

April 18

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RADIO WORLD

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Vol. 7. No. 4. ILLUSTRATED. Every Week

The 7-Tube Pressley Super-Heterodyne

By Thomas W. Benson

Completing the Diamond, a 4-Tube DX Loop Set

By Herman Bernard

Eight Days' Advance Programs



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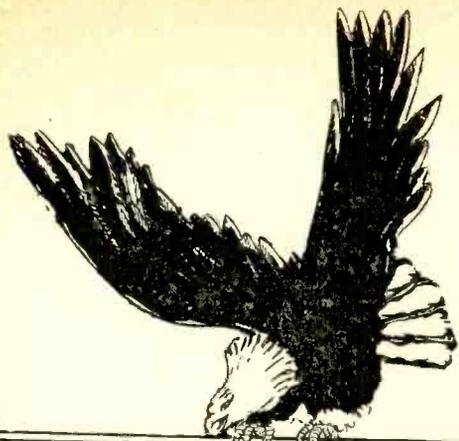
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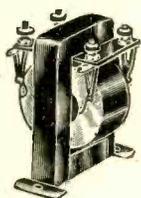
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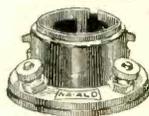
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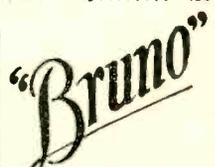


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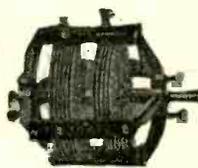


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April 18, 1925

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The 7-Tube Super-Heterodyne As Devised by Pressley

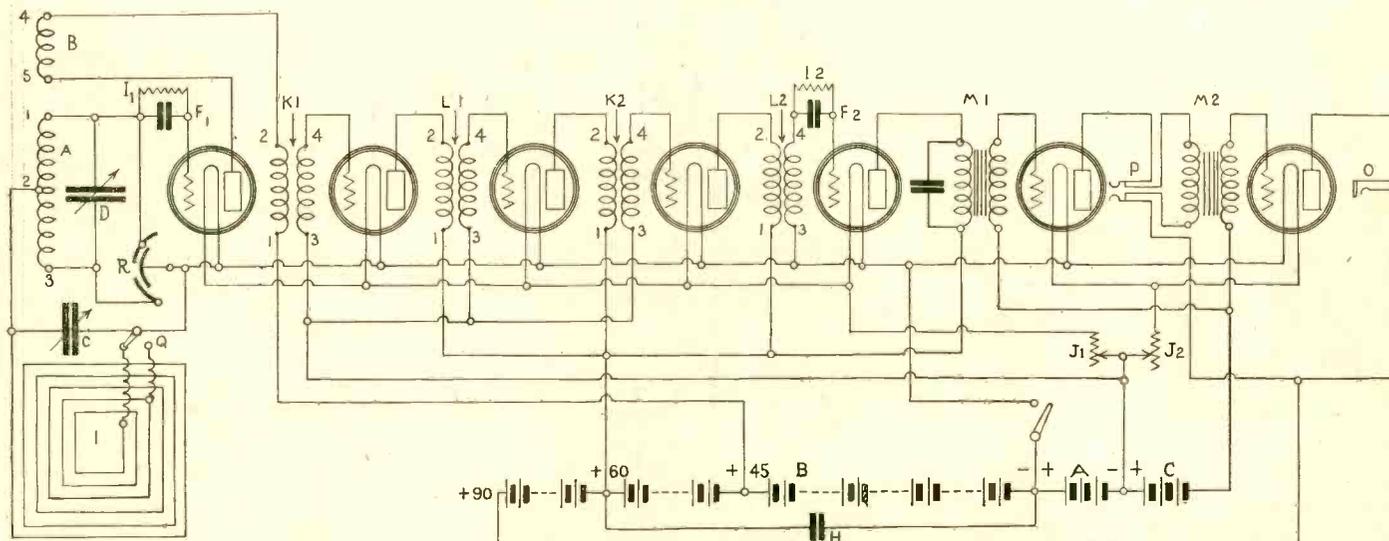


FIG. 2—Wiring diagram of the 7-tube Pressley Super-Heterodyne, one of the best circuits that can be built for loop operation. The tube at extreme left is both the modulator (first detector) and the oscillator. The fifth tube from left is the second detector, followed by two transformer-coupled audio stages.

By Thomas W. Benson

Noted Radio Engineer

PART I

THE Super Heterodyne receiver has long been regarded as the highest development of the radio art although it was originally devised some five years ago. There have been many changes wrought in the details of construction and wiring of this receiver that have improved it greatly in the intervening years but it remained for Jackson H. Pressley, Chief Engineer of the Signal Corps Radio Laboratories at Camp Vail, N. J., to remove several of the outstanding disadvantages of this type of receiver.

Possibly the most important defect of Super Heterodynes has been their tendency to radiate, due to the high-frequency currents in the local oscillator getting into the antenna. In addition to remedying this the Pressley design gives an extremely compact receiver, even making it adaptable to aeroplane service, a receiver simple in construction and operation and still retaining all the features of selectivity, long range reception, good tone value with satisfactory volume on a loop.

Bridge Arrangement Used

This is all made possible by the Wheatstone Bridge arrangement used to couple the input circuit to the oscillator without danger of causing the set to radiate. Briefly there are two important problems in the design of an efficient Super Heterodyne. The first is an effective method of producing the beat currents that give the intermediate frequency currents, the second

being the design of transformers that will amplify the intermediate frequency with highest efficiency.

In the past the usual practice has been to make use of a separate oscillator the current from which was mixed with the incoming signal currents in the detector tube to produce the beats. This required two tubes for frequency changing and likewise caused radiation. This led to the adoption of harmonic-tuned oscillators and modulation systems to reduce the number of tubes in the first case and to prevent radiation in the second, but the Pressley bridge circuit accomplishes both results, that is, the one tube functions both as oscillator and first detector yet radiation is prevented.

