sunday Hymn Sing" and Interdenominational Services under the auspices of the Greater New York Federation of Churches. 7:20, musical program from the Capitol Theatre, New York City by "Roxy and His Gang." 9:15, organ recital.

KGW, Portland, Oregon, 491.5 (P. S. T.)—10:30 A. M., service from First Presbyterian Church. 6 P. M., church services provided by Portland Council of Churches. 7, Colburn concert orch.

KTHS, Hot Springs, Ark., 374.8 (C. S. T.)—11 A. M., complete services of the Central Methodist Church, Rev. J. J. Stowe, pastor. 8:30 P. M., Sunday night de luxe program by the Meyer Davis New Arlington orch., Jacques Renard leader. 10, Sunday night frolic by Phil Baxter and his singing orch. of the DeSoto Springs Japanese ballroom.

KOA, Denver, Col., 322.4 (M. S. T.)—11 A. M., service of First Baptist Church, Denver. 4 P. M., Sunday afternoon music hour; concert by the Civic Symphony orch. 7:45, service of First Baptist Church, Denver.

KGO, Oakland, Cal., 361.2 (P. S. T.)—11 A. M., service, First Presbyterian Church. 3:30 P. M., concert, KGO Little Symphony Orch. 7:30, service, First Presbyterian Church, Oakland.

KNX, Los Angeles, Cal., 337 (P. S. T.)—10 A. M., First Presbyterian Church of Hollywood. 5 P. M., sunset service, Charles F. Asked, DD., LL.D. 7, First Presbyterian Church of Hollywood. 8, Ambassador Concert Orch. 9, courtesy program by R. C. Durant.

KFI, Los Angeles, Cal., 467 (P. S. T.)—10 A. M., morning church service. 11, Third Church of Christ-Scientist morning service. 4 P. M., Federated Church musicians. 6:30, MacDaniel's Nightly Doings and Amusement Information Service. 6:45, radiotorial period and music appreciation chat. 7, program presented by Albert Kaufman from the stage and studio of the Metropolitan Theatre. 8, classic hour. 9, program presented by the Los Angeles Examiner. 10, Packard Eight Orch.

KPO, San Francisco, Cal., 429.5 (P. S. T.)—8 A. M., presentation of the "funnies" from the San Francisco Chronicle, by Big Brother of KPO. 10:30, theatre announcements. 11, undenominational and non-sectarian church services. 6 P. M., States Restaurant Orch. 6:30, Palace Hotel concert. 7, theatre announcements. 8, Palace hotel concert. 8:30, Fairmont Hotel Orch.

MONDAY, MAY 4

WOAW, Omaha, Neb., 526 (C. S. T.)—12:30 P. M., Randall's Royal Fontenelle Orch. 5:45, public news period. 6, organ music. 6:30, Bob Miller Orch. 9, Hannan-Van Brunt Co., ford dealers program.

WCBD, Zion, Ill., 344.6 (C. S. T.)—8 P. M., the Mixed Quartet, Cornet Quartet and String Quartet.

WWQ, Detroit, Mich., 352.7 (E. S. T.)—8 A. M., setting-up exercises. 9:30, "Tonight's Dinner" and a special talk by the Woman's Editor. 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 market report and baseball scores. 6, dinner concert. 8, the Detroit News Orch. 9, concert broadcast from New York through WEAF.

WHAS, Louisville, Ky., 399.8 (C. S. T.)—4 P. M., concert from the Louisville Conservatory of Music. 4:50, local livestock, produce and grain market reports. 4:55, baseball scores. 5, time. 7:30, silent.

WOO, Philadelphia, Pa., 508.2 (E. S. T.)—11 A. M., grand organ. 11:30, weather. 12 M., Golden's orch. 12:55, time. 4:40, police reports and sports results. 4:45, grand organ trumpets. 7:30, police reports and sports results; Hotel Adelphia orch. 8, musical program direct from the Mark Strand Theatre, Broadway and 47th street, New York City. 8:30, grand organ recital, Mary E. Vogt. 9, music by the A. & P. Gypsies. 10, Blue Ribbon Quartet. 10:30, Ban Bernie Hotel Roosevelt orch. 10:55, time, weather. 11, Vincent Rizzo orch.

WMC, Memphis, Tenn, 499.7 (E. S. T.)—7:30 P. M., weekly farm talk by Dr. C. W. Watson. 8:30, Hotel Gayoso orch.

WFAA, Dallas, Texas, 475.9 (C. S. T.)—12:30 P. M., address, Dr. A. D. Laugenour, of the Dallas Astronomical Society, discussing the "Beauty Spots of the Heavens Tonight." 6:30, Buddy's Blue Melody Boys orch. 8:30, Magnolia Petroleum Company's Dallas Band.

WIP, Philadelphia, Pa., 508.2 (E. S. T.)—7 A. M., setting-up exercises. 1 P. M., Gimbel tea room orch. 1:30, weather. 3, artist recital; Skibinsky studios. 4, "Hints on Home Gardening," talk by Charles K. Hallowell. 6, weather. 6:05, Hotel St. James orch. 6:45, livestock and produce market reports. 7, Uncle Wip's bedtime story.

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.

WEMC, Berrien Springs, Mich., 285.5 (C. S. T.)—8:15 P. M., orch. concert by Radio Lighthouse Music Makers.

WGR, Buffalo, N. Y., 319 (E. S. T.)—8:30 P. M., program by the Buffalo State Normal School. 10, recital by Bradley Yaw and friends.

WEAF, New York City, 492 (E. S. T.)—6:45 A. M., Tower Health Exercises. 1:45 P. M., Government Club meeting. 4, Christine Wood Black, soprano; Elementary French Lessons by William Doub-Kerr; children's stories. 6, Waldorf-Astoria orch.; "Where is Our Education Taking Us," by Dr. Otis W. Caldwell; musical program from the Mark Strand Theatre, New York City; "Tower Health Talk"; Chevalier Luigi Constantino, pianist ;A. and P. Gypsies; Blue Ribbon Quartette; Ben Bernie's orch.

WEEI, Boston, Mass., 476 (E. S. T.)—6:45 A. M., setting-up exercises. 3 P. M., Palm Garden Ramblers. 6:30, Big Brother Club. 8, dance selections. 8:45, From New Cork," health talk. 9, A. & P. Gypsies. 10, Blue Ribbon quartet.

WBBR, New York City, 272.6 (E. S. T.)—8 P. M., Syrian Oriental music. 8:10, vocal selections. 8:20, World News Digest, by editor of Golden Age Magazine. 8:40, vocal selections. 8:50, Syrian Oriental music.

WDAF, Kansas City, Kansas, 365.6 (C. S. T.)—3:30, 4, 4:30, 5 P. M., baseball scores. 3:30, program broadcast from the Newman and Royal theatres. 5, weekly Boy Scout program. 5:50, Marketgram, weather, time and road report. 6, School of the Air. 8, program by the Ivanhoe

Betsy Ayres to Wed, Roxy Announces Over Radio

RADIO fans who tuned in on any one of six different stations a recent Sunday night, heard that one of their favorites, Betsy Ayres, a member of "Roxy's Gang," was soon to be married. S. L. Rothafel (Roxy), who discovered Miss Ayre's soprano voice and who employed her four years ago as both a broadcasting feature and as a soloist at the Capitol Theatre, made the microphone announcement.

Those stations through which the message was sent were WEAF, New York; WJR, Providence; WEEI, Boston; WWJ, Detroit; WCAP, Washington, and WDBH, Worcester. Miss Ayres's fiance is Dr. Floyd McDaniel, a throat specialist, of this city. Dr. McDaniel is a native of South Carolina and Miss Ayres of Dallas, Texas. They met as physician and patient and have been engaged a year or so.

band; popular songs. 11:45, Nighthawk Frolic, "Merry Old Chief" and the Plantation Players, Hotel Muehlbach.

WOI, Ames, Iowa, 270 (C. S. T.)—9:30 A. M., weather. 12:30 P. M., College Chimes; weather; livestock markets; Miss Viola M. Bell, "The Wedding Breakfast." 9:30, weather. 10, program of popular music.

KOB, State College, N. M., 348.6 (M. S. T.)—7:30 P. M., music, various numbers by Las Cruces, New Mexico.

KGW, Portland, Oregon, 491.5 (P. S. T.)—11:30 A. M., weather. 12:30 P. M., Rose City Trio. 5, children's program. 6, dinner concert. e 7:15, markets, weather, news bulletins and police reports.

KTHS, Hot Springs, Ark., 374.8 (C. S. T.)—12:30 P. M., markets, weather, music. 8:30, Phil Baxter's singing orch. 9, Meyer Davis orch.

KGO, Oakland, Cal., 361.2 (P. S. T.)—9 A. M., music and lectures, California State Department of Education. 11:30, luncheon concert. 1:30 P. M., N. Y. and S. F. stock reports and weather. 3, studio musical program and speaker. 4, Henry Halstead's Orch. 5:30, Aunt Betty stories and KGO Kiddies' Klub. 6:45, final reading, stock reports, weather, S. F. produce news, baseball scores. 8, educational program. Music, Arion Trio; address, Present Status of Fruit Beverage Industry," J. H. Irish, Assistant Professor Fruit Products, University of California; "A Lesson in English," Wilda Wilson Church; address, "The Influence of Music Mentally," Virginia White Lockhart; address, "Non-metallic Industrial Minerals of Western States," C. M. Redfern; "Chats about New Books," Joseph Henry Jackson. 10, Henry Halstead's Orch.

KPO, San Francisco, Cal., 429.5 (P. S. T.)—10:30 A. M., theatre announcements. 12 M., time, reading of the Scripture. 1 P. M., Fairmont Hotel Orch. 2:30, program from Loew's Warfield Theatre. 4:30, Fairmont Hotel Orch. 5:30, children's hour stories. 6:25, theatre announcements. 6:30, the States Restaurant Orch. 7, Fairmont Hotel Orch. 8, organ recital. 9, program by the San Francisco Conservatory of Music. 10, Johnny Buick's Cabirians.

KFI, Los Angeles, Cal., 467 (P. S. T.)—5 P. M., news. 5:30, Los Angeles Examiner matinee program. 6, MacDaniel's Nightly Doings and Amusement Information service. 6:45, KFI Radiotorial period. 7, program presented by the Los Angeles Evening Herald. 8, special program presented by the Southwestern College of Music. 9, program presented by the Walter M. Murphy Motors Co. 10, program presented by the Los Angeles Examiner.

KFAE, State College of Washington (348.6 (P. S. T.)—7:30 P. M., program by voice students of Mrs. LaVerna Kimbrough and piano students of Dean Herbert Kimbrough. Weeds, Prof. E. G. Schaefer; designing the interior of your new home, Prof. Fred G. Rounds; what is worth seeing in Florence, Prof. Carl M. Brewster; forestry, Prof. E. H. Steffen; making and keeping a good lawn, M. D. Armstrong.

KNX, Los Angeles, Cal., 337 (P. S. T.)—12 M., West Coast Theatres from West Coast Studio. 4 P. M., Joe Lyons, tenor. 6:30, Detmer's Optical Co. program. 8, Listenwalter and Gough program. 9, courtesy program by Stockwell Mfg. Co. 11, Abe Lyman's Cocoanut Grove Orch.

KOA, Denver, Col., 322.4 (M. S. T.)—11:30 A. M., stock reports; live stock; fruit and vegetable report and weather. 12 M., artists' concert. 1 P. M., Harmony Peerless orch. 2, early afternoon concert. 6, stock reports; live stock; vegetables and late news bulletins. 6:30, bedtime stories. 7, Colorado School of Mines band. 8, Schumann Choral Club. 10, Harmony Peerless orch.

TUESDAY, MAY 5

WOAI, San Antonio, Tex., 394.5 (C. S. T.)—8:30 P. M., the WOAI entertainers. 9:30, Jimmy Joy's Orch.

WOAW, Omaha, Neb., 526 (C. S. T.)—12:30 P. D., Art Landry Orch. 5:45, public news period. 6, "Advice to Lovelorn." 6:25, dinner program. 9, Auto Electric & Radio Corporation program. 10:30, Nightingale Orch.

WWJ, Detroit, Mich., 352.7 (E. S. T.)—8 A. M., setting-up exercises. 9:30, "Tonight's Dinner" and a special talk by the Woman's Editor. 10:25, weather. 11:55, time. 10:05 P. M., Jules Klein's Hotel Statler Orch. 3, the Detroit News Orch. 3:50, weather. 3:55 market reports and baseball scores. 6, dinner concert. 8, concert broadcast from New York through WEAF.

WHAS, Louisville, Ky., 399.8 (C. S. T.)—4 P. M., concert from the Louisville Conservatory of Music; police bulletins; weather; news. 4:50, local livestock, produce and grain market reports. 4:55, baseball scores. 5, time. 7:30, concert by Carl Zoeller's Melodists; time.

WCAE, Pittsburgh, Pa., 461.3 (E. S. T.)—12:30 P. M., news, weather, reading of program for the day. 4:30, stock market reports; The Sunshine Girl. 6:30, dinner concert transmitted from the 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, grand opera.

WOO, Philadelphia, Pa., 508.2 (E. S. T.)—11 A. M., grand organ. 11:30, weather. 12 M., Golden's orch. 12:55 P. M., time. 4:40, police reports and sports results. 4:45, grand organ and trumpets. 10:55, time. 11:02, weather.

WIP, Philadelphia, Pa., 508.2 (E. S. T.)—7 A. M., setting-up exercises. 1 P. M., organ recital. 1:30, weather. 3, artist recital; Eleanor Swayne, soprano; Kathryn Keedner, pianist; James T. Van Atta, violinist. 4:20, "Market Hints for Housewives. 6, weather. 6:05, baseball talk. 6:15, Benjamin Franklin concert orch. 6:45, U. S. Department of Agriculture; livestock and produce market reports. 7, Uncle Wip's Roll Call and Birthday List. 8, "Timely Talks to Motorists. 8:15, the Matinee Musical Club string concert; Matinee Musical Club orch. 10:05, "Emo's Weekly Movie Broadcast." 10:30, Benjamin Franklin dance orch.

WMC, Memphis, Tenn., 499.7 (E. S. T.)—7:30 P. M., weekly health talk by Dr. E. E. Francis. 8:30, program arranged by Harry Kohn. 11, organ recital by Harry O. Nichols from the Scottish Rite Cathedral.

WFAA, Dallas, Texas, 475.9 (C. S. T.)—12:30 P. M., health talk, Charles E. Osborne, Physical Director of the Dallas Young Men's Christian Association. 6:30, vesper recital by Southern Methodist University. 8:30, Tell Me This Club. 11, the Palace Theatre.

WEEI, Boston, Mass., 476 (E. S. T.)—6:45 A. M., setting-up exercises. 1 P. M., Civitan Club. 3, Napoli Four. 6:30, Big Brother Club. 7:15, Hugh J. McMackin on "Carbonated Beverage Day." 7:30, Dok-Eisenbourg and his Sinfonians. 8, From New York, Musicale. 8:30, Gold Dust Twins. 9, Eveready Hour. 10, American Opera Ensemble.