Solution Is Simple

The manner in which this is accomplished is so simple that it is a surprise. It has long been overlooked. Let us consider the plain tuned circuit shown at A in Fig. 1. When a current is induced in such a circuit it will be found that the potential at the points 1 and 3 will be of opposite polarity but will rise and fall in value, in phase or in step with the oscillations induced in the circuit. But at the middle point 2 there will be practically no change in potential in relation to the earth. This led to the evolution of circuits in which the input currents were fed into a center tap of the oscillator grid winding but it was found that currents from the oscillator would feed back into the tuning system and cause the set to radiate.

When the circuit is arranged in the form of a Wheatstone bridge, familiar to those who have used a similar device for measuring resistance, the effect is as shown in Fig.

1 at B. Two small condensers are provided to balance the bridge and it is possible to create potentials at points 1 and 3 without causing a difference of potential between points 2 and R.

The exact method of employing this bridge arrangement in the Pressley circuit is shown at C in Fig. 1. The coil A is the grid coil of the oscillating tube, the plate circuit of the tube being coupled to it by coil B to cause continuous oscillations in this tube. The two small condensers as shown in the bridge in B are replaced by a small split stator condenser E that permits simultaneous variation of both capacities to balance the circuit. The tuning circuit consisting of a loop L tuned by a variable condenser C is connected to points 2 and R as shown.

How the System Works

We then have the following action. The tube is oscillating at a frequency that is determined by the setting of the variable condenser D. Due to parasitic feedback or stray fields the loop L will be set into oscillation when its wavelength approaches the wavelength of the oscillator, but by carefully adjusting the balancing condenser R it is possible to balance out the circuits so that little or no energy is transferred to the loop circuit at any adjustment. The action of the circuit then is to permit any signal energy picked up by the tube to be transferred into the oscillator circuit but it is impossible for appreciable currents to get back into the loop. Thus radiation is effectively prevented.

The Heterodyne effect or frequency changing is then accomplished by one tube. The incoming signal current in mixing with the oscillator current gives rise to a beat

How Pressley's Set Excels

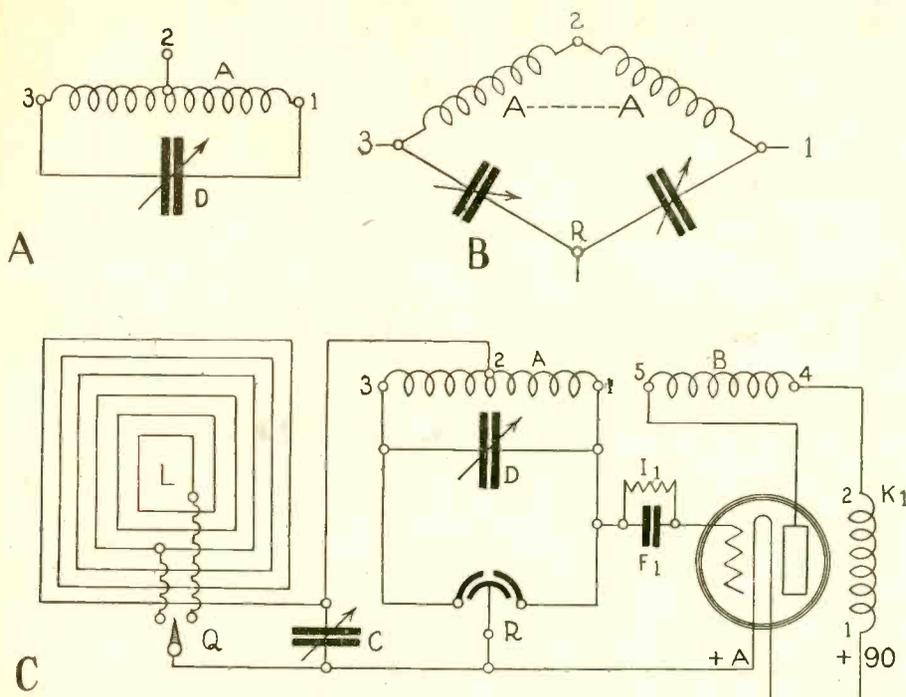


FIG. 1.—Analysis of the capacity bridge method of balancing out oscillations. Radiation is prevented, the feedback to the loop being blocked by neutralization. The balancing condenser R in Fig. C (lower) has a common rotor and two stators. At point 2 in Fig. A there is virtually no potential change in respect to ground. In Fig. B like potentials exist at 2 and R. Fig. C shows the Wheatstone Bridge effect as actually employed in the circuit.

current whose frequency is equal to the difference in frequencies of the signal and oscillator frequency. This beat current is then passed on to the following tubes for further amplification.

The complete circuit of the Pressley Super-Heterodyne is given in Fig. 2. The complete receiver employs seven tubes which may be of any of the commonly-used types of tubes. For the best all-around results the UV201A or C301A tubes are recommended and the circuit will be described as employing these tubes. Where other tubes are used the proper rheostats and A battery will have to be employed. A very good arrangement is to use five WD12 tubes with their filaments connected in series for the first five tubes, with two of the larger storage battery tubes in the audio stages.

In this circuit in addition to the combined oscillator-detector there are three stages of intermediate radio-frequency amplification, second detector and two stages of audio amplification. After the circuit is once balanced there are but two tuning controls and two rheostats to operate and when the set is mounted in the 7 x 18" panel the receiver looks like a 3-tube regenerator.

When constructing a receiver of this type it does not pay to use other than the best grade of parts. If the constructor has any doubts it is best to select from among those listed.