WOI, Ames, Iowa, 270 (C. S. T.)—9:30 A. M., weather. 12:30 P. M., college chimes, weather, Miss Belle Lowe, "Wedding Cakes. 9:30 weather.

WDAF, Kansas City, Kansas, 365.6 (C. S. T.)—Baseball scores at 3:30, 4, 4:30, 5 and 6 P. M. 3:30, The Star's radio trio. 5, weekly child talent program. 5:50, marketgram, weather, time, road report. 6, School of the Air. 11:45, Nighthawk Frolic—"Newman Nighthawk Night," theatre entertainers, broadcast from the stage of the Newman Theatre.

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.

WGR, Buffalo, N. Y., 319 (E. S. T.)—11 A. M., Mrs. Katherine N. Britt, Manager of Buffalo Home Bureau. 8, joint broadcasting with WEAF, New York City.

WEAF, New York City, 492 (E. S. T.)—6:45 A. M., "Tower Health Exercises." 11, musical program, Board of Education Lecture; motion picture forecast by Adele Woodard; market and weather reports. 4 P. M., Harriett Ochs, mezzo soprano; women's program. 6, Waldorf-Astoria orch.; Myrtle Wagner Whitt, coloratura soprano; talk under the auspices of the American Federation of Art Eagle Neutrodyne Trio; financial discussion by Dudley F. Fowler; "The Gold Dust Twins"; "Eveready Hour"; Meyer Davis' orch.

KNX, Los Angeles, Cal., 337 (P. S. T.)—9 A. M., State Board of Education. 4 P. M., Helen's household hints. 6:30, Globe Ice Cream Co. concert. 7:30, style talk by Myer Siegel, Jr., of Myer Siegel & Co. 7:45, talk on health by Dr. Robert T. Williams. 8, feature program. 9, Independent Furniture Manufacturing Co. 10, Abe Lyman's Orch.

KFI, Los Angeles, Cal., 467 (P. S. T.)—5 P. M., News. 5:30, Los Angeles Examiner matinee program. 6, MacDaniel's Nightly Doings and Amusement Information service. 6:45, radiotorial period. 7, the Aeolian organ recital. 8, program presented by the Los Angeles Examiner. 9, the Welch Presbyterian Church Choir. 10, Packard ballad hour.

KPO, San Francisco, Cal., 429.5 (P. S. T.)—7 A. M., daily dozen. 10:30, theatre announcements. 11, talk on cooking and household management. 12 M., time, reading of the Scripture. 1 P. M., Fairmont Hotel Orch. 3:30 Palace Hotel concert. 4:30, Fairmont Hotel Orch. 5:30, market report. 5:35, children's hour stories. 6:20, garden hints. 6:30, children's hour stories. 6:20, garden hints. 6:30, theatre announcements. 6:35, States Restaurant Orch. 7, Fairmont Hotel Orch. 8, program by the U. S. Army Band. 10, Johnny Buick's Cabirians.

KGO, Oakland, Cal., 361.2 (P. S. T.)—11:30 A. M., luncheon concert. 1:30 P. M., N. Y. and S. F. stock reports and weather. 4, Concert Orch. 6:45, final reading, stock reports, weather, S. F. produce news, baseball scores. 8, Program, KGO Little Symphony Orch. 10, Henry Halstead's Orch.

KGW, Portland, Ore., 491.5 (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 lecture. 8:30, concert by courtesy Woolach & Powell. 10, Multnomah Hotel Strollers.

KTHS, Hot Springs, Ark., 374.8 (C. S. T.)—12:30 P. M., markets, weather, music. 8:30, Al A. Reynolds featuring negro dialect songs and stories. 9, dance program by the Meyer Davis New Arlington Orch., Jacques Renard, director.

KOA, Denver, Col., 322.4 (M. S. T.)—11:30 A. M., stock reports, live stock, fruit and vegetable report and weather. 12 P. M., artists, concert. 1, dance music. 2, concert by advanced students of music. 3:30, concert by Denver Junior high schools. 6, dinner music. 6:30, stock reports, live stock, vegetables and late news bulletins. 7, military band.

WEDNESDAY, MAY 6

WWJ, Detroit, Mich., 352.7 (E. S. T.)—8 A. M., setting-up exercises. 9:30, "Tonight's Dinner" and a special talk by the Woman's Editor. 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, market reports and baseball scores. 6, dinnr concert. 8, the Detroit News Orch.; Anne Campbell, Detroit News poet, 10, Jean Goldkette's Orch.

WHAS, Louisville, Ky., 399.8 (C. S. T.)—4 P. M., concert from the Louisville Conservatory of Music; police bulletins; weather; news. 4:50, local livestock, produce and grain market reports. 4:55, baseball scores. 5, time. 7:30, concert by the Tropical Hawaiian Sextette; baseball scores; news; time.

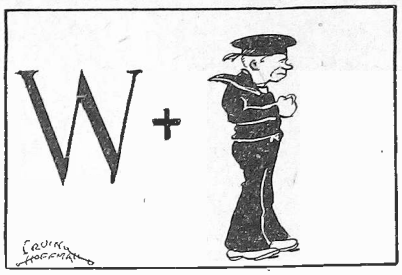
WCAE, Pittsburgh, Pa., 461.3 (E. S. T.)—12:30 P. M., news, weather reports. 4:30, stock market reports, Uncle Kaybee. 6:30, dinner concert. 7:30, The Sunshine Girl. 7:45, police reports, 8 silent. 8:30, recital by George Bob Wick, tenor. 10, silent. 10:30, Nixon Resaturant Orch.

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.

WOO, Philadelphia, Pa., 508.2 (E. S. T.)—11 A. M., grand organ. 11:30 weather. 12 N., Golden's Orch. 12:55 P. M., time. 4:40, police reports and sports results. 4:45, grand organ and trumpets. 7:30, police reports and sports re-

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.

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Clanton Munroe, Jr., 3 Taft Ave., Maynard, Mass.
George Cobas, 1020 Jackson St., San Francisco, Cal.
I. Weiss, 608 E. 9th St., N. Y. C.
Bernice Jennings, 116 Bay View Ave., Jersey City, N. J.

sults, U. S. Navy Band. 9, "Ipana Troubadors." 10, Chamlers Ensemble, assisted by Maria Mugavero, colorature soprano. 10:30, Hotel Sylvanit Orch. 10:55, time, weather. 11, continuation of dance program.

WFAA, Dallas, Texas, 475.9 (C. S. T.)—12:30 P. M., musical recital by Alex Hughes, pianist.

WIP, Philadelphia, Pa., 508.2 (E. S. T.)—7 A. M., setting-up exercises. 1 P. M., Gimbel Tea Room Orch. 1:30, weather. 3, "Kaunizawa, the Summer Resort of Japan." Talk by Professor James G. Rodger, Ph.D. 3:15, violin recital of American Composers; Theodore Liedemedt. Walter Kruger, pianist; Katharine V. Heuser, solo trumpet. 6, weather. 6:05, Benjamin Franklin Concert Orch. 6:45, livestock and produce market reports. 7, Uncle Wip's bedtime story and roll call.

WEEI, Boston, Mass., 476 (E. S. T.)—6:45 A. M., setting-up exercises. 3 P. M., Frankie Ward and his Avalon Orch. 6:30, Big Brother Club. 7:15, Joseph Eccleston, tenor. 7:30, program arranged by Mrs. G. Y. Kells. 8, The Traveler Shoe Orch. 8:30, M. B. Cohan's half hour musicale. 9, Gillette Safety Razor Band Concert. 10, Dok-Eisenbourg and his Sinfonians.

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

WDAF, Kansas City, Kans., 365.6 (C. S. T.)—Baseball scores at 3:30, 4, 4:30, 5 and 6 P. M. 3:30, The Star's radio trio. 5:50, marketgram, weather, time and road report. 6, School of the Air. 8, program of classical music. 11:45, Nighthawk Frolic—The "Merry Old Chief" and Carl Nordberg's Plantation Players, Hotel Muehlebach.

WEMC, Berrien Springs, Mich., 285.5 (C. S. T.) 8:15 P. M., Miss Marguerite Bordeau, reader; Miss Rhea Yeager, cellist, exclusive WEMC entertainers. 9, Sebree's orch.

WGR, Buffalo, N. Y., 319 (E. S. T.)—6:30 P. M., program by Joe Stewart's orch. 8, Washburn Crosby Company's Commencement Exercises, for the Gold Medal Radio Cooking School. 9, "Two in One Players." 10, concert by the Buffalo Association for the Blind, with all blind musicians.

WEAF, New York City, 492 (E. S. T.)—6:45 A. M., "Tower Health Exercises." 11, musical program; young mothers' program; market and weather reports. 4 P. M., Louis John Johnen, baritone; Loraine Osborne, soprano; children's stories. 6, Waldorf-Astoria orch; Synagogue Services; "Ipana Hour"; Royal Little Symphony orch.; Ben Bernie and orch.

KFAE, State Colloge of Washington, 348.6 (P. S. T.)—7:30 P. M., sacred concert Colfax Methodist Choir, Mrs. L. A. Kirtland, director, Miss Bess Ferguson, piano. Effect of sulphur on protein content of legumes, J. R. Neller; the living room, Ogden F. Beeman; bee diseases and their treatment, B. A. Slocum.

KNX, Los Angeles, Cal., 337 (P. S. T.)—1 P. M., Dr. Wayne B. Burr care of children. 7, Ambassador Concert Orch. 8, courtesy program Security Trust & Savings Bank. 9, Wrightwood program. 10, Hollywoodland Dance Orch.

KFI, Los Angeles, Cal., 467 (P. S. T.)—5 P. M., news. 5:30, Los Angeles Examiner matinee program. 6, MacDaniel's Nightly Doings and Amusement service. 6:45, radiotorial period. 7, Nick Harris, detective stories. 7:20, Hebrew melody, Jewish cantor. 7:30, program presented by the Goodwin, Klinger, MacKay Insurance Co. 8, Los Angeles Evening Herald program. 9, program presented by the Los Angeles Examiner. 10, Patrick-Marsh Orch.

KPO, San Francisco, Cal., 429. 5 (P. S. T.)—7 A. M., daily dozen. 10:30, theatre announcements. 12 M., time. 1 P. M., Fairmont Hotel Orch. 4:30, Fairmont Hotel Orch. 5:30, market reports. 5:35, Children's hour stories. 6:25, theatre announcements. 6:30, States Restaurant Orch. 7, Fairmont Hotel Orch. 8, Atwater Kent Artist program. 9, George Hildreth, tenor. 10, Johnny Buick's Cabirians.

KGO, Oakland, Cal., 361.2 (P. S. T.)—11:30 A. M., luncheon concert. 1:30 P. M., N. Y. and S. F. stock reports and weather. 3, musical program, speaker from Cora L. Williams Institute. 4, concert orch. 6:45, final reading, stock reports, weather, S. F. produce news, baseball scores. Silent Night.

KGW, Portland, Ore., 491.5 (P. S. T.)—11:30 A. M., weather. 12:30 P. M., Rose City Trio. 5, children's program. 6, Hotel Portland dinner concert. 7:15, markets, weather, news bulletins and police reports. 8, Western Auto Supply concert. 10, concert from Sherman, Clay & Co.

KOA, Denver, Col., 322.4 (M. S. T.)—11:30 A. M., stock reports, livestock, fruit and vegetable report and weather. 12 M., artists' concert. 1 P. M., dance music. 3, three-act musical comedy, "In Old Louisiana." 6, stock reports, livestock, vegetables and late news bulletins. 6:30, bedtime stories. 7, Union Pacific Railroad Band of Denver. 8, operatic night. 10, Joe Man's Orch.

KTHS, Hot Springs, Ark., 374.8 (C. S. T.)—12:30 P. M., markets, weather, music. 8:30, solo selections by W. C. Brown, baritone; Arthur Platz, accompanist. 9, Meyer Davis Orch.

THURSDAY, MAY 7

WGR, Buffalo, N. Y., 319 (E. S. T.)—8 P. M., joint broadcasting with WEAF, New York.

WOAI, San Antonia, Tex., 394.5 (C. S. T.)—9:30 P. M., dance music by Jimmy Joy's arch.

WEAF, New York City, 492 (E. S. T.)—6:45 A. M., "Tower Health Exercises." 11, musical program; "Talk to Housewives," by Empire State Gas and Electric Assn.; market and weather reports. 4 P. M., Marguerite Ronzada, soprano; "Women's Club Program." 6, Waldorf-Astoria orch.; mid-week services under the auspices of the Greater New York Federation of Churches; "Cushman's Serenaders"; Juan Pulido, baritone; lecture on American history by Columbia University; "Touring in a Packard Eight," by George Elliott Cooley; "Atwater Kent Radio Artists"; The Silvertown Cord Orch.; Vincent Lopez and orch.

WOAW, Omaha, Neb., 526 (C. S. T.)—12:30 P. M., noonday program. 5:45, public news. 6, every child's story hour. 6:30, to be announced. 6:45, Randall's Royal Fontenelle orch. 9, program. 10:20, Nightingale orch.

WCBO, Zion, Ill., 344.6 (C. S. T.)—8 P. M., Zion orch.

WWJ, Detroit, Mich., 352.7 (E. S. T.)—8 A. M., setting-up exercises. 9:30, "To-night's Dinner" and a special talk by the Women's Editor. 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, market reports and baseball scores. 6, dinner concert. 8, concert broadcast from New York through WEAF.

WHAS, Louisville, Ky., 399.8 (C. S. T.)—4 P. M., concert from the Louisville Conservatory of Music; police bulletins; weather; news. 4:50, local livestock, produce and grain market reports. 4:55, baseball scores. 5, time. 7:30, concert under the auspices of the Men's Glee Club of Asbury College, Wilmore, Ky.; four-minute welfare talk; baseball scores, news, time.

WCAE, Pittsburgh, Pa., 461.3 (E. S. T.)—12:30 P. M., news; weather reports. 4:30, stock market reports; the Sunshine Girl. 6:30, dinner concert transmitted from the William Penn Hotel. 7:30, Uncle Kaybee. 8, Moore's Caffeteria radio review. 9, Atwater-Kent radio artists from WEAF, New York. 10, concert by the Goodrich Silvertown Cord orch.

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.

WOO, Philadelphia, Pa., 508.2 (E. S. T.)—11 A. M., grand organ. 11:30, weather. 12 M., Golden's Orch. 12:55 P. M., time. 4:40, police reports and sports results. 4:45, grand organ and trumpets. 10:55, time. 11:02, weather.

WMC, Memphis, Tenn., 499.7 (E. S. T.)—7:30 P. M., weekly science talk by Brother Joseph of C. B. C. 8:30, program to be announced later.

WFAA, Dallas, Texas, 475.9 (C. S. T.—12:30 P. M., "Mental and Moral Health," by DeWitt McMurray. 6:30, Lone Star Orch. 8:30, Edwin Lisman and the Baylor Dallas Glee Club. 11, Majestic Theatre Orch.