It is advisable to have all the parts at hand before commencing the assembly of the receiver, for one can then proceed rapidly with less chance of making mistakes in laying out and wiring. The purchase of the kit with the correctly designed and constructed intermediate transformers effectively removes the source of greatest trouble with home-made Super-Heterodynes. Unless the intermediate transformers are carefully wound and perfectly matched the operation of any Super-Heterodyne is at the best poor and is the cause of much condemnation of this type of receiver.

We will take up the drilling of the panel first. These instructions will cover the use of certain listed parts and if other instruments are substituted it will, of course, require a slightly different ar-

range of the holes in the panel for mounting them. The drilling plan for the panel is given in Fig. 3. The location of the holes should be first marked on sheet of paper of the correct size which then can be pasted on the panel and pan-center punched through the paper. By first drilling all holes with a small drill, say 1/16", it is easier to center the larger holes. An alternative method often used by the writer is to lay out the holes on the back of the panel and drill through from the back with a small drill then drilling holes to the proper size from the front prevents any marring of the front of the panel.

It will be noted that no hole sizes are given, it being a simple matter to determine the proper size of hole from the mounting screws to be used with the instruments. It is well to allow plenty of clearance around condenser and rheostat shafts. Allow at least 1/16 of an inch in both cases.

The holes double-ringed are to be countersunk, the others being straight drilled. Since a number of screw heads will show on the panel be careful in countersinking, using a regular countersink for the purpose and fitting the screws to make sure the heads fit flush with the panel or the appearance of the receiver will be spoiled.

Having drilled the panel it may be given a dull finish by rubbing lengthwise with fine sandpaper until the surface presents a fine grained appearance, then pour a little thin oil and repeat the rubbing. When the surface is perfectly smooth wipe it dry with a clean rag and a permanent satin finish will result.

With the panel completed the assembly of the instruments thereon can be started at once. The arrangement of the instruments on the rear of the panel is shown in Fig. 4 and will assist greatly in obtaining the proper relation of the parts. First mount the switches Q and R in the holes provided for them and tighten them securely. Use small wrenches wherever possible so the parts can be made secure without danger of marring the finish. Switch Q is the Carter switch jack while R is the battery switch. The rheostats J1 and J2 are next to be mounted making

List of Parts

One Sangmo Super-Heterodyne Kit. This includes the intermediate transformers and oscillator coil.

One "X" Lab. or Cardwell Vernier Condenser, .0005 with right hand vernier.

One "X" Lab. or Cardwell Vernier Condenser, .0005 with left hand vernier.

One "X" Lab. Split Condenser or Cardwell Split Stator Condenser.

Two 4" Dials.

Two Thordarson, General Radio or Stromberg-Carlson audio-frequency transformers.

One Benjamin 7-gang socket panel brackets.

One pair Benjamin Socket panel brackets.

One Benjamin grid leak panel.

One Benjamin battery switch.

One Saturn single-circuit jack.

One Saturn double-circuit jack.

One Carter jack switch.

One Dubilier fixed condenser .005 mfd.

One Dubilier fixed condenser .5 mfd.

Two Dubilier .00015 fixed condensers with leak mounts.

Two Daven grid leaks, 1/2 and 2 megohm.

Two "X" Lab. or General Radio 10-ohm rheostats.

One 7x18" drilled engraved panel.

One Standard Cabinet.

Bus wire, screws.

sure that the terminals face each other just as shown. Below the rheostats the two audio-frequency transformers are to be mounted.

Be careful in mounting the transformers that the terminals come just as shown in the illustration or it will lead to difficulties when the set is assembled. The two jacks may be mounted next, placing the double-circuit jack P above the single circuit jack O.

The oscillator coil in the kit consisting of coils A and B is to be mounted directly above switch Q in the holes provided. In mounting this coil the terminal numbered 4 should be toward the bottom of the panel.

The oscillator condenser D and the loop tuning condenser C are then mounted either side of the switch Q in the holes provided. Be sure to get the left hand vernier condenser nearest the end of the panel. The dials can be left off these condensers till the set is completed.

The split stator condenser E is mounted at the bottom of the panel as shown. This completes the assembly of the panel instruments. Too much stress cannot be laid on taking care to follow every detail of the assembly. The location of these instruments has been determined with great care to obtain the shortest leads.

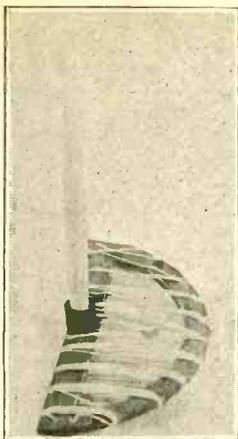
[Part II of Thomas W. Benson's article on the Pressley Super-Heterodyne will be published next week, issue of April 25, and Part III, the conclusion, in the May 2, issue. Complete constructional data will be given].

THE PRESSLEY SUPER-HETERO-DYNE, described by Thomas W. Benson, beginning in this issue, will be continued in the April 25 and concluded in the May 2 issue. Send 30 cents for the April 25 and May 2 issues to Circulation Manager, Radio World, 1493 Broadway, New York City.

AN EASILY MADE D COIL

By Jack Norwood

Illustrations by the Author.



DISTANT reception is one of the advantages of a well-made D coil. Those delighting in experiments with coils will find the D coil offers many interesting possibilities.

It may be used as a variometer, by having two windings in inductive relationship, connecting one terminal of one coil to one terminal of another, preferably with pigtail, or may serve a useful purpose for strictly inductive coupling.

Coil on Low Loss Form

Two coils are made, with a low-loss form as the support, this form being drilled to permit the insertion of a dowel stick through one counterpart, and a set-screw of the wood variety through the smaller corresponding hole. Mind you, I don't mean a wooden screw but a wood screw. The screw goes through the No. 26 hole and into the dowel.

If a variometer effect is desired the coil will be found extremely useful in providing smoothness of tuning, the low wavelengths not being crowded so closely together as they are on when a variable condenser is used for tuning a fixed coil. I refer particularly to the straight-line capacity or square law capacity condensers. The straight-line frequency and straight-line wavelength condensers give about the same effect as the D coil variometer.