WIP, Philadelphia, Pa., 508.2 (E. S. T.)—7 A. M., setting-up exercises. 1 P. M., Gimbel Tea Room Orch. 1:30, weather. 3, Artist Recital, Philips Jenkins Studio. 6, weather. 6:05, Benjamin Franklin Concert Orch. 7, Uncle Rip's Roll Call and Birthday List. 8, "Intimate Information Concerning Social Dancing." 8:15, piano recital, Oscar Prushankin. 8:30, "Prison Tales," related by Chaplain William Nisson Brenner. 8:45, Cho Hsiung Wu, Chinese violinist; Dr. Mandler, accompanist. 9, WIP's Music Appreciation. 11, Benjamin Franklin Dance Orch.

WEEI, Boston, Mass., 476 (E. S. T.)—6:45 A. M., setting-up exercises. 1 P. M., Boston Chamber of Commerce Assembly Luncheon. 3:15, Noah's Arkadians, J. W. Rines, director. 6:30, Big Brother Club. 7:15, Sager's half hour of hospitality. 8, From New York, musicale. 8:30 musicale. 9, Atwater-Kent artists. 10, Goodrich Silverton Cord Orch.

WBBR, New York City, 272.6 (E. S. T.)—8 P. M., Watchtower Instrumental Trio. 8:10, violin solos, Mr. Carl Park. 8:20, International Sunday school lesson. 8:40, clarinet solos, Mr. Carment. 8:50, Watcheower Instrumental Trio.

WOI, Ames, Iowa, 270 (C. S. T.)—9:30 A. M., weather report. 12:30 P. M., college chimes, livestock markets; Mrs. Lulu May Brandt, "The Wedding Trousseau." 8:15, musical program. 9:30, weather.

WDAF, Kansas City, Kans., 365.6 (C. S. T.)—Baseball scores at 3:30, 4, 4:30, 5 and 6 P. M. 3:30, The Star's Radio Orch. 5:50, marketgram, weather, time and road report. 6, School of the Air. 11:45, Nighthawk Frolic—The "Merry Old Chief" and the Plantation Players, Hotel Muehlebach; Eddie Kuhn's Kansas City Athletic Club Orch.; Johnnie Campbell's Kansas City Club Orch.

KNX, Los Angeles, Col., 337 (P. S. T.)—4 P. M., Estelle Lawton Lindsay's Travel Talk. 6:30, Los Angeles County Assn. of Optometrists courtesy program. 7:30, security business talk by J. R. Dougless. 8, El Encanto Apartments program. 10, Abe Lyman's Cocoanut Grove orch. 11, Campus Night, students of University of California concert.

KFI, Los Angeles, Cal., 467 (P. S. T.)—5 P. M., news. 5:30, Los Angeles Examiner program. 6, MacDaniels Nightly Doings and Amusement Information service. 6:45, radiatorial period. 7, a varied program featuring the Apollo male quartet, Sunshine Instrumental Trio and others. 8, Standard Oil Company of California program. 9, Southern California Music Co. 10, program presented by the Los Angeles Examiner.

KPO, San Francisco, Cal., 429.5 (P. S. T.)—7 A. M., daily dozen. 10:30, theatre announcements. 12 M., time; reading of the Scripture. 1 P. M., Fairmont Hotel orch. 3:30, concert orch. 4:30, Fairmont Hotel orch. 5:30, market reports. 5:35, children's hour stories. 6:25, theatre announcements. 6:30, States Restaurant orch. 7, Fairmont Hotel orch. 8, Theodore J. Irwin, organist. 9, Don Lee, Cadillac Night. 10, Johnny Buick's Cabirians.

KGO, Oakland, Cal., 361.2 (P. S. T.)—11:30 A. M., luncheon concert. 1:30 P. M., N. Y. and S. F. stock reports and weather. 4, concert Orch. 6:45, final reading, stock reports, weather, S. F. produce news, baseball scores. 7:15, golf lesson, Joe Novak. 8, "You Never Can Tell," four-act comedy by Bernard Shaw, presented by KGO Players. 10, Henry Halstead's orch.

KTHS, Hot Springs, Ark., 374.8 (C. S. T.)—12:30 P. M, markets, weather, music. 8:30, organ concert.

KGW, Portland, Ore., 491.5 (P. S. T.) 11:30 A. M., weather. 12:30 P. M., Rose City Trio. 5, children's program. 7:15, market, weather and news bulletins and police reports. 8, Oregonian Concert Orch. 9, Sunset Electric Company, music contest. 10, Multnomah Hotel Strollers.

KOA, Denver Col., 322.4 (M. S. T.)—11:30 A. M., stock reports, livestock, fruit and vegetable report and weather. 12 M., artists' concert. 1 P. M., dance music. 2, afternoon concert by Denver Senior high schools. 6, stock reports, livestock, vegetables and late news bulletins. 7, Western State Teachers' College Band (40 pieces).

FRIDAY, MAY 8

WIP, Philadelphia, Pa., 508.2 (E. S. T.)—7 A. M., setting-up exercises. 1 P. M., Gimbel Tea Room Orch. 1:30, weather. 3, Artist Recital, Ella Nowinski, pianist. 4, "Our Interest in the Economic Revival of Europe." 6, weather. 6:05, Harold Knights' Singing Orch. 6:45, livestosk and produce market reports. 7, Uncle Wip's Bedtime Story, Roll Call and Birthday List.

WEEI, Boston, Mass., 476 (E. S. T.)—6:45 A. M., setting-up exercises;. 2 P. M., Gene Wetmore. 3:15, Greater Boston Federation of Churches program. 6:30, Big Brother Club. 7:15, Frank Witcher, tenor. 7:30, A. E. Richardson presents "The Four Merry Milkmen." 8, program courtesy Neapolitan Ice Cream Company. 8:30, continuation of program by Frank Whitcher, tenor. 9, Howe's Valeteria entertainers. 9:30, Edison Employee's Club Night. 10:30, organ recital.

WMC, Memphis, Tenn., 499.7 (E. S. T.)—7:30 P. M., weekly radio talk. 8:30, Britling's Cafeteria Orch. 11, midnight frolic by Bob Miller.

WOAW, Omoha, Neb., 526 (C. S. T.)—12:30 P. M., Art Landry orch. 1, Sunshine program, under auspices of Loose-Wiles Biscuit Co. 5:45, public news period. 6, "Uncle Ross" stories. 6:20, dance orch. 7:10, current sport events. 9, Union Pacific Railroad Co. program. 12, Nightingale orch.

WWJ, Detroit, Mich., 352.7 (E. S. T.)—8 A. M., setting-up exercises. 9:30, "Tonight's Dinner" and a special talk by the Woman's Editor. 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, market reports and baseball scores. 6, dinner concert. 8, the Detroit News orch. 9, Jean Goldkette's orch.

WHAS, Louisville, Ky., 399.8 (C. S. T.)—4 P. M., concert from the Louisville Conservatory of Music. 4:50, local livestock, produce and grain market reports. 4:55, baseball scores. 5, time. 7:30, concert under the auspices of the Erin Farley studio; news; baseball scores; time.

WCAE, Pittsburgh, Pa., 461.3 (E. S. T.)—12:30 P. M., weather reports; latest news bulletins. 4:30, Sunshine Girl; stock market reports. 6:30, dinner concert. 7:30, Uncle Kaybee. 7:50, police reports. 8, silent. 8:30, concert.

WGR, Buffalo, N. Y., 319 (E. S. T.)—8:45 P. M., John Dodsworth, reader. 9, program by St. Andrews Scottish Society. 10, Orchard Park High School orch.

WEAF, New York City, 492 (E. S. T.)—6:45 A. M., "Tower Health Exercises." 11, musical program; health talk; market and weather reports. 4 P. M., Rose Haas, soprano talk by American Museum of Natural History. 6, Waldorf-Astoria orch.; Gustav Langenus—Clarinet Sextette; Ola B. Rankin, contralto; "Sir Hobgoblin Takes a Ride," by Blanche Elizabeth Wade, Story Teller for G. R. Kinney Company; The Happiness Candy Boys; Sterling Piano Duo; Chas. C. Green, "Advertising and the Public;" Scott Blakeley, Scotch comedian; The Glorient Girls; Meyer Davis' orch.

WEMC, Berrien Springs, Mich., 285.5 (C. S. T.) 9 P. M., Radio Lighthouse Choir; Miss Opal Hoover, saxophonist; International Uniform Sunday School Lesson Hour; talk: "Your Dusty Books," T. E. Unruh.

WOI, Ames, Iowa, 270 (C. S. T.)—9:30 A. M., weather. 12:30 P. M., college chimes, weather, livestock; Miss Mary Gabrielson, "Household Linens for the Bride." 9:30, weather.

WDAF, Kansas City, Kans., 365.6 (C. S. T.)—Baseball scores at 3:30, 4, 4:30, 5 and 6 P. M. 3:30, The Star's radio trio. 5:50 marketgram, weather, time and road report. 8, popular program. 11:45, Nighthawk Frolic—The "Merry Old Chief" and the Plantation Players, Hotel Muehlebach.

WFAA, Dallas, Texas, 475.9 (C. S. T.)—12:30 P. M., address, Dr. Robert Stewart Hver. president emeritus of Southern Methodist University. 4:30, Woman's hour. 6:30, Frank Davenport's Orch. 8:30, musical recital.

KTHS, Hot Springs, Ark., 374.8 (C. S. T.)—8:30 P. M., piano selections by Phil Wall, featuring popular selection. 9:10, Meyer Davis Orch.

KWX, Los Angeles, Cal., 337 (P. S. T.)—11:30 A. M., Estelle Lawton Lindsay's talk to women. 1 P. M., Mr. A. Peters of Germain Seed Co. talk. 4, Veda Knapp, music appreciation. 6:15, Richfield Oil Co.'s motorlogue. 6:30, Beverly Ridge Co. program. 7:30, Eastern Outfitting Co. program. 8, West Coast Theatres from West Coast studio. 9, Davis Perfection Bread Co. program. 11, Abe Lyman's Cocoanut Grove orch. 12, Night Hawks-Wurlitzer studio.

KFI, Los Angeles, Cal., 467 (P. S. T.)—5 P. M., news. 5:30, Los Angeles Examiner matinee program. 6, MacDaniel's Nightly Doings and Amusement Information service. 6:45, radiotorial per-

(Concluded on next page)

RESULTS

RESULTS EDITOR:

I AM writing to tell you of my results with the Diamond of the Air, as described by Herman Bernard in the April 4, 11 and 18 issues. I made the set in three nights. As soon as I hooked it up locals came with great volume. Then yesterday I picked up the following stations: KDKA, Pittsburgh; KYW, Chicago; WCCO, St. Paul; WDAF, Kansas City; WGY, Schenectady; WOAW, Omaha; WJJD, Mooseheart, Ill.; WQJ, Chicago; WRC, Washington. All except WGY were heard through locals. KDKA and WGY came in nearly as loud as locals. The set tunes sharp.

ALEX. HORVATH, JR.,
2658 Grand Ave.,
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This Nameplate FREE

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DIAMOND
OF THE AIR
"A Gem, A Jewel and A Joy"
1925 SPRING MODEL

Done in rich colors, this transfer type of nameplate (decalcomanie) will beautify the panel of your Diamond of the Air. Send in your request and the nameplate will be mailed to you FREE! This 4-tube loop set (non-reflexed) was described in the April 4, 11 and 18 issues of RADIO WORLD, and a trouble-shooting article was printed in the April 25 issue. The circuit won instantaneous popularity, being very selective and affording loud, beautiful reception, including that from distant stations. Send your request NOW to Nameplate Editor, RADIO WORLD, 1493 Broadway, New York City.

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John Kotelec, 1931 Niagara St., Buffalo, N. Y.
Ray Turentine, 846 Maine St., Sulphur Springs, Tex.
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RADIO WORLD SELLS BEST

BLAN, The Radio Man, 145 East 42nd Street, New York City, handles RADIO WORLD. Blan, who has been in business six months, has established an excellent clientele and finds that RADIO WORLD is his best seller among all the radio publications that he handles.

Ban on Broadcasting of News Is Modified by A. P.

THE members of The Associated Press, meeting in the Waldorf-Astoria Hotel New York City, voted in favor of broadcasting of A. P. news "of transcendent importance." By a vote of 130 to 10, they authorized the Board of Directors to make rules permitting this to be done when the news broadcast is properly credited to the A. P. and when it is safeguarded in other respects.

By-laws of the organization hitherto had prohibited the broadcasting of A. P. news. The broadcasting of ejection returns last November, however, caused many newspapers to favor the use of the radio in giving the first news of election results and other big national and international results.

The resolution adopted follows:

"Whereas, the tremendous and continuing growth of radio broadcasting is presenting many new problems not contemplated when the existing by-laws and rules of The Associated Press were adopted; and

"Whereas, the great public interest in the result of Presidential elections and other events of nation-wide importance has repeatedly raised the question of the advisability and wisdom of permitting the limited and restricted use of Associated Press matter in the broadcasting of such special and outstanding events; therefore be it

"Resolved, That the Board of Directors be authorized to adopt the necessary rules and regulations which shall permit the broadcast of such news of the association as it shall deem of transcendent national and international importance and which cannot by its very nature be exclusive, provide adequate safeguards, and require that proper credit in each and every instance be accorded The Associated Press."

The resolution was presented by Edgar B. Piper of The Portland Oregonian, Harry Chandler of The Los Angeles Times, George E. Miller of The Detroit News, Robert McCormick of The Chicago Tribune, W. H. Pettibone of The Detroit Free Press, C. D. Atkinson of The Atlanta Journal and Irwin Kirkwood of The Kansas City Star.

Navy to Hold Low-Wave Tests in Pacific Maneuvers

WASHINGTON.

EXTENSIVE tests of the possibility of high frequency radio communication over long distance will be conducted by the fleet in the Pacific in the next few months, including the period of the present Hawaiian manoeuvres and the trip to Australia.

During the stay in Honolulu the fleet will endeavor to communicate with amateurs in Australia and the Philippines. They will use the signal NRRL.

The navy for some time has been experimenting with high frequencies in the hope of reducing interference and improving transmission, and the tests this spring, to be conducted probably from the umpire ship Seattle, as other radios in the fleet are "sealed" for this period, are looked to for important results.

Squier Appeals Patent Defeat

THE appeal of Major Gen. George O. Squier, Chief Signal Officer of the United States Army, now retired, from a decision by Federal Judge Knox, dismissing his action against the American Telephone and Telegraph Company for alleged infringement of the patent on the multiple telephone device, sometimes known as "wired wireless," was argued before Judges Rogers, Hough and Manton of the Circuit Court of Appeals, in New York. Millions of dollars are involved in the action, and the defendant company is no more interested in the case, it was said, than are the Westinghouse Electric and Manufacturing, the General Electric, the Western Electric companies and the Radio Corporation of America.

Upon the result of the action, it was explained during the court proceedings, will depend the standing in the patent office of hundreds of inventors in the United States Army and Navy and in all of the other departments of the Government. It was stated that all Government employes have been encouraged to do research work, and that patents resulting from this labor would be for the benefit of the patentees, but that free use of them should be allowed the Government.

There is much interest in the case.

Conclusion of Program Schedule

iod. 7, program presented by the Los Angeles Examiner. 8, the Aolian organ recital. 9, program presented by the Los Angeles Evening Herald. 10, recital of Margerite Johnston, concert violinist; Ralph Reiley, lyric tenor, and Hazel Schertzinger-Brewster, harpist.

KPO, San Francisco, Cal., 429.5 (P. S. T.)—7 A. M., daily dozen. 10, talk on cooking and household management. 10:30, theatre announcements. 12 M., time; reading of the Scripture. 12:45 P. M., talk from the Commonwealth Club luncheon at the Palace Hotel. 1:30, Fairmont Hotel orch. 4:30, Fairmont Hotel orch. 5:30, market reports. 6, theatre announcements; program from Loew's Warfield Theatre. 7, Fairmont Hotel orch. 8, concert and dance music.

KGO, Oakland, Cal., 361.2 (P. S. T.)—11:10 A. M., Prudence Penny home-making talks. 11:30, luncheon concert. 1:30 P. M., N. Y. and S. F. stock reports and weather. 3, studio musical program and speaker. 4, concert orch. 5:30, girls' half hour. 6:45, final reading, stock reports, weather, S. F. produce news, baseball scores. 8, annual dinner, Mills College, Oakland, Cal.

KOB., State College, N. M., 348.6 (M. S. T.)—7:30 P. M., music by Miss Robbins.

KGW, Portland, Ore., 491.5 (P. S. T.).—11:30 A. M., weather. 12:30 P. M., Rose City Trio. 5, children's program. 6, St. Francis choir directed by Catherine Covach Fredrich. 7:15, market, weather, news bulletins and police reports. 9, concert from Sherman, Clay & Co. studio. 10:30, Hoot Owls.

KOA, Denver, Col., 322.4 (M. S. T.)—10 A. M., State contests for high school orchestras, trios and male quartets. 11:30, stock reports, livestock, fruit and vegetable report and weather. 12 M., artists, concert. 1 P. M., dance music. 2, State contests for high school glee clubs and choruses. 6, stock reports, livestock, vegetables and late news bulletins. 6:30, book of knowledge program (questions and answers). 7, Boulder (Colo.) Municipal Band. 8, folk songs of all nationalities.

A Zero-Potential Loop Antenna

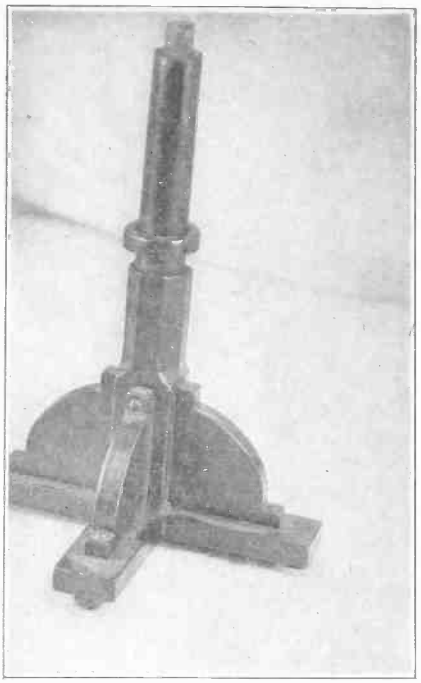

FIG. 1—Close-up of the stand. This measures about 6" high and has been turned from a piece of wood 1" diameter. The little feet, four of which are used, extend out from the sides of the main upright about 2½". Notice the top of the stick which has been turned down to about ½" diameter. This fits into the base of the loop. This is an elaborate device and the same practical effect can be attained by using a ½" dowel stick and an ordinary loop base.

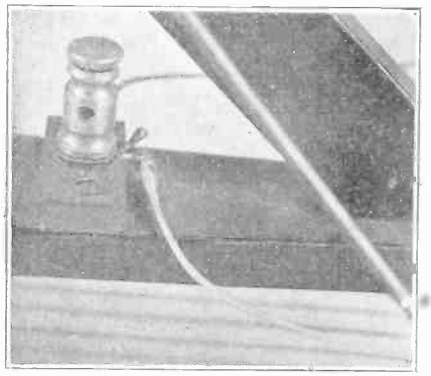

FIG. 2, close-up of the binding posts. Two are used, one for each end of the loop. They are mounted on the base of the loop.

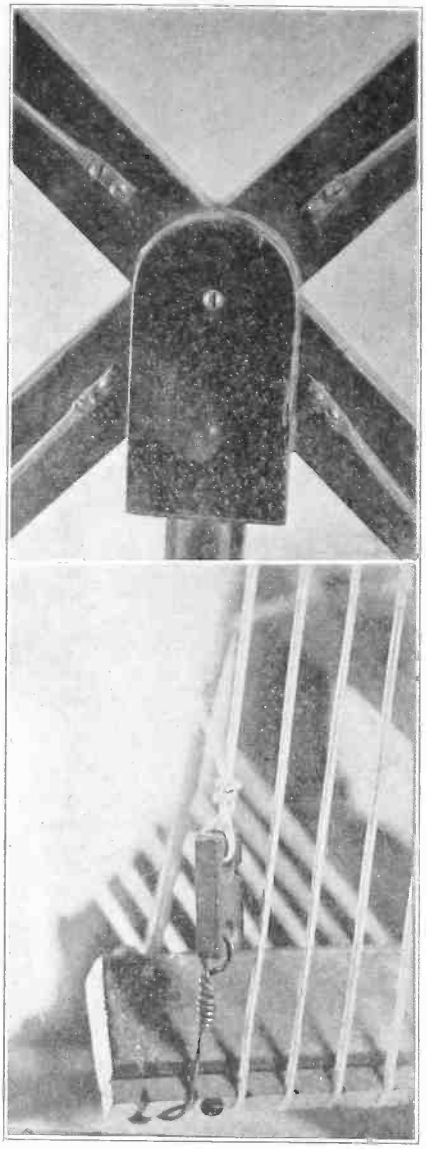

FIG. 3—this is a close-up of the cross sticks or supporting framework. It has no electrical value and is merely a crossed stick arrangement to give mechanical strength to the loop which is very necessary. Fig. 4 (lower) shows close-up of the method used in terminating the ends of the winding. They are brought through a little Bakelite block 1x¾x3/16". Two holes are drilled with No. 18 drill. Thus the wire is handled much after the fashion of your aerial. The insulator (the little Bakelite block is the insulator in this case) is held to the frame with a little piece of bare wire and the loop wire passes through the other hole, thence to the binding posts, where it ends.

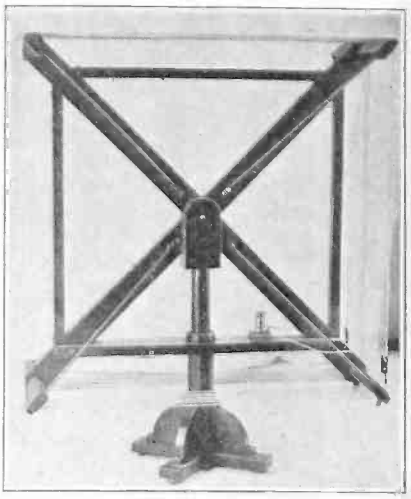

FIG. 5—A view of the completed loop. The type is referred to as box loop. It measures 12" square. A ⅝" hole has been drilled in the center-piece so that the stand fits in and allows the loop to be turned freely

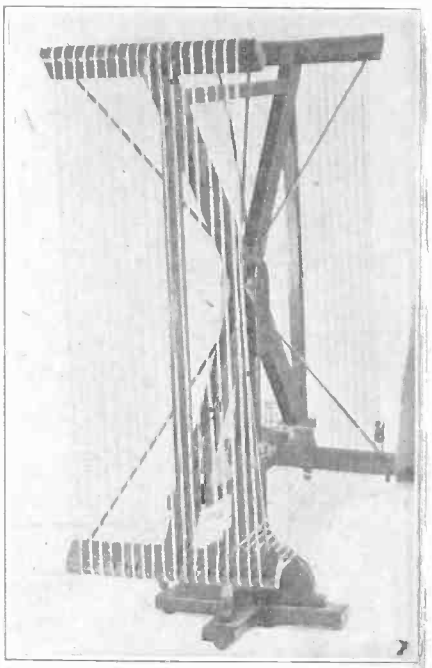

FIG. 6—Side view of loop, showing winding method.

By Frank Freer

IN 1919 while in the U. S. Air Mail service, I built a loop antenna of the box type 4x4 ft. x 10 in. It was wound with about 320 feet of 18 strands rubber insulated wire. A piece of brass pipe 2x4 in. was put on the post of the frame. To this were soldered two hack-saw blades; a brass ring was connected across the ends of the hack-saw blades, and the ends of the wire connected thereto. This formed a closed loop circuit. One wire was used to connect with the receiving set, which was a Navy type designed for telegraphic reception.

The Government experimental station at Bush Stores, Brooklyn, N. Y., was the only one on the air at that time broadcasting wireless telephone. The reception was good.

This loop was sent to St. Louis for further experiments in equipping planes to receive radio telephone. Some time in the Winter of 1920-21, the U. S. Bureau of Standards borrowed this loop for experimental purposes.

It was an efficient loop.

This was due to the amount of wire on the loop, *and the fact that only one lead was used to connect with the receiving set.* Although this connection gives more volume to any loop, and has been used by me since 1919, it appears from time to time as a "new and valuable discovery to obtain maximum volume from loops." It is generally agreed that the standard wound loop has about 1/1000 the value of a regular outside antenna. However, the relative value of any antenna is determined by its size.

This is the reason why the Army, Navy, and the U. S. Bureau of Standards use loops ranging up to 8 and 10 feet in size. The large size of the standard loop required for efficiency led the writer to make many experiments in winding loops on coils, and various kinds of frames, i.e., square, hexagon, octagon and oblong.

It was found that any loop was better if wound on a frame with four equal length sides. In March, 1921, a loop was wound that worked a common crystal set as well as a regular outside antenna. I did not at first understand this phenomenon, but did know it was radically different from what was supposed to be electrically sound.

The men to whom it was shown, all declared it was an electrical impossibility, and refused to hook it up unless I made them a present of one, and then they quoted what Professor So and So said about loops, and they got no results. Of

Inventor Explains Novel Theory

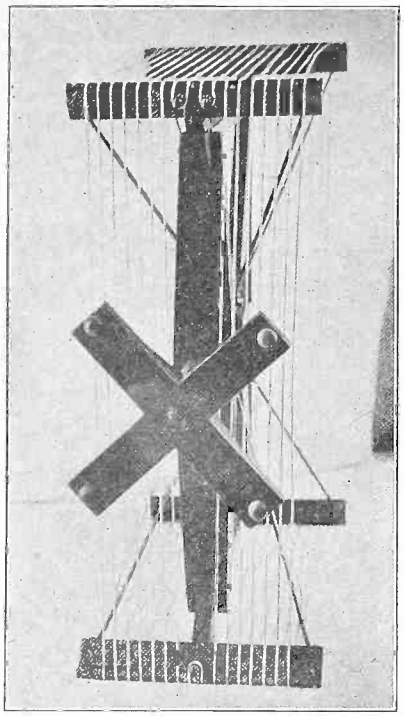

FIG. 7—Bottom view. Note two bushings on top and one on bottom where direction of the winding is changed

course, they were sorry that I didn't know any better.

An exception to these was W. W. Thompson, former superintendent of the DeForest Raid & Telegraph Company, of Jersey City, and Professor Reginald A. Fessenden, of Watch Hill, Mass.

Mr. Thompson found and readily admitted, that a certain 24x24 in. loop demonstrated was superior to a certain outside antenna.

Later experiments by me proved that this loop was a perfect magnetic field with the minus and plus fields, and zero in center.

It is now well-known to electrical experts that the standard wound loop has too much self-inductance for a condenser to be used to tune it most conveniently.

It was recently submitted to Professor Fessenden. His opinion was that this loop was new and of value.

By the elimination of the self inductance in this loop I can bring in all local stations on a loudspeaker, using a 6x6 in. loop and a dry cell set consisting of detector, and two stages of audio-frequency.

Many writers make the mistake of referring to all kinds of antennas (except loop antennas), as capacity antennas. Nearly all metal has some capacity for absorbing the Hertzian waves.

The capacity of any antenna is determined by size alone. Any antenna's value is proportionate to the amount of inductance it receives and delivers to the set, in my opinion. The reason why my magnetic loop is good is that the self-inductance is almost wholly eliminated, there being a perfect magnetic field that receives and delivers more power. If placed outdoors I believe it outclasses the regular antenna for bringing in distant stations.

It has been tried with almost every

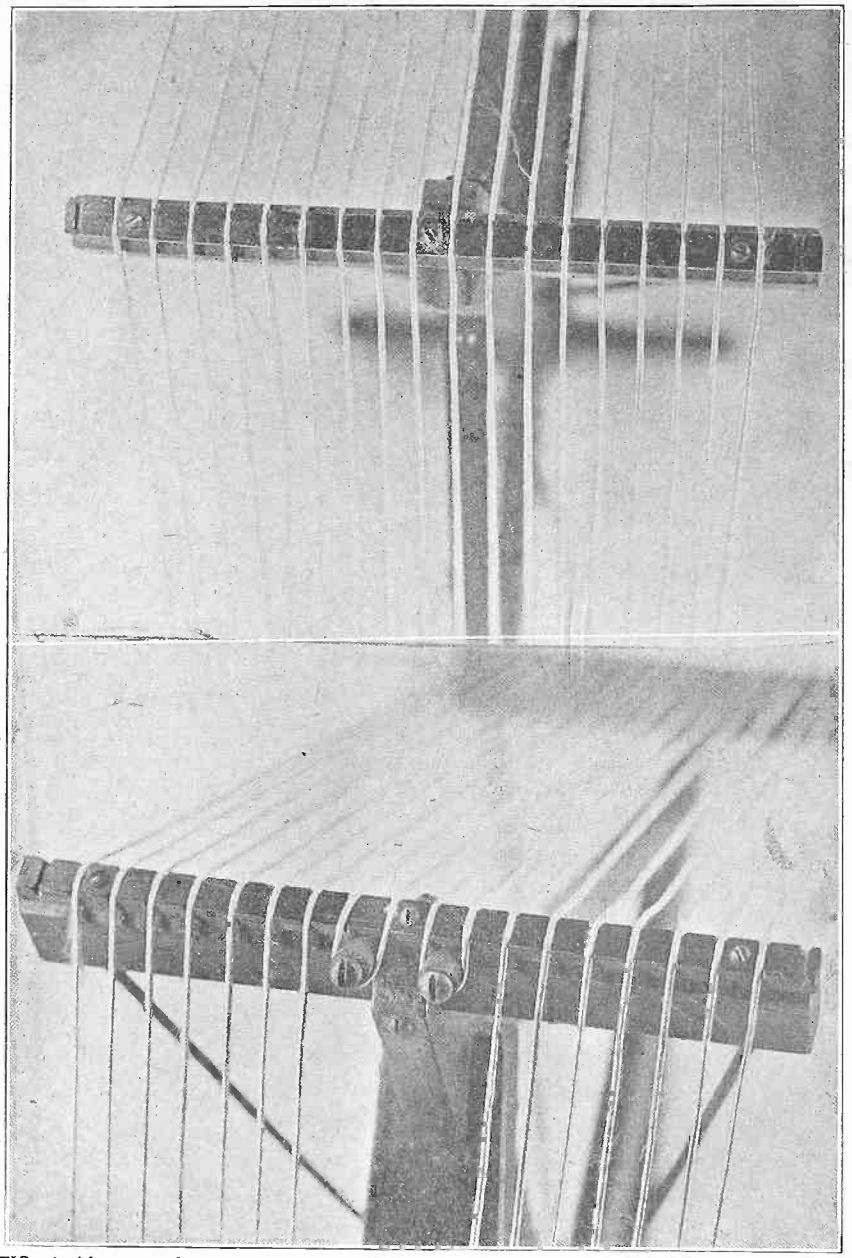

FIG. 8—After you have constructed the box frame of thin pieces of wood, cut four pieces of Bakelite 5" long by ¼" square. Then file little notches ¼" apart (20 in all) in these Bakelite strips, clearly shown almost full size. These are attached to the four corners of the box frame by drilling small holes with No. 49 drill and using ⅜" No. 1 wood screws (brass-round head). A close-up of winding as it passes over Bakelite strips is shown in top photo, while bottom (Fig. 9) is a close-up of cross arm bushings and winding.

known standard hook-up and worked with all. If several units are connected in series the power increases as each unit is added, and if a battery is connected across these units and tested with a compass, each unit shows its own fields and zero.