Use in Regenerative Set

The number of turns on the forms, the size of the forms, and other constructional data are given in the captions. No. 18 DCC wire is used. If variometers are the desire, they may be made quite simply and used in the 3-variometer regenerative set, or, if merely regeneration is desired and the rest of a circuit is to be left intact, the variometer may be placed in series with the plate circuit of the detector tube. One free terminal of the variometer goes to the plate, the other to one of the phone connections.

Covers the Wave Band

The coil as described in the captions is sufficient to cover the wavelength band of broadcasting stations. The construction contemplates the making of two coils of similar inductive value, but whose variation as to mutual inductance is rather novel. The number of turns on each coil increases proportionately. Notice that there are notches in the form. Notch No. 1 has one turn, Notch No. 2 has two turns, etc. When two coils are made that way, and so placed together that the terminal of one coil with one turn is next to the terminal of the other coil with nine turns (the maximum number used) the inductive ratio is 9 to 1. The next step is that the relationship is 8-to-2. This system makes for great smoothness in variation and produces a coil that gives fine satisfaction.

Double Variation System

There is an inherent capacity of course due to the fact the turns of a given coil are adjacent, especially where multi-turns are on one notch. However, the total amount of this distributed capacity is rather small. There exists besides this distributed capacity the capacity effect between the two complete coils. To some extent this capacity variation is utilized in the tuning, the inductive change being

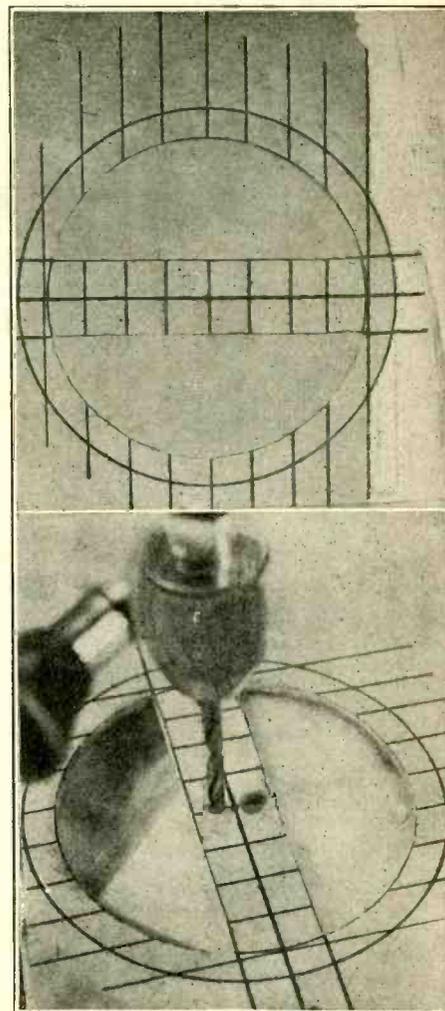


FIG. 4 (top)—The process described in Fig. 3 is completed for both top and bottom sections, as shown, the cardboard being completely removed, leaving a 1" retaining strip running through center. Fig. 5, select the center line, and about 1/4" distance therefrom, drill two holes, one on each side of the line, using No. 26 drill. In one of these holes (but not in the other) insert a 1/4" drill, making the new hole 1/4", the other hole remaining the same size as previously. With heavy shears cut along center line leaving two Ds.

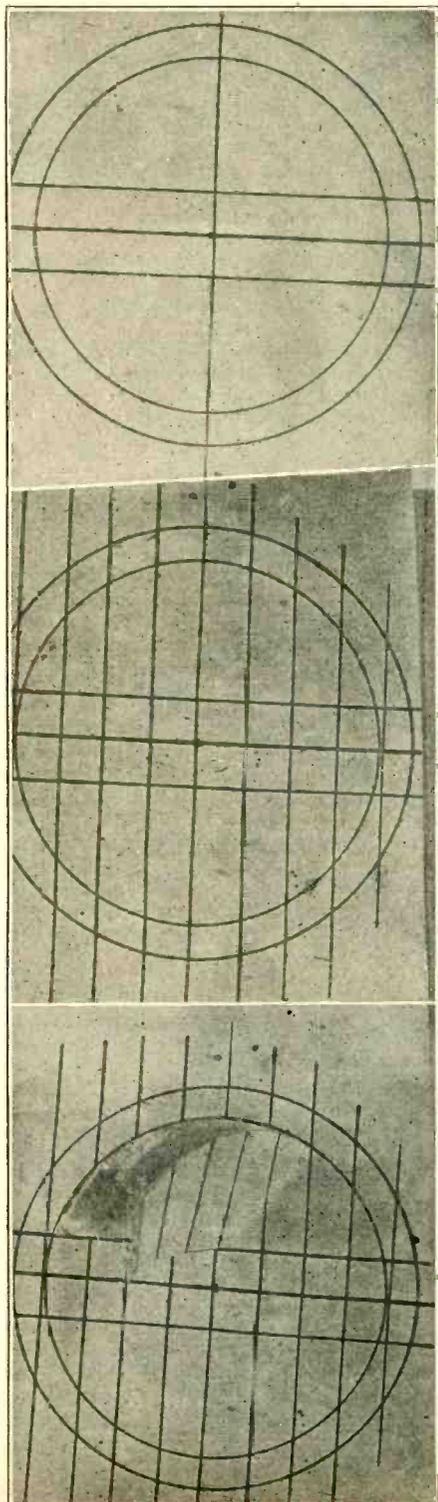


FIG. 1—On a piece of cardboard at least 5" square, 3/16" thick, describe a 4" diameter circle (top photo). Then, after drawing center lines, mark two lines 1/2" from horizontal center line. Fig. 2 (center photo) shows how a total of nine lines are drawn, 1/2" apart, parallel with the perpendicular. This requires eight new lines, as one was drawn previously. Above the top horizontal line, up to the inner semi-circumference, peel off the section (Fig. 3) with a knife.

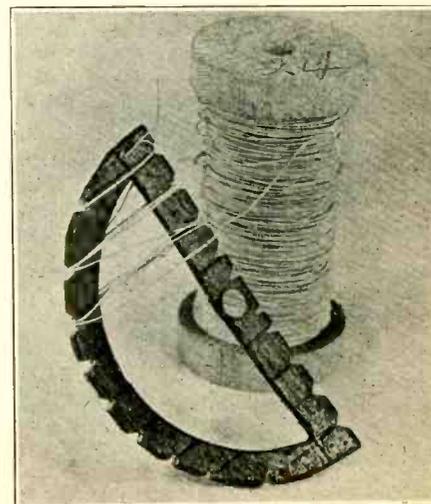


FIG. 6—Cut to pattern by niching on the outside only. Each niche is on the outside only, where the lines intersect circumference or center line. Each niche is provided with a continuing slot, a knife being used, so that the slot runs to the inside of the D. Notice that there are nine notches on the semi-circumference but ten on the straight piece. That is due to two small notches made to left and right of the center hole, instead of one notch just above the center hole.

Completing and Mounting Coil

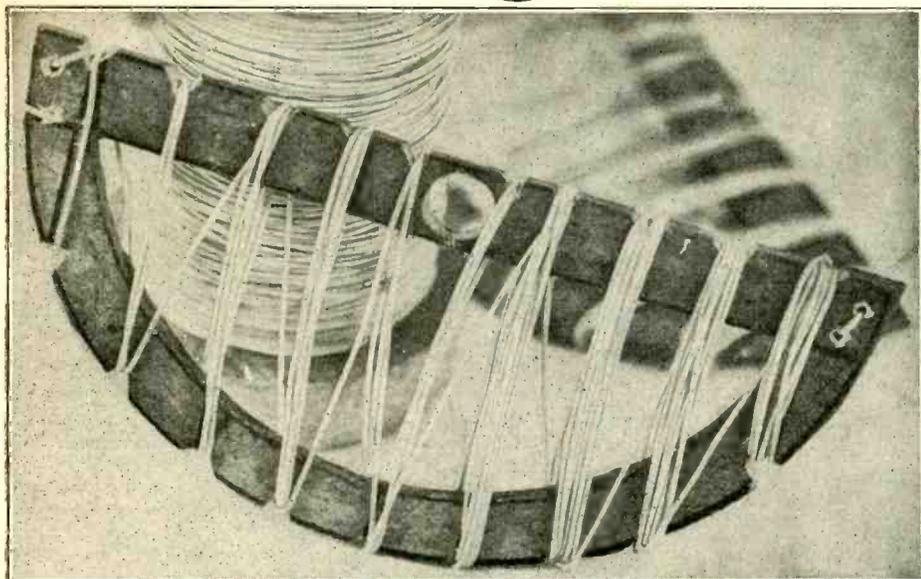


FIG. 7, a clear view of the winding. First wind one turn on the first notch, then two turns on the second, three on the third, four on the fourth. When the notches on each side of the 1/4" center hole are reached, wind two and a half turns on each, all five turns going to one notch (the fifth) on the semi-circumference, in line with the center hole. Now wind six turns on notch No. 6, seven on notch 7, eight on notch No. 8 and nine on notch No. 9. Use the semi-circumference notches in counting the numbers. By piercing the cardboard with a needle anchorages are provided for the wire terminals. Notice them at left and right on the straight cardboard piece.

supplemented by this slight capacity change.

A coil of this sort consisting of the two complete windings not physically connected, may be used in the aerial circuit, by connecting one terminal of one of the coils to the aerial and the other terminal of that coil to the ground, and tuning the other coil with a condenser (grid-battery

circuit). If the tube to which this is hooked up is an RF tube you have a stage of inductively tuned RF. If the variometer is used, one end to aerial and grid, the other end to A battery minus and ground, you have a stage of tuned impedance RF. The variometer may be used in any place in a circuit where such tuning instrument is called for.

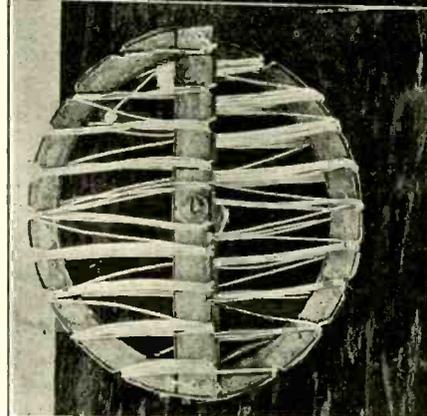
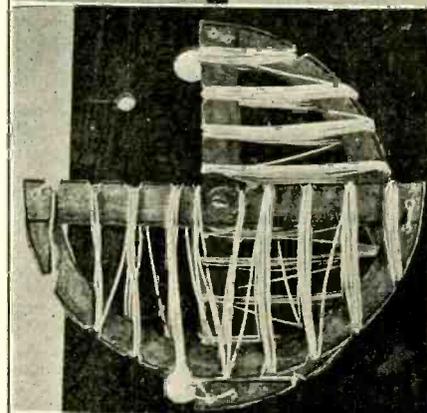
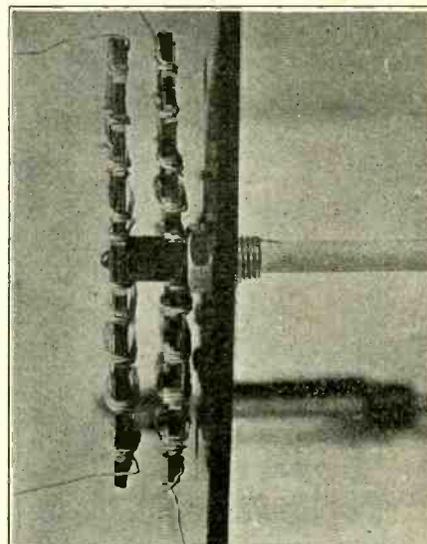


FIG. 9, the two coils mounted. Note the dowel stick at right, which represents the outside of the panel. Inside are the two coils, identically wound. The hard rubber or bakelite tubing separating them is 1/2" long. The dowel passes through the coil form with the 1/4" hole and through the bearing on the panel. The rod does not go through the other coil form (left) but the woodscrew does.