No explanation is now given of the individual action of each unit, but it proves that each unit is a separate magnetic field.

When using this loop with a variable condenser it is connected across the fields, which must be moved apart to deliver the maximum power. This movable feature requires some constructional skill, so is omitted from the loop pictured here.

This loop was filed for patent July 27, 1922. It was rejected by the examiners on February 14, 1923, on the grounds that it appeared that if one-half of the turns are opposed to the other half, the voltages in each half will be opposed to each other, and no signal will be obtained. A French patent was also cited. This proved to be a crystal set wound in one direction on a frame, and was hooked up like our first slider sets.

In May, 1923, this loop was demonstrated in the Patent Office, using a common crystal receiving set. The examiner was impressed, I believe.

An inventor can amend or in other ways have his application reconsidered. This takes about one year, and no harm is done to the inventor. [SEE P. 26].

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.

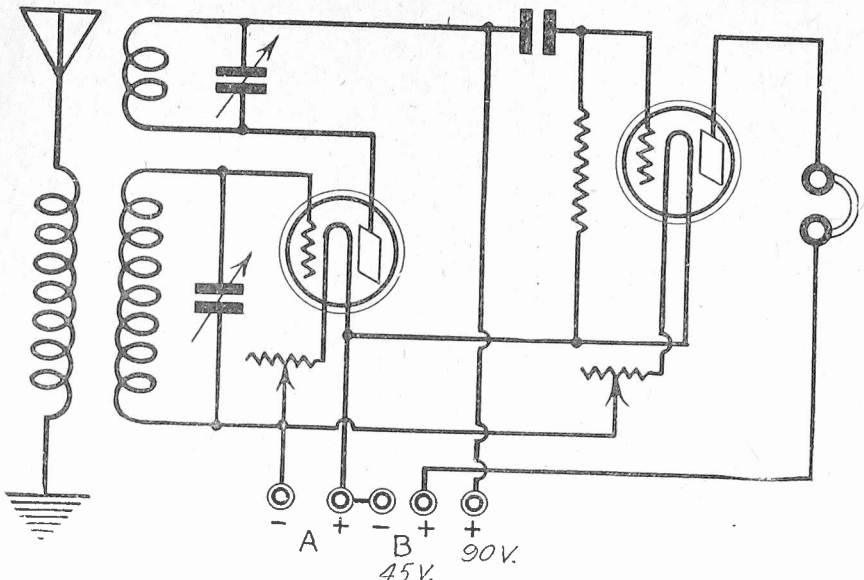

FIG. 135 shows a step of tuned radio-frequency employing regeneration in the RF stage. Wonderful results have been gotten with this 2-tube set. The primary has 10 turns, the secondary 42 turns, the fixed tickler 35 turns. The wire is No. 22 SCC. The variable condensers are .0005 mfd. There are only two controls.

IS THERE any advantage gained by putting the rheostat in the negative lead of the A battery? (2) Should the grid return be connected to the ground? (3) Should I increase the plate voltage to get louder signals from my radio frequency tube? (4) How can I get rid of frying noises in my set? (5) Would another stage of radio-frequency be beneficial to my receiver? (6) Please give a diagram of a step of tuned radio frequency.—D. W. Mansfield, 1537 South Wilton Place, Los Angeles, Cal.

(1) Yes, the 1-volt negative grid bias resulting. (2) Yes, if the negative A is grounded. (3) Yes. (4) Put in new B batteries, push up prongs of all sockets, see that all jacks make perfect contact. (5) It should increase the distance, the volume of the set and the quality of reception. (6) A diagram of a step of tuned radio frequency is given in Fig. 135.

* * *

I BUILT the reflexed Neutrodyne published in the issue of February 28. The set neutralizes well, tunes beautifully, and the tone is excellent. The only trouble is that the volume is insufficient for loud speaker operation. How can I obtain about 25 per cent more volume?—L. R. Cook, 140 Lafayette St., New York City.

Use more B voltage and higher ratio audio transformers.

* * *

WHAT can I do to keep my Benson's Super-Heterodyne from going into oscillations too quickly?—William H. Kleinberger, 3249 N. Bailey St., Philadelphia, Pa.

Decrease the number of turns of wire on the oscillator plate coil.

* * *

WHAT are the essentials for the receiving of an Amateur First Class Transmitting License?—M. L. Savoy, Port Jervis, N. Y.

The first thing that is required is the ability to receive the code at a speed of 15 words per minute in a code test lasting 5 minutes. You then have to draw a diagram of your transmitting and receiving apparatus labelling all parts, on a sheet of paper 10x12". You then will be asked three questions on transmitting and receiving apparatus, viz., (1) How would you tune your transmitter to the specific wavelength to which you are assigned? (2) What would you do in case of an SOS? (3) Certain laws and regulations.

* * *

WILL the Eastern Ccil Co. picklebottle coil work well in O'Rourke's 4-tube, 3-control DX set, issue of March 21? (2) In the schematic diagram of the set should a ground connection be shown?—C. A. Larson, 624 Daniel Ave., Highland Park, Ill.

(1) Yes. (2) The set works with or without a ground. In case it is desired to use a ground it may be attached to A—.

* * *

BY connecting a large magnet to the aerial binding post I increased the volume of my set 25 to 50 per cent. Would this stunt in any way harm the set?—Henry A. Wittman, 208 Van Beuren St., Brooklyn, N. Y.

No.

* * *

HOW many turns of wire should I have on the variometer rotor and stator to receive the broadcasting wavelengths?—H. Schlegel, 16 Waugoo St., Oshkosh, Wis.

Use 72 turns on the rotor and 56 turns on the stator, the stator coil being divided in half, each half having 28 turns, and the rotor coil also divided in half, each half having 36 turns. This will take in the 200-600 meter waveband easily. The wire No. 18 DCC.

* * *

SHOULD the rotor of the variable condenser be grounded?—Thos. Johnston, Fort Monroe, Va.

Yes, ground the rotor to prevent the capacity of your body from adding to the wavelength to which you are tuning your set.

* * *

WHAT IS selectivity? (2) Is the Uncle Sam Tuner O. K.?—Harry Shafer, Baden, Pa.

(1) Selectivity is the efficiency of a receiver to tune in one station at a time, without any interference from another, despite only slight difference in wavelengths. (2) Yes.

* * *

IS it necessary to have a transmitter before you obtain an amateur license?—R. W. Griffith, 114 16th St., Ashland, Ky.

It is not necessary to have a transmitter before you obtain a license, but you must know the type of set you are going to build, so that you may describe it fully at the Customs House. However, when applying for a call, it is necessary then to have a transmitter so that the Radio Inspector may go to your home and see if you are keeping within your wavelength.

* * *

PLEASE give the diagram of the O'Rourke 1-tube set.—G. Foirster, Ft. Wayne, Ind.

Fig. 136 shows diagram.

* * *

MAY a Meyers tube be used as a radio-frequency amplifier?—A. E. Philbrick, Roxbury, Conn.

Yes, it is one of the most efficient radio-frequency tubes, on account of its small separated elements.

* * *

IS it very important to put audio-frequency transformers at right angles? (2) Do grid leaks that work well when bought get spoiled within a period of several weeks? (3) I have constructed the Anderson Superdyne and have to keep adjusting the rheostat to get good reception.—D. J. Crotte, 14 Bainbridge St., Brooklyn.

(1) It is advisable to mount transformers at right angles except if they are shielded. (2) Yes, this sometimes happens. Always used closed grid leaks, so that moisture will not be absorbed and cause the number of megohms to be increased. (3) Test your A battery; test prongs in tube sockets; test rheostat for loose connections.

* * *

WHAT do you consider the most reliable manufactured Super-Heterodyne set on the market today?—Dr. E. E. Schmidt, Blanton, Fla.

The Radio Corporation's 6-Tube Super-Heterodyne, employing Major Armstrong's Second Harmonic principle.

* * *

IS radiation absent in the 1925 Portable Set, as described by Herbert E. Hayden?—H. E. Flack, 4706 N. Raune Ave., Chicago.

No.

* * *

WHAT is the co-called "dry cell" and the "wet cell"?—C. L. Charelson, Topeka, Kan.

The dry cell is a primary cell and one in which the yielding of an electric current is the direct result of the chemical action of an acid solution or an alkali (NAOH) upon two dissimilar elements in electro-chemical series. This cell delivers an electric current without being "charged." The wet cell is a secondary cell, capable of delivering or generating an electromotive force after an electric current is transmitted from one set of battery elements through an electrolyte such as H_2SO_4 to a second set of elements. The chemical action which results from the actions gives these elements dissimilar electro-chemical properties. This in turn sets up a difference of electrical potential between the plates of the cell. When these plates are joined by a conductor an electric current flows. The chemical within the cell is the reverse or opposite to that taking place when the battery is being charged.

* * *

WHAT happens when a radio-frequency wave strikes an aerial?—J. Magnuston, Bloomfield, S. C.

When an antenna is struck by a radio-frequency wave train, a radio-frequency current is generated, which is transferred either inductively or conductively to the secondary or detector circuit. If a simple rectifying device is used such as the ordinary crystal detector, the incoming radio-frequency currents are changed to uni-directional pulsating currents, which in the case of spark and phone transmitters occur at audible frequencies. These currents actuate the diaphragm of the telephone receiver

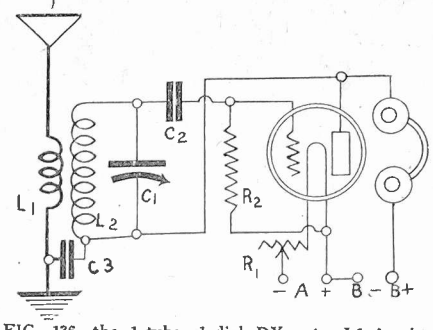

FIG. 136, the 1-tube, 1-dial DX set. L1 is the primary while L2 is the secondary, both of which can be wound on a 3½" tubing, 4" high, using No. 22 DCC. L1 consists of 12 turns and L2 of 47 turns. C is a .0005 variable condenser. The regeneration is controlled mainly by the rheostat. C2 is the .00025 mfd. grid condenser, C3 is .001 mfd. This set works well on dry-cell tubes.

Is a "Bargain" Radio a Good Purchase?

IT IS not what you pay a minister to marry you but the upkeep cost of the years afterward that count. The first cost in most things is not the most important to consider, but the utility, the pleasure and the upkeep.

No art or industry has moved so rapidly in the past three years as radio. Some manufacturers would no more than get a model out before some rival would have a better one. Some sets that brought in stations loud and clear were found not to be selective; others that were selective were apparently so selective that they choked off the rich harmonies and produced distortion. Others were "howlers."

About this time of the year defective sets and obsolete models are gathered together and sold to some department store at whatever cash price the manufacturer can get. Most of these sets are junk. Anything the manufacturer can get over the price of junk is considered salvage.

The department stores turn their advertising experts on the job. They produce most attractive newspaper pages, telling about the set that has been selling for $100 or $200 and now it can be bought for $20 or $30. To the uninitiated this is apparently a wonderful radio bargain.

For example, the other day I read a department store advertisement of one of these sets, a model discontinued largely on account of the poor volume it gave. One of RADIO WORLD'S staff went down to the department store to see what kind of a loud speaker they were using to make the set produce a satisfactory volume, and to his surprise the investigator found that even with an ordinary loud speaker it was giving great volume.

On investigation he found that the manager of the radio department of this department store had placed an excellent power amplifier under the counter, which would bring forth great volume even from a crystal set. Of course when a customer took the set home he could lay the weak reception to his aerial or his own loud speaker.

Another store is advertising that it will take back your old set and allow you $75 toward the purchase of a new set. Of course the consumer knows that he can buy a new Freshman 5-tube set for $60, and according to this advertisement can get $75 in exchange! The other set, advertised for sale, originally was priced at about $200 and a better one can be bought today for half the price.

If you have had no past experience in radio, ask a "fan" who is a reader of a radio paper and who has had actual experience with a radio set. Hear his set, then, if you like it, buy just that set AND BUY IT from A REGULAR RADIO dealer. As a rule the store or dealer in regular radio products does not buy junk, for it does not pay to buy poor radio merchandise at any price. He leaves it to the department store to buy up all the junk.

Then there are the piano and phonograph stores. The phonograph man's experience has largely been in the beauty of the cabinet or case. His training for years has been along the "line of beauty." He sells you exactly the same phonograph in different cases all the way from $50 to $500.

As a rule the average phonograph man

(*Concluded on page 25*)

How to Hear Pure CW Signals On a Super-Heterodyne

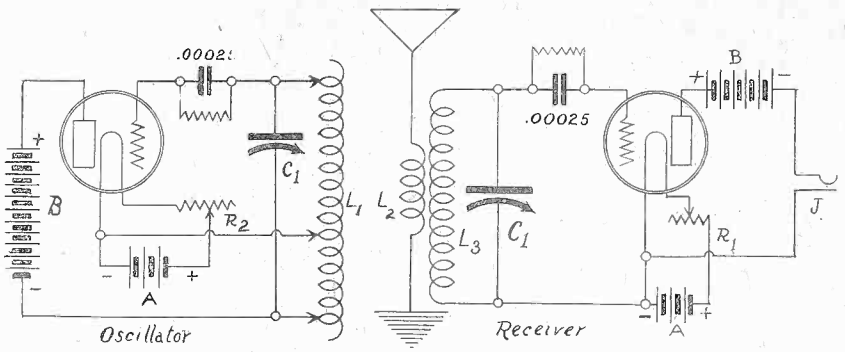

FIG. 1, a separate oscillator placed in inductive relation to the antenna coil, or the open oscillating circuit of the non-regenerative receiver. C1 is a calibrated condenser and L1 is a coil which can be moved about, so that the oscillations from the oscillator coil can be varied (moved nearer or further away from L2.) The variable condenser is of the General Radio Wavemeter type, .0005. L1 has 75 turns wound on a 6" high tubing, 2½" in diameter. The B battery should be 67½ volts, A UV201A vacuum tube is used. The taps for L1 are at every three turns

By Lewis Winner

Radio Engineer

ONE way of employing the heterodyne method of reception, which consists of an external oscillator or generator of radio-frequency currents coupled or put in inductive value to a non-regenerative vacuum receiver, is shown in Fig. 1. Now let us take an example of how this system works. Let the incoming wave have a frequency of 500,000 cycles (600 meters). Tune the oscillator to produce oscillations at a frequency of either 499.500 cycles. Then what is known as a beat note will actuate the diaphragm of the telephone receivers, this being of a frequency equal to the difference between 500,000 cycles and 499,500 cycles, a 500-cycle audio-frequency note.