FIG. 10 shows how the inductive relationship of the coils is varied (50% coupling). Another view of rotation is shown in Fig. 11 (bottom photo). Here the inductive relationship is at minimum. The end of one coil, with nine turns at the particular notch, starts to enter the field of the other coil at the 1-turn end of that other coil, with a coupling ratio of nine-to-one. As the rotation continues this coupling accordingly increases and a condition of full mutual inductance is reached.

given are .1 megohm, as usual (100,000 ohms) but the grid leak values are 1 megohm, .25 megohm and .1 megohm for the first, second and third tubes, respectively.

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Contemporary Review

Looking the Other Fellow Over

"Radio Broadcast"

April Issue

THE LEADING article for home constructors in "Radio Broadcast" for April is "Progressive Experiment With the Roberts Circuit," by Keith Henney. This is the most popular circuit the magazine ever put out. The experimental work was done with simplification of controls and greater volume in view. The article is not one on how to build the circuit but on how to direct efforts toward improving the set, if the reader has one. The complete Roberts circuit is published again, showing the four major controls, aerial series condenser, RF grid tuning condenser, detector grid tuning condenser and tickler.

"It has been demonstrated," writes Mr. Henney, "that it is unwise to go to extremes in the matter of size of wire (for coils), say larger than No. 18 or smaller than No. 28. At the present time it seems that any of the methods of winding are effective, say the single-layer coil, the spider-web or the basket-weave. The main thing is to see that there are no short-circuited turns, and to avoid all forms of 'stickem,' except on occasional dab of collodion."

Antenna coupling, neutralization, turn ratios of RFT, by-pass condensers and other important subjects are discussed. Regarding by-pass condensers Mr. Henney says:

"In all reflex circuits by-pass condensers

are important items. Across the primary of the audio-frequency transformer is a condenser to pass the radio frequencies around this high impedance coil. Unless this condenser is large enough, the detector circuit will not oscillate. On the other hand the condenser must not be too large or some of the high audio-frequencies, say those of the piccolo or higher violin harmonics, will not be heard.

"The condenser across the secondary should be as small as possible, for a small capacity here has the same effect as a large one across the primary. The experimenter should begin with the smallest condenser available, as say, .0001 mfd., and increase its value slowly until full gain is secured from the amplifier."

The magazine leads off with G. Y. Allen's contribution, "How Radio is Being Standardized," telling of united action by manufacturers regarding technical terms and construction of batteries, connecting cords, plugs and jacks.

Zeh Bouck writes on "Can We Solve the Broadcast Riddle?" Mildred Weinberger tells "How to Write a Radio Play." Jennie Irene Wix gives "The Listener's Point of View."

The department "In the R. B. Lab" contains "Some Notes on the Second Harmonic Super"; "A Radio Power Panel"; "A Handy Capacity Bridge," and "The C Battery and Resistance Coupling." In connection with resistance AF the values are somewhat different from those usually recommended. The plate resistances

Tips on the 1-A Portable

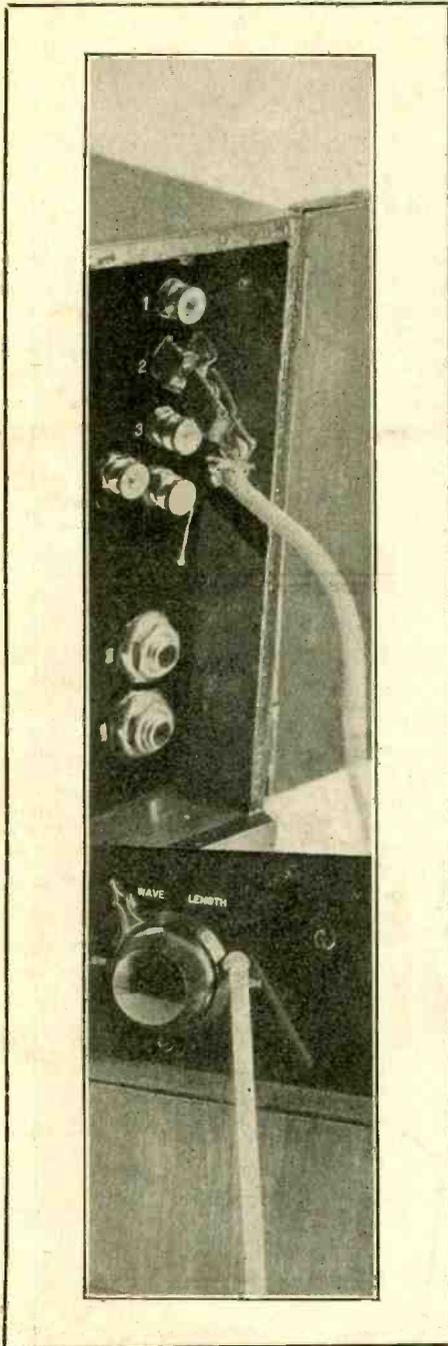


FIG. 1 (top), a convenient clip method for quick change from one aerial post to another. Fig. 2 shows how a dowel with a rubber cap may be used as an emergency vernier to tune in distant stations on the wavelength dial.