This system is used most extensively in the Super-Heterodyne receiver, for the purpose of receiving pure continuous wave signals (CW).

The special oscillator is placed in inductive relation to the grid coil of the second detector tube of the Super-Heterodyne receiver. The pure CW signal is of a radio-frequency character when it passes through the radio-frequency transformers and cannot be heard, unless a "beat note" effect is had in the second detector, so that audio-frequency tones can be heard in the telephones. When modulated CW or phone passes through the first oscillator and detector, through the radio-frequency transformer, the note is still inaudible, but can be detected by the detector in the same way that a 1-tube receiver rectifies signals. This is not so in the case of pure CW signals. All that will be heard will be a lot of clicks. Since the second detector cannot oscillate, a "beat note" has to be produced.

MacMillan to Send on Wave of Twenty Meters

A NEW era and method of dispensing publicity of Polar explorations will be inaugurated with the Donald B. MacMillan aerial expedition to discover the one million square miles of land in the Arctic this summer.

Lieut-Commander E. F. McDonald of the United States Naval Reserve, who will assist Mr. MacMillan in the trip and represent the navy, in an interview at Hotel Vandervilt, New York City, said the National Geographic Society, sponsoring the trip, and other officials at a conference in the office of Curtis D. Wilbur, Secretary of the Navy, recently, agreed to radio news of their explorations so that everybody will have a chance to get an authentic report daily. Heretofore, it is said, large newspapers and news syndicates have monopolized reports of Polar explorations of this kind.

Lieut.-Commander McDonald, who will be in charge of sending out the news from the north on a 20 meter wavelength outfit when the expedition begins, June 15, said he expects to carry along a supply of United States flags to claim the vast area of unexplored land for the United States. This land lies northwest of Melville Bay, off the coast of Greenland.

JOHN L. REINARTZ, of Reinartz circuit fame, radio operator on MacMillan expedition. Reinartz is a short-wave expert. (U. & U.)

A THOUGHT FOR THE WEEK

BUYERS of radio goods should always remember this: you usually get what you pay for.

RADIO WORLD

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

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MANAGING EDITOR, Herman Bernard

SUBSCRIPTION RATES

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

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

ADVERTISING RATES

General Advertising

1 Page, 7¼"x11"	462 lines	$300.00
½ Page, 7¼"x5½"	221 lines	150.00
¼ Page, 4½" D. C.,	115 lines	75.00
1 Column, 2¼"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%
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WEEKLY, dated each Saturday, published Wednesday. Advertising forms close Tuesday, eleven days in advance of date of issue.

CLASSIFIED ADVERTISEMENTS

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

MAY 2, 1925

A Short-Wave Receiver

Well-Known Men Contestants for Popularity Honors

Contest Rules

1. The votes in RADIO WORLD'S 1925 contest to determine the radio entertainer entitled to the popularity gold medal may be cast by filling out the coupon as published weekly in RADIO WORLD. One coupon entitles the sender to one vote. The coupon should be properly filled out and mailed. One subscribing to RADIO WORLD (a new subscriber or one renewing an existing subscription), may cast as many votes as are represented by the total number of weeks of the new or renewed subscription. In addition, as the coupons are published, the subscriber may use them for sending in one vote on each such coupon. When subscribing, cast your total subscription votes by specifying the candidate in the subscription order.

2. This contest closes July 31. The last coupon will be published in the July 25 issue.

3. In case of a tie, a gold medal will be awarded to each contestant so tied.

IMPORTANT personages will be contestants in RADIO WORLD'S contest to determine the entertainer who, in the estimation of its readers, is the most popular. That much is clear already. The opening of the contest a month ago brought forth a rain of ballots, and now that the competition is well under way there is a steady receipt of votes. To vote, clip the coupon, properly filling it out and mailing it to the Popularity Editor.

It is a little premature to publish a list of the standing of the contestants, but the printing of these lists will be begun very soon and will continue from week to week. It has been found true that those who figure in the early listings usually make a good showing at the finish. This is due to the publication of the names of early contenders stimulating votes for them, since they are in the running already. Therefore do not hold back your votes. This is friendly advice to all concerned. There is no indication that any votes are being held back, for the rush is great indeed.

Perhaps it is no violation of secrets to say that the name of J. Andrew White, popular announcer heard often from WJZ, New York City, is prominent in the contest. Friends and other admirers are backing him strong. Mr. White is famous as a sports announcer, but also cuts an important figure in other microphonic lines, for instance, announcing music. He is associated with the Haynes-Griffin Radio Service, leading New York radio retailers.

William C. Schlefeld, director of the Amphion Quartet, heard from WGBS, New York City, is one of the noted contenders, too, as is Leo Reisman and his orchestra, whose microphonic home is at WBZ, the Springfield, Mass., station which, like WJZ and WGBS, puts on delightful programs.

New Amateur Waves Recommended by World Parley

PARIS.

A PLENARY session of the International Union of Radio Amateurs and Juridical Congress of the International Radio Committee was held, M. Belin, the noted inventor, presiding. The chief topic discussed was allotment of wavelengths for amateur broadcasting, which must be subject to approval of various Governments to be effective.

The meeting unanimously approved wavelengths as follows: United States, 85 to 70 meters and 41.50 to 37.50; Canada and Newfoundland, 120 to 115 and 43 to 41.50; Europe, 115 to 95, 75 to 70 and 57 to 43; other countries, 95 to 85 and 37.50 to 35, all lengths in meters.

RADIO WORLD'S POPULARITY TEST

To Determine the Gold Medal Radio Entertainer for 1925

Popularity Editor, RADIO WORLD,
1493 Broadway, New York City.

I hereby cast one ballot for:

(Name of Entertainer).....

(Entertainer's Station).....

(Voter Sign Full Name Here).....

(Street and Number).....

(City)..... **(State)**.....

FILL OUT THIS COUPON AND MAIL NOW!

No. 4, 5-2.

Radio and the Fourth Dimension

By James H. Carroll

IS radio the key to the fourth dimension? We know that we live in a three dimensional world, that every material thing must have length, breadth and thickness; in short, that all matter must have solidity. Science tells us that there is another dimension, however, outside of the three in which we live, and savants have sought during the ages for concrete proof of its existence. Advanced mathematics, through algebraic formulae, gives theoretical proof to the laymen and accepted fact to the scientist.

Now, radio, the greatest invention of the century, may offer us at last the means of finding and proving the existence of the fourth dimension by opening communication with the inhabitants thereof, and herein lies a new field for the radio experimenter. That inherent hook-up, combining the requisite selectivity and sensitivity; what plate coils and condensers, and what powered tubes will be required to detect and amplify the undiscovered signals constantly flashing through the ambient ether? Great indeed will be the honors and rewards accruing to the one who will eventually answer these questions in theory and demonstration.

If any of you doubt that unknown signals are constantly passing through your antenna, ask any advanced radio experimenter you know and he will tell you of the weird noises he has often received over his speaker or phones, especially late at night or in the early mornnig. During the last Transatlantic tests, the eclipse and the recent nearness of Mars to the earth, many strange phenomena were heard by experimenters, and at one of the foremost stations in the country, operators believed they were picking up signals from Mars.

These have been explained away as static, heterodyning, carrier-waves, etc., but the experienced fan having a discriminating ear for these sounds is not easily misled by these causes and the man with an open mind will admit that many things are possible, and who knows but what some night an unknown Columbus of the air skillfully coaxing his dials may bring in a message from the Great Unknown, mayhap a message from the beings of the Fourth Dimension, the long sought message from Mars or some other planet, or from the spiritual plane where dwell the departed souls.

Many theories have been advanced as to the fourth dimension, and the most interesting and easily understood is that it is a plane superimposed upon the one on which we live, so that continents, cities and their inhabitants may be intermingled with ours without our being able to detect them, we not being able to perceive this fourth dimension, it having neither length, breadth nor thickness. For illustration, take a sheet of cigarette paper and hold it edgewise between you and the light; if you get it in the right position it will almost disappear from your sight as it has almost the minimum of length, breadth and thickness. If you could take away from it these three dimensions it would disappear, becoming a fourth dimensional object and if you could add these three dimensions to a fourth-dimensional object it would become visible to you and be on the material plane.

If this theory is true and the fourth dimension exists, communication is only a matter of apparatus and radio offers the key. Light vibrations or sound vibrations will not reach it—therefore, there remain only radio vibrations which penetrate the ether for incalculable distances, the theory even having been advanced that they go on intreminably. Now, as to communication, it is reasonably possible that our broadcast waves reach into this unknown plane.

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,
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Thomas Williams, 1100 E. Madison Ave., Youngstown, Ohio.
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Richfield Hardware, Dealers, 54th & Nicollet Ave., Minneapolis, Minn.
Fred White, Muscatine, Iowa.
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H. T. Coop & Co., Dealer, P. O. Box 135, Granite, Okla.
Hugh Hunnicutt, Hominy, Okla.
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Anthony Ahern, Orchard St., Medford, Mass.
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R. A. Macomber, Dealer, Parma, Mich.
Burton Lindheim, 523 W. 187th St., radio expert, New York, N. Y.
George F. Bryde, 9 Rock St., Canjoharie, N. Y.
Montgomery Electric Light & Power Co., Dealers, Canjoharie, N. Y.
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H. A. Fleming, 712 Monmouth St., Newport, Ky.
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John J. Eder, North and 11th Sts., Elwood, Ind. (Dealer.)
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G. F. Tucker, 620 Poplar St., Chattanooga, Tenn.
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THE RADIO TRADE

SECOND RADIO WORLD'S FAIR HAS TICKET BOOM

PRACTICALLY all of the exhibiting space in the second Radio World's Fair to be held in New York City's 258th Field Artillery Armory, September 14 to 19, is reserved.

Welfare bureaus of eleven of the biggest industrial institutions in the Metropolitan District have arranged to purchase large blocks of tickets at party rates which they will in turn retail to their employees slightly under the regular box office prices. Orders for 26,000 of these admission cards have been booked to date. This indicates that the entire allotment of 50,000 tickets which have been set aside for this purpose will be subscribed for long before the exposition opens on Monday night, September 14. Three unique features will be a Radio Factory Employees' Night, a Radio Salesman's Night and the third an Amateur Radio Club Night.

GEM TUBES ON MARKET

A VERY good tube for the price is manufactured by the Gem Tube Co., 200 Broadway, New York City. All types may be had, including a powerful 6-volt tube that meets all conditions; a 6-volt soft detector tube that is extremely sensitive; a sturdy quarter-ampere dry-cell tube; a 3-volt dry-cell tube that performs up to exacting standards, this tube being also made with a standard base to fit any socket. This concern has also perfected a 7½-volt guaranteed transmitting tube that gives the ultimate result in power and DX and is used throughout the country by amateurs for transmission, giving excellent results for this purpose. All these tubes stood up well under the most exacting tests for volume, clarity and tone.

(Tested and approved by RADIO WORLD.)

RADIO COMPANY IN MERGER

ELKHART, IND.

THE merging of five manufacturing companies two in Chicago, two in Elkhart and one in Watertown, Wis.—was announced here. The new corporation, to be known as the Monarch Industries, Inc., will be located in Elkhart.

The companies in the merger are the Monarch Tractor Company, Watertown, Wis.; Monarch Radio Corporation, Chicago; Krasco Manufacturing Company, Chicago, and the Foster Machine Company and the Foster-Johnson Reamer Company of Elkhart.

E. B. Caldwell of Chicago and New York, is president of the new organization, and W. H. Foster, Watertown, Wis., vice-president.

COMPLETE LINE OF BRACKETS

PAUL GLAMZO, 203 Lafayette Street, New York City, is offering to manufacturers and jobbers a complete line of brass brackets of the highest quality. They may be had in the smallest size to the largest (No. 10) for heavy use. Mr. Glamzo is the inventor of the Glamzo solderless lug, which he is producing in great quantities, the demand being strong all over the country.

(Tested and Approved by RADIO WORLD.)

SOME FINE SPECIALS

THE 1-A PORTABLE, 1925 Spring Model, a 2-Tube Set of Great DX Powers. Two controls. Described by Herbert E. Hayden in RADIO WORLD, issues of March 28, April 4 and April 11, with trouble-shooting article in April 18 issue. Profusely illustrated, including templates. Send 60c, get all four copies. Address Circulation Manager, RADIO WORLD, 1493 Broadway, New York City.

HOW TO MAKE IDEAL COILS, for tuning with .0005 and .001 mfd. condensers. Described by J. E. Anderson in March 7 and 14 and April 11 issues. Send 45c for all three. RADIO WORLD, 1493 Broadway, New York City.

ONE STAGE OF TRANSFORMER AF, two of resistance AF. Send 15c for April 11 issue of RADIO WORLD.

A SURVEY OF 1-TUBE DX SETS, by Lieut. Peter V. O'Rourke. Seven circuit diagrams. Great material for DX fans. Send 15c for April 11 issue. RADIO WORLD, 1493 Broadway, New York City.

A 3-TUBE REFLEX FOR THE NOVICE, by Feodor Rofpatkin. Schematic and picture diagrams, panel and assembly. Send 15c for March 28 issue of RADIO WORLD.

A COMPLETE INDEX TO MARCH ISSUES was published in the April 4 issue, the great Third Anniversary Number.

RECENT BACK NUMBERS

of RADIO WORLD, 15 cent each, or any seven for $1. Address Circulation Manager, RADIO WORLD, 1493 Broadway, New York City.

Coming Events

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

AUG. 22 to 28—3d Annual Pacific Radio Exposition, Civic Auditorium, San Francisco. Write P. R. E., 905 Mission St., San Francisco.

SEPT. 6 TO 12—National Radio Exposition, Grand Central Palace, N. Y. C. Write American Radio Exp. Co., 522 Fifth Ave., N. Y. C.

SEPT. 14 TO 19—Second Radio World's Fair, 258th Field Artillery Armory, Kingsbridge Road and Jerome Ave., N. Y. C. Write Radio World's Fair, Times Bldg., N. Y. C.

SEPT. 14 TO 19—Pittsburgh Radio Show, Motor Square Garden. Write J. A. Simpson, 420 Bessemer Bldg., Pittsburgh, Pa.

SEPT. 15 TO 19—Washington Radio Show. Write Chamber of Commerce, Homer Bldg., Washington, D. C.