By Herbert E. Hayden

THE Model 1-A Portable, the construction of which was described in the March 28, April 4 and April 11 issues, may develop, under some conditions, over-regeneration trouble, occasioning a slight difficulty in control. That may be overcome by introducing a variable resistance in the aerial or ground circuit. Try it both ways. The ground way may give better stability. However, in my own model I have had no trouble with over-regeneration and am citing this means of overcoming it only because the condition may exist in any regenerative set.

The resistance should be variable, and when the best setting is found, it may remain that way. Probably the better way would be to adjust it for some troublesome low wave, then leave it there. The resistance may be a potentiometer (Fig. 3). If you have one handy, use that. If

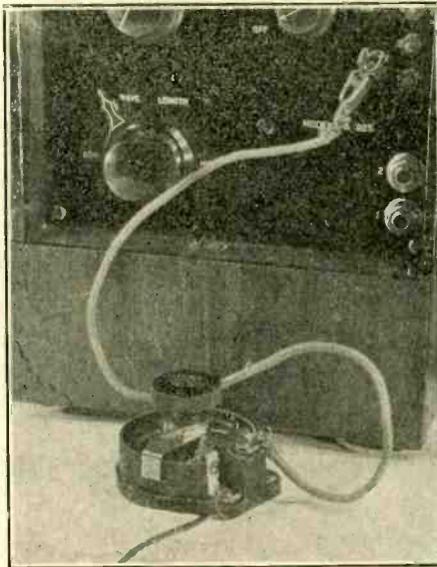


FIG. 3—A variable resistance may be connected in series with the ground, that is, one side of the resistance to the ground post of the set, the other side of the resistance to the ground. The resistance may be about 300 ohms. A potentiometer may be used.

you are to buy one, get a 400-ohm type, because that gives you the option of all the resistance values under 400. Then connect the traveller arm to the ground post of the set, and one side terminal to the ground. That leaves the third potentiometer connection free. It remains thus.

Difficulty may arise in tuning in some distant stations, on account of absence of vernier control. This will not be a frequent source of trouble, so no vernier dial is needed, but for solution of the occasional difficulty, a rubber knob on a dowel stick will serve the purpose. The stick is turned and the motion is communicated to the dial by the rubber cap. (Fig. 2).

As the set is portable, different aerial conditions will be encountered. One may take about 50 feet of aerial wire with him wherever he goes and string it up between two supports, but I find that barbed wire fences and the like will be pressed into service more often than one would imagine offhand. Therefore, there must be an adjustment of the aerial connection to the correct aerial post for accommodation of the receiver to the demands of the aerial. A clip such as is shown in Fig. 1 makes change of this connection very simple and easy.

Where Shaft Holes Go

The coil tubing (stator) should be $5\frac{1}{2}$ " long, a hole drilled $1\frac{1}{2}$ " from bottom and top, leaving $\frac{1}{2}$ " space between the 2" dials, the rotors $2\frac{1}{2}$ " diameter x $1\frac{3}{8}$ " wide.

Borneo Hears London

LONDON.

THE British Broadcasting Company has received information that part of its program at the London station, including the chimes of "Big Ben," the great clock on the House of Parliament, has been heard in Borneo, 8,000 miles away.

PHONE CORD IDENTIFIED

TELEPHONE receiver and loud speaker cords have one of their tips usually marked with a thin red string running through the insulation. This tip should always be connected to the phone plug in such a way that the connection eventually reaches the plus of the B batteries.

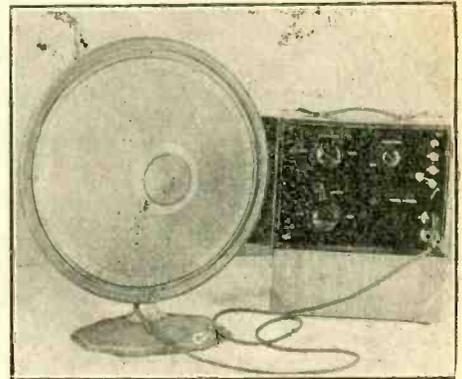


FIG. 4, the 1-A Portable in use in the home, operating the new cone type Crosley speaker on locals, although only two tubes are used.

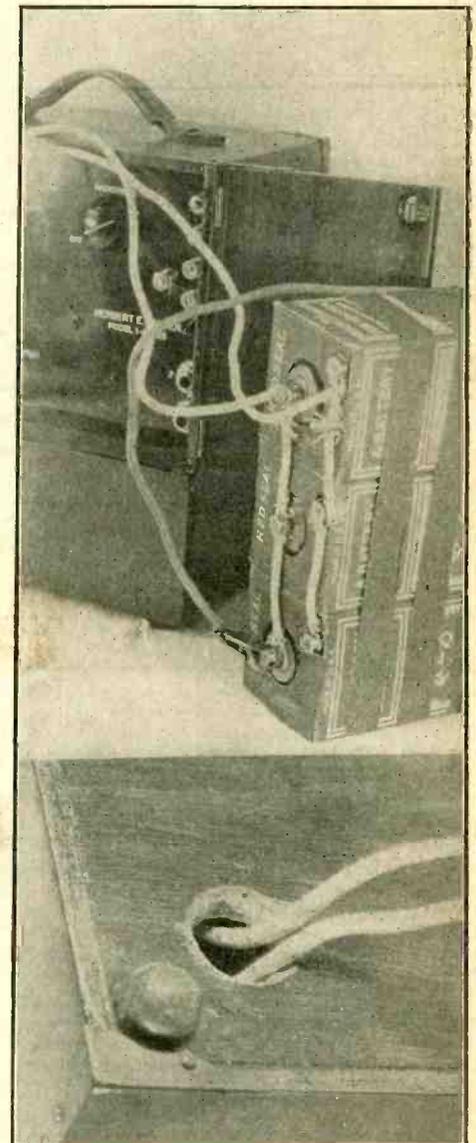


FIG. 5 (top) showing how three parallel-connected No. 6 dry cells may be used when the set is in the home. This affords more volume. A hole is drilled in the bottom of the cabinet (Fig. 6) to introduce the cable. Also extra B voltage may be supplied by leads thus introduced.