SEPT. 23 TO OCT. 4—International Wireless Exp., Geneva, Switzerland.

SEPT. 28 TO OCT. 3—National Radio Exposition, American Exp. Palace, Chicago. Write N. R. E., 440 S. Dearborn St., Chicago, Ill.

OCT. 17 TO 24—Brooklyn Radio Show, 23d Regt. Armory. Write Jos. O'Malley, 1157 Atlantic Ave., Brooklyn, N. Y.

OCT. 12 TO 17—St. Louis Radio Show, Coliseum. Write Thos. P. Convey, manager, 737 Frisco Bldg., St. Louis, Mo.

OCT. 19 TO 25—Second Annual Cincinnati Radio Exp., Music Hall. Write G. B. Bodenhoff, care Cincinnati Enquirer.

NOV. 19 TO 25—Milwaukee Radio Exp., Civic Auditorium. Write Sidney Neu, of J. Andrae & Sons, Milwaukee, Wis.

NOV. 17 to 22—4th Annual Chicago Radio Exp., Coliseum. Write Herrmann & Kerr, Cort Theatre Bldg., Chicago, Ill.

DEC. 1 TO 6—Boston Radio Show, Mechanics' Hall. Write to B. R. S., 209 Massachusetts Ave., Boston, Mass.

New Incorporations

The Indiana Radio and Electric Company, capital of $50,000; Robert J. Spencer, Robert J. Spencer, Jr., and Arthur E. Case.

Retail Stores Corp., radio, $50,000; H. M. and H. Stein, M. Cohen.

Swan-Haverstick, Trenton, N. J., radio supplies, 1000 shares, no par; Charles E. Swan, Daniel F. Haverstick, Harlan H. Cope, Trenton. (Atty., Homan & Buchanan, Trenton).

Broadcast Electrical and Radio Supply Co., Newark, $125,000; Max Schechter, Anne Schechter, William Lachs, Gussie Lachs, Newark. (Atty., William L. Greenbaum, Newark, N. J.).

Business Opportunities Radio and Electrical

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RADIO AND ELECTRICAL STORE, GOOD location, low rent; no competition; established 2 years; dissolution of partnership reason for selling. Box 10, Radio World.

RADIO PATENTS WANTED (NOT PATENT applications) by one of the largest radio manufacturers; mail copy of patent and if possible state purchase price. Box 20, Radio World.

WANTED—Broker or security-selling organization handle small issue on attractive basis for radio manufacturer with completely equipped plant for manufacturing high-grade receivers and parts. Box 30, Radio World.

A LARGE, WELL-ADVERTISED RADIO manufacturing concern requires additional capital for expansion; worth investigation. Box 40, Radio World.

RADIO ENGINEER, HAVING SEVERAL unusually good inventions, is looking for associates with $50,000 up, to manufacture same; only principals willing to build up a solid enterprise need reply; references exchanged. Box 50, Radio World.

MANUFACTURER OF RADIO PARTS HAS developed set that operates from lighting circuit, wishes active partner with few thousand capital to market. Box 60, Radio World.

THE DIAMOND OF THE AIR, by Herman Bernard, a 4-tube DX loop set of tremendous range and power. Three controls. Not reflexed. Send 45c, get April 4, 11 and 18 issues. RADIO WORLD, 1493 Broadway, New York City.

COPENHAGEN EXHIBITION HELD

WASHINGTON.

FROM March 7 to 15, the Dansk Radio Club held a radio exhibition in Copenhagen, which was the first of its kind attempted in the Scandinavian countries, says A. E. Fenselau, Clerk to Commercial Attache, Copenhagen, in a report to the Department of Commerce. The exhibition was well attended and has resulted in arousing a great deal of enthusiasm and interest in radio developments.

Practically every Danish radio dealer and manufacturer was represented at the exhibition. The dealers showed numerous articles of German, French, British, and American manufacture in addition to domestic products. A few complete sets of local manufacture were exhibited, but the majority of the sets were apparently assembled in Denmark from imported parts. In fact, it appears that the greater part of the business done in Denmark by foreign manufacturers is in radio parts and accessories. Several firms, including a German manufacturer, exhibited combination receiving sets and phonographs.

Fan Gets DX on Crystal Set But Can't Tell Why

Covers Almost Half of Continent

WASHINGTON.

ANOTHER long-distance record has been established by a crystal set at the National Capital. R. B. Gott, warrant clerk of the Police Court, claims to have received WCCO, Minneapolis, Minn., on his set. Mr. Gott lives in Dixon, Md., and through some unexplained scientific reason has been able to get into the tube set class with his crystal. Besides WCCO he has picked up with it Davenport, Iowa; Zion City, Chicago, Cincinnati, New York and Springfield, Mass.

THE 1-A PORTABLE, 1925 Spring Model, a 2-Tube Set of Great DX Powers. Two controls. Described by Herbert E. Hayden in RADIO WORLD, issues of March 28, April 4 and April 11, with trouble-shooting article in April 18 issue. Profusely illustrated, including templates. Send 60c, get all four copies. Address Circulation Manager, RADIO WORLD, 1493 Broadway, New York City.

A $5 HOME-MADE LOUDSPEAKER, by Herbert E. Hayden, in Feb. 7 and March 4 issues. Send 30c for both copies. RADIO WORLD, 1493 Broadway.

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

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"BARGAIN" RADIOS

(*Concluded from page* 19)

knows nothing about radio. He keeps one or two brands of high-priced sets, largely because they look well, and even if you buy your radio at a radio-phonograph store you will eventually have to go to a radio dealer to buy your aerials, batteries, tubes and accessories as well as to have problems solved. So why not go to the radio dealer at the start?

The other day one of my friends told me he could buy a good bargain in a radio set at one of the large department stores and asked my advice. I told him not to buy it. He said: "Why, this set is made by one of the best-known and reputable manufacturers. My brother bought a set made by the same manufacturer and it works beautifully."

I then suggested to him that he investigate carefully just what his brother had bought. The result was that although the set the department store was selling was made by the same manufacturer, it proved to be "one of the mistakes," a set that was so defective that the manufacturer had withdrawn it from the regular market.

In other words, even though a good name is on a set, it may be one of the poorest that that manufacturer ever made—in fact too poor to sell through the regular channels.

I have just received a letter from F. A. D. Andrea, Inc., who say: "The vultures are busy." Many times a day, the firm is called up on the telephone by "get-rich-quicks" who want to know if they have some obsolete sets "at a price." Andrea's reply is always: "We have no obselete stock, but if we did have we would throw it in the river before we would throw it on the market."

All manufacturers would find it more profitable to follow this lead.

—F. S. C.

The Directions for Making Neutralized Loop Antenna

(See pages 16 and 17)

THERE are many divergent opinions concerning the best kind of wire with which to wind a loop. The photographs show a loop, embodying on a modified scale the zero potential principle discussed by Frank Freer. The wire used was No. 22 double silk covered.

Attach the Bakelite insulator to one end of the crossarms, as shown in close-up in Fig. 4 and depicted in relative position in Fig. 3. Wire stronger than the winding wire is preferable. Then attach one winding wire to the other aperture in the insulator, leaving about one foot slack before starting, so that this excess may be used for purposes of connection to the binding post shown in Fig. 2. Place a woodscrew in the frame (bottom of Fig. 7), a small piece of insulator tubing covering the screw and serving as a sort of bushing. This screw is in one bottom arm. The tubing may be hard rubber, ¼" long. This screw is at center of the arm (Fig. 8). At the other arm two similar insulated screws are inserted, these being, however, equally off center, sufficiently to each side of center line to permit the wiring to be accommodated by the pair of notches (Fig. 9). These screws are on the other bottom arm.

Seven full turns of wire are wound in one direction. Next carry the winding three-quarters around the square to the first of the pair of insulator screws, return to the single center screw at the opposite arm, catch the winding on the remaining one of the pair of insulated screws, and then, counting from this point, put on seven more full turns. All told there are fourteen full turns and four ¾ turns, a total of eighteen turns. As for the pairs of seven turns, each turn is wound completely around in the form of a square, while the four other turns do not go across the bottom of the loop (Fig. 9) and thus make room for the base rod.

It will be seen that the object of using three insulated screws is that the odd number causes the direction of the winding to be changed. Thus, in the winding, four turns made around these screws cause the zero potential to be set up, according to Mr. Freer. His system contemplates the termination of both windings at a common binding post, and he asserts that better results are obtained that way, for the reasons which he outlined.

The theory of the loop as constructed is that it has no net inductive value more than an outside aerial, self-induction being equalized, hence nullified.

The four corner arms, the two X-shaped supports and pair of braces therefore are clearly shown in the photographs.

This is made as a 1 ft. loop, that is, each side of the square is 1 ft. The cross-corner supports (shown as stiff rods in Fig. 6), are not essential.

Mr. Freer outlines two methods of connection, one employing the single binding post, the other two posts. A regular loop set would require two connections in conventional style, a condenser tuning the loop. A crystal set would be connected as follows: Both loop terminals to the aerial post, the ground post to ground.

On an aperiodic primary set the loop's two terminals would go to the aerial post and the ground post to ground.

One terminal of the loop is negative, the other positive, the center neutral or zero potential.

Good Tube News and Information

Its Great Importance, Etc.

ONE of the most essential factors in radio reception and transmission is the thermionic valve, more widely known as the vacuum tube. Some of the functions which a tube is capable of doing: — speech amplifying and modulating, oscillating, rectifying and filtering. Of course, the function which most people are familiar with is the rectifying value of the tube. Here is what really happens inside the tube:—The filament is heated, the source of power being from a battery, so that electrons may flow from filament through meshed grid to plate. The grid is the device which controls the amount of electrons which flows from the filament to the plate, which in turn varies the plate current and determines the amplification of the tube. Now the tube here in question has a filament, which takes a quarter of an ampere and is made of thorium, this metal having the highest electron emission and taking the lowest amount of current of any metal known. The plate is of nickel and the grid of nickel mesh. The plate and grid are so mounted that neither will touch, no matter how rough a treatment the tube is subjected to. The amplitude of the R. F. signals after rectification in the tube is greater than in any other tube, according to tests held at our laboratories. The tube is very quiet in operation and requires no delicate filament control. This tube is absolutely guaranteed against any technical or physical defects, and it sells for the small price of $1.00. The manufacturers deserve some real credit for putting out a tube of such high quality. $2.00 is the price, but the $1.00 figure will prevail for a little while as an advertising plan. The James H. Konkle genuine guaranteed LOUDSPEAKER vacuum tubes will be sent you direct on request. Just pay your postman $1.00 for each tube on delivery. Moreover, every tube is sold on a money back guarantee. Address James H. Konkle, 192 Market Street, Newark, New Jersey.

AMATEURS RESTRICTED

INSTRUCTIONS have been issued to amateurs that in the future they will not be permitted to communicate with commercial or government stations unless authorized by the Secretary of Commerce, except in an emergency or for testing purposes which may be construed to cover official government business.

"HOW TO MAKE—"

The following constructional articles have appeared in recent issues of RADIO WORLD:

Sept. 6, 1924—A simplified Neutrodyne with Grid-Biased Detector, by J. E. Anderson. A Low-Loss Wave Trap, by Brewster Lee.
Nov. 15—A Sturdy Low-Loss Coil, by Lieut. P. V. O'Rourke. An Ultra 2-Tube Receiver, by Byrt C. Caldwell.
Dec. 6—A 6-Tube Super-Heterodyne Using a Variometer, by J. E. Anderson. A $1 Coil Winder, by Herbert E. Hayden.
Dec. 13—The World's Simplest Tube Set, by Lieut. P. V. O'Rourke.
Dec. 20—A 1-Tube DX Wonder, Rich in Tone, by Herman Bernard. An Interchangeable Detector, by Chas. M. White.
Dec. 27—A 2-Tube Variometer Set, by Lieut. P. V. O'Rourke.
Jan. 3, 1925—A 3-Tube Portable That Needs No Outdoor Aerial, by Abner J. Gelula.
Jan. 10—A Low-Loss DX Inductance, by Herbert E. Hayden.
Jan. 17—A $25 1-Tube DX Wonder, by Abner J. Gelula.
Jan. 24—A Selective $15 Crystal Set, by Brewster Lee. A Variometer-Tuned Reflex, by Abner J. Gelula. An $18 1-Tube DX Circuit for the Beginner, by Feodor Rofpatkin.
Jan. 31—A Transcontinental 2-Tube Set, by H. E. Wright. An Experimental Reflex, by Lieut. P. V. O'Rourke.
Feb. 7—The Bluebird Reflex, by Lieut. P. V. O'Rourke. A $5 Home-Made Loudspeaker, by Herbert E. Hayden.
Feb. 14—A Super-Sensitive Receiver, by Chas. H. M. White. A Honeycomb RET for DX, by Herbert E. Hayden.
Feb. 21—A 1-Tube Reflex for the Novice, by Feodor Rofpatkin. A Set for Professional Folk, by Lieut. P. V. O'Rourke. A Honeycomb Crystal Receiver, by Raymond B. Wailes.
Feb. 28—A Set That Does the Most Possible With 6-Tubes, by Thomas W. Benson. Three Resistance Stages of AF on the 3-Circuit Tuner, by Albert Edwin Sonn.
March 7—Storage B Battery, by Herbert E. Hayden. Benson's Super-Heterodyne.
March 14—The Reflexed 3-Circuit Tuner That You Can Log, by Herman Bernard.
March 21—A Variable Leak, by Herbert E. Hayden. A 4-Tube, 3-Control Set That Gets the Most DX, by Lieut. P. V. O'Rourke.
March 28—The Improved DX Dandy Set, by Herbert E. Hayden. A 3-Tube Reflex for the Novice, by Feodor Rofpatkin.
April 4—The Diamond of the Air, by Herman Bernard. What the New Sodion Tube Is, by Sidney E. Finkelstein. Sets for the DX Devotee, by Lieut. P. V. O'Rourke.
April 11—Audio Hookups for Fine Volume and Quality as Well, by Brewster Lee. The Coils for The Diamond, by Herman Bernard. 1-Tube Distance-Getting Sets, by Lieut. V. P. O'Rourke.

Any copy 15c., Any 7 copies, $1.00. The whole 21 copies for $3.00, or start subscription with any issue. Radio World, 1493 Broadway, N. Y. City.

Standards Bureau Will Test Low Waves In Summer

WASHINGTON.

PLANS are being completed at the Bureau of Standards for a series of observations during the summer months on the unexpected phenomena encountered in the very high frequencies. It is hoped that fuller knowledge of these phenomena may make it possible for methods to be devised to overcome some of the present difficulties to perfect transmission and reception.

Already two such observations have been made, the first in connection with the solar eclipse, and the second on the marked changes of transmission occurring at sunset. The details of future cooperative tests to be arranged will be determined to a considerable extent by the cumulative result of the completed tests.

Laboratories all over the country are invited by the Bureau of Standards to participate in this work. The apparatus required for recording signal intensity variations can be constructed for the most part from the equipment of the average college or commercial radio laboratory.

10,000,000 Radio Sets by 1930

TEN million radio sets will be in use in the United States in 1930, according to a survey of the industry from the time of its first real start five years ago. Estimated expenditures by the American public for radio in 1925 will total $450,000,000, as against $2,000,000 spent in 1920 and $345,000,000 spent last year.

Marked increase has been shown in the use of radio by the farmers of the country. There were 145,350 sets on farms in 1923. Last year 360,000 sets were in use in the homes of farmers. Investments by the agriculturists in radio two years ago totalled $18,459,450. In 1924 they spent $46,990,000.

Evolution of the volume of complete set sales affords interesting statistics. In 1920 all sets in use were assembled from parts. In 1923 82 per cent were thus assembled. In 1924, and so far this year, 40 per cent of all sets in use were bought complete.

Broadcasting stations in the United States today number 563. Of the total, 108 stations are in Class B, with power of 500 watts or more, wavelengths of more than 279

"How near to the saturation point is radio?" January 1 there were 11,000,000 of the 26,000,000 homes in the United States without motor cars; 16,000,000 without phonographs; 13,000,000 without electricity and 22,000,000 without radio."—*Radio Investors' Guide.*"

REVIEW

(*Continued from page 6*)

connection between the condenser and plate, angle bracket, and bus bar strip is assured.

Fig. 10 also shows how the binding post terminal strip is mounted on the bracket. Connections to the binding posts are made on the under side, and the wires are soldered to lugs fastened to the posts.

Other Attractive Features

"Radio Broadcast" makes a strong appeal to the popular interest in radio—the listener-in—as well as paying attention to the needs of the technical fan. Along the popular line are such articles as "A New Method of Transmitting Photos by Wire or Radio," by Charles C. Henry; "How the Government is Regulating Radio Broadcasting," by R. S. McBride; "The March of Radio," Prof. J. H. Morecroft's masterly monthly department; "As the Broadcaster Sees It," by Carl Dreher, and "Do Weather Conditions Affect Radio?" by Eugene Van Cleef.

"How to Solder," by W. F. Crosby; "How to Design Radio Coils," by Homer S. Dairs, and the technical information department, "The Grid" will prove attractive to the technician.

"RADIO NEWS" May Issue

ONE of the fascinating constructional articles in "Radio News," may issue, is "The Most Selective Set," by Alfred R. Marcy. The circuit, as shown here, consists of a stage of RF ahead of a tube detector, regeneration being employed by feedback from detector plate to RF grid. Says Mr. Marcy (p. 2078):

"With the constant increase in the number of broadcast stations in every populous city, the question of receiving anything but the most powerful local station becomes of the utmost importance. In fact, with a majority of the sets now on the market, it is almost impossible to get an out-of-town station operating on a wave-length anywhere in the immediate neighborhood of the locals. The set described in this article is undoubtedly the most selective one possible, incorporating at the same time no new device and very simple tuning."

After telling of progressive experiments the author says:

"We, therefore, come to the complete circuit, the antenna inductance directly connected to the grid circuit of the first tube. The closed oscillatory circuit coupled to the antenna is a wave trap while that coupled to the plate circuit is more properly termed an inductively coupled variable reactance, whose function is to increase the effective plate inductance, L_s, as L_2 C_2 is brought into resonance with the incoming frequency, thus again allowing increased selectivity and

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RADIO HOSPITAL. Specialists in Neutrodynes and Superhetrodynes. Radio Central, Abilene, Kansas.

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THE JRS PROFESSIONAL model nine tube Super-Heterodyne gives enormous volume, knife-like selectivity and the sensitiveness of the bloodhound. Simple to construct at moderate cost. Parts obtainable most any store. If you want to take the "cake" for distant reception and perfect reproduction try this one. Speaker range—3,000 miles—average weather conditions. Complete blueprints leaving nothing to guess at. $2.00. Jordan Radio Shop, Jordan, N. Y. Experimental work a specialty.

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THE DIAMOND OF THE AIR, by Herman Bernard, a 4-tube DX loop set of tremendous range and power. Three controls. Not reflexed. Send 45c, get April 4, 11 and 18 issues. RADIO WORLD, 1493 Broadway, New York City.

COMPLETE LIST OF U. S. BROADCASTING STATIONS appeared in RADIO WORLD dated April 4, 1925. 15c per copy, or start your subscription with that number. RADIO WORLD, 1493 Broadway, N. Y. C.

PATENTS—Write for free Guide Books and "Record of Invention Blank" before disclosing inventions. Send model or sketch of your invention for our Inspection and Instructions Free. Terms reasonable. Radio, Chemical, Mechanical, Electrical and Trademark experts. Victor J. Evans & So., 924 Ninth, Washington, D. C.

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A $5 HOME-MADE LOUDSPEAKER, by Herbert E. Hayden, in Feb. 7 and March 4 issues. Send 30c for both copies. RADIO WORLD, 1493 Broadway.

HOW TO MAKE A VARIABLE GRID LEAK. Send 15c for March 21 issue of RADIO WORLD.

ONE STAGE OF TRANSFORMER AF, two of resistance AF. Send 15c for April 11 issue of RADIO WORLD.

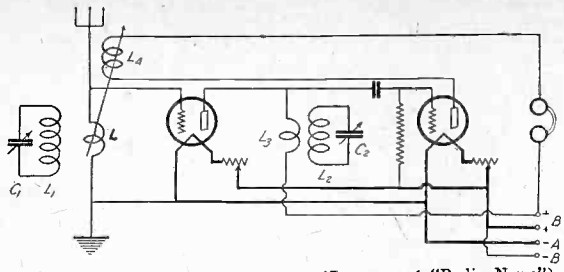
A 3-TUBE REFLEX FOR THE NOVICE, by Feodor Rofpatkin. Schematic and picture diagrams, panel and assembly. Send 15c for March 28 issue of RADIO WORLD.

HOW TO MAKE IDEAL COILS, for tuning with .0005 and .001 mfd. condensers. Described by J. E. Anderson in March 7 and 14 and April 11 issues. Send 45c for all three. RADIO WORLD, 1493 Broadway, New York City.

A SURVEY OF 1-TUBE DX SETS, by Lieut. Peter V. O'Rourke. Seven circuit diagrams. Great material for DX fans. Send 15c for April 11 issue. RADIO WORLD, 1493 Broadway, New York City.

Set Called Utmost In Selectivity

Use of Absorption Method described by Alfred R. Marcy in "Radio News," May issue.



(Courtesy of "Radio News")

MARCY'S "Most Selective Set," as published in the May issue of "Radio News." Note the two closed circuits, C1L1, a wavetrap, C2L2 an inductively coupled variable reactance. The aerial goes direct to grid, the best way to get greatest signal strength.

sensitivity greatly. It is only optional to incorporate an inductively coupled input circuit, which means an extra control.

To tune the circuit, the antenna wave trap is tuned to the incoming interfering wave so that it can be completely absorbed. All frequencies other than this will readily pass through the antenna circuit and onto the grid of the first tube. Of course, it is desirable to tune in but one station. L_2 C_2 is then adjusted to resonance with the incoming desired wave and its coupling varied in relation to L_3 for the purpose of controlling the conditions for self-oscillation. Having received a maximum signal, L_4, the tickler feed-back coil is coupled to the antenna coil until again best results are obtained.

"As many as three stages of radio frequency amplification using this method of coupling can be used, although the circuit must of necessity contain numerous controls. It is most desirable, however, to use the circuit with no further alterations, since exceptionally good results may be had with it."

Coils You May Use

The winding of the coils is not given, as that was beyond the object of the article. C1L1 and C2L2 may be identical, consisting of 41 turns of No. 20 double silk covered wire on a 3½" diameter tubing, 4" high, a .0005 mfd. variable condenser (C1, C2) being placed in shunt. L and L3 are aperiodic primaries and may consist of 10 turns each of No. 20 DSC wire on the same tubing as the closed circuits. L4, the tickler, may be 30 turns of No. 26 SSC wire on a 2¾" diameter tubing 2¼" high. If commercial coils are used LL1 may be an RFT, with C1 of proper capacity to cover the wave band, L3L2L4 being a 3-circuit coupler. The rheostats may be placed preferably in the negative leg. The grid condenser is .00025 mfd. and the leak normally 2 megohms.

Adelman's Interesting Article

Leon L. Adelman, noted expert, discusses "Oscillations and How They Are Overcome." The capacity bridge, potentiometer, the Hazeltine circuit, the suberdyne and the

(*Concluded on next page*)

Broadcasting Unites Religious Spirit, Says Bishop

WASHINGTON.

BISHOP James E. Freeman, whose sermons every Sunday morning are broadcast, is convinced that the new art will do more to spread religious teachings than any other medium. He said:

"Through the medium of the radio we will bring about among all types and classes of our people not only a better understanding, but a finer spirit of unity and comradeship. In the course of a ministry covering thirty-one years I have never had a greater evidence of the widespread interest in religion—and that from all types of people—than during the year and a half in which we have been broadcasting our services from the National Cathedral in Washington.

Unity of Spirit Shown

"It is becoming literally true that the transmission of truth through the medium of the air effects a unity of spirit hitherto unknown. Jew and Gentile, Catholic and Protestant are coming to realize that 'God hath made of one blood all nations of men to dwell on the face of the whole earth.'

"The volume of my mail, from what I have come to call my radio congregation, represents every type of mind and every profession of religious faith. Among the most chivalrous and generous of these letters are those that come from communions other than my own.

Letters From All Classes

"Nothing has heartened or encouraged me more than the letters I have received from rabbis and Catholic priests and the official representatives of the many communions scattered over the countryside. These letters disclose a passionate yearning for a finer expression of unity and fellowship. They also reveal, without exception, the transcendent interest of men generally in the great theme of religion.

"If anyone needs a demonstration of the sheer popularity of religion, let him note the interest disclosed Sunday after Sunday by countless thousands in the religious messages sent over the air.

"No one may venture to forecast what the future influence of this new method of transmitting the gospel message is to be in the days that lie ahead."

REVIEW

(*Concluded from preceding page*)

closed inductive circuit are thoroughly discussed and illustrated.

Sylvan Harris, brilliant managing editor of "Radio News," writes on "Some Effects of Resistance in Radio Tuning Circuits." Power losses are explained.

Gernsback's Vision

The cover design evidences the prophetic genius of the editor, Hugo Gernsback. It shows father and daughter listening to "Radioscopa," the electrically-dialled set of the future, that brings in European stations at will. This bears on Mr. Gernsback's article, "Radio in 1935" (p. 2050).

A. P. Peck has an article on "Overhauling Your Radio Set." among the other good things in this issue.

DAESCHNER IS A FAN

EMILE DAESCHNER, the new French Ambassador, is an ardent radio fan and makes it a point to tune in when any prominent speakers are on the air.

Transatlantic Phone Tests Prove Successful

LONDON.

SECRET wireless experiments from British stations have resulted in a success which brings within a measurable distance the time when telephone calls between this country and the United States will be possible, declares The Morning Post.

The experiments have been conducted from Rocky Point, in America, and two places in England, in Somerset and Wiltshire. Results, the newspaper says, prove very definitely that the day of the public wireless telephone and regular transatlantic commercial service is near at hand. The high-power station at Rugby when completed will be the England equivalent of Rocky Point.

The experiments, which have been kept a dead secret, have indicated that wireless telephony is a commercial possibility during the mornings, evenings and nights of Summer, while from September to the end of April communication of a commercial standard can be maintained during the whole twenty-four hours, except at sunset. Sunset presents difficulties which may never be overcome.

It is almost impossible for the conversations to be tapped. The Morning Post says, when the plans are completed for transmission of regular messages; each station will be connected with a large central exchange, so that when a subscriber calls "Transatlantic trunks" he will be switched to an exchange that will put him on to the New York or Rock Point exchange, and this exchange immediately will switch him to the required number.

SOS Calls Drowned By News to Ships, League Hears

GENEVA.

PASSENGERS on de luxe steamers may soon have to sacrifice their breakfast newspapers for safety.

Resolutions of the League of Nations Radio Telegraphic Committee published show that the International Federation of Radio Telegraphists considers that excessive transmission of news dispatches by radio to passenger ships may interfere with the reception of distress signals.

The League of Nations Committee is calling the attention of members of the International Radio Telegraphic Union to this question. The problem will come up at the Washington conference for the revision of the radio telegraphic convention of 1912. If the United States officials follow the suggestion of the League committee they will place on the agenda the questions of security at sea and the protection of navigation.

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Give low losses and amplification without distortion to any set

QUALITY and distance are what a radio set must give. To insure Quality, amplification without distortion is essential. And to insure Distance, low losses are essential. That is radio in a nutshell.

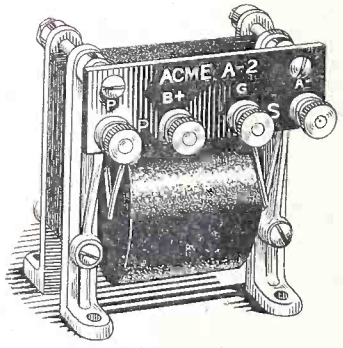
People in whose sets Acme Transformers are used, are sure of hearing concerts "loud and clear" so a whole roomful of people can enjoy them.

The Acme A-2 Audio Amplifying Transformer is the part that gives quality. It is the result of 5 years of research and experimenting. It gives amplification without distortion to any set. Whether you have a neutrodyne, super-heterodyne, regenerative or reflex the addition of the Acme A-2 will make it better.

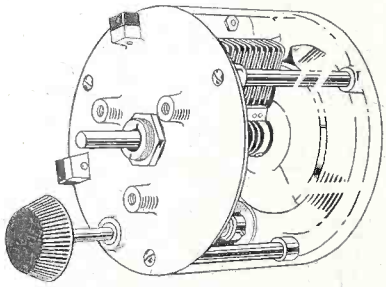
To get the thrill of hearing distant stations loud and clear, your set must have low losses for it is low losses that give sharp tuning to cut through the locals, and it is low losses that allow the little energy in your antenna to come to the amplifier undiminished. That's what the Acme condenser will do for any set. And it will do it for years because the ends can't warp, the bearings can't stick and the dust can't get in and drive up the losses several hundred per cent.

The Acme Reflex (trade mark) owes its success and its continued popularity to these two outstanding parts in the radio industry for low losses and amplification go hand in hand.

Use these two parts in the set you build. Insist on them in the set you buy.



Acme A-2 Audio Frequency Amplifying Transformer



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We have prepared a 40-page book called "Amplification without Distortion." It contains 19 valuable wiring diagrams. In clear non-technical language it discusses such subjects as, Radio Essentials and Set-building; How to make a loop; Audio frequency amplifying apparatus and circuits; Instructions for constructing and operating Reflex amplifiers; How to operate Reflex receivers; Antenna tuning circuits for Reflex sets; "D" Coil added to Acme four tube reflex; "D" coil tuned R. F. and Reflex diagrams; and several more besides. It will help you build a set or make your present set better. Send us 10 cents with coupon below and we will mail you a copy at once.

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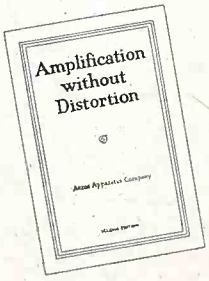

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