THE MODEL 1-A 1925 PORTABLE, by Herbert E. Hayden, a 2-Tube DX Set of Wonderful Volume and Tone, fully described in RADIO WORLD, issues of March 28, April 4 and 11. Send 45 cents, get all three of these important issues. This set is the successor to Hayden's famous DX Dandy. RADIO WORLD, 1493 Broadway, New York City.

Wiring the Diamond Circuit

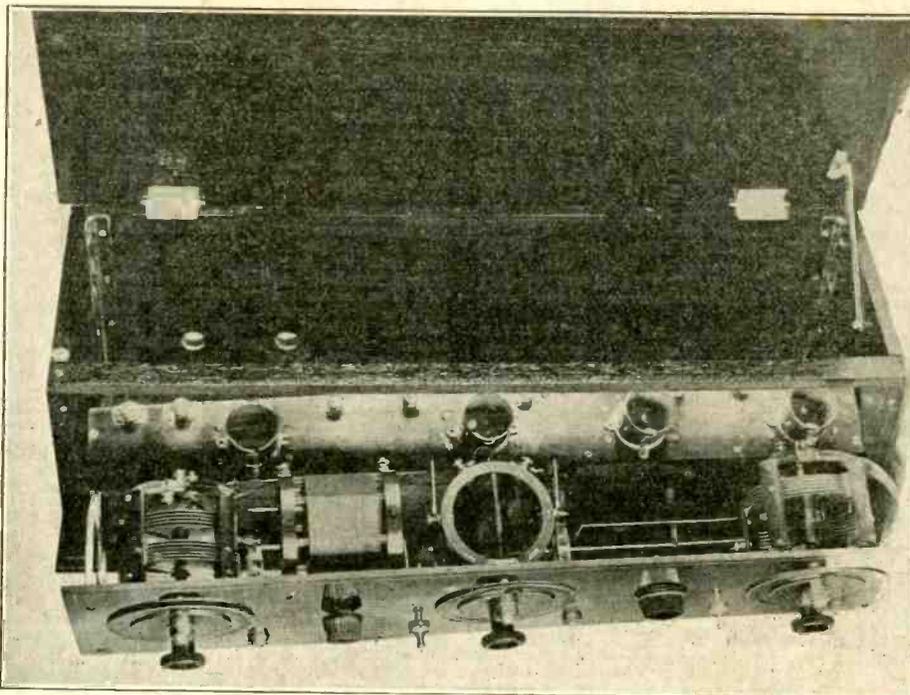
By Herman Bernard

PART III.

THE layout of parts is important in "The Diamond of the Air" because there must be virtually no coupling between the radio-frequency transformer LoL (Fig. 5) and the variocoupler, L1L2L3. If there is, considerable trouble may result. The mere fact that two coils are mounted with axes at right angles to each other does not insure absence of magnetic coupling. It may represent what is loosely termed minimum coupling, but there is a great peril of interflow of current. With coils mounted at right angles, the height of the horizontal coil from the baseboard of subpanel (using these merely as determining planes) is important. It is possible to get virtually no coupling by having the horizontal coil in exactly the correct position, a variation of 1/16" being enough to destroy the desirable effect. Therefore this position must be determined before the horizontally mounted coil is permanently put in place. It may be panel-mounted. If so care should be taken also to get the right distance between panel and coil, too, for a critical condition seems to exist in all directions regarding close mounting for approximate absence of magnetic coupling.

How the Parts Lie

If the conventional baseboard arrangement is used, then the condenser at left tunes the RF coil, which is mounted on the baseboard, safely to the rear of that condenser; the middle dial actuates the



THE DIAMOND OF THE AIR, about to be placed in the cabinet for permanent use in the home. The aerial RFT is the left-hand coil and has been so placed in respect to the coupler and the upright distance from the coupler windings as to be virtually free from stray magnetic coupling with the 3-circuit coil. The aerial (or loop) tuning condenser is at extreme left and the detector tuning condenser at extreme right.

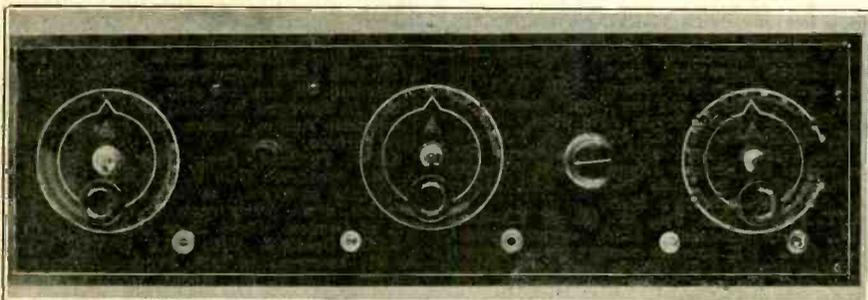
much more satisfactorily on the loop. The reasons are several, two being that the loop is an added selectivity control (due

to its directional effect) and the signal-to-static ratio, so important with DX work, is greater than with an outdoor aerial.

Wiring Directions

The filament should be wired first, this being the same no matter how the rest of the circuit may be arranged. A battery minus connects to one side of the rheostat R1, 10 to 15 ohms maximum. The other side of this rheostat connects to the F minus post of the RF tube. The A battery minus (not the filament side of the recently connected rheostat) is then joined to one side of the other rheostat, R2, in this case a Bradleystat. The unconnected side of this rheostat is then joined to the filament minus posts of all the other sockets, that is, detector and two audio.

(Continued on page 24)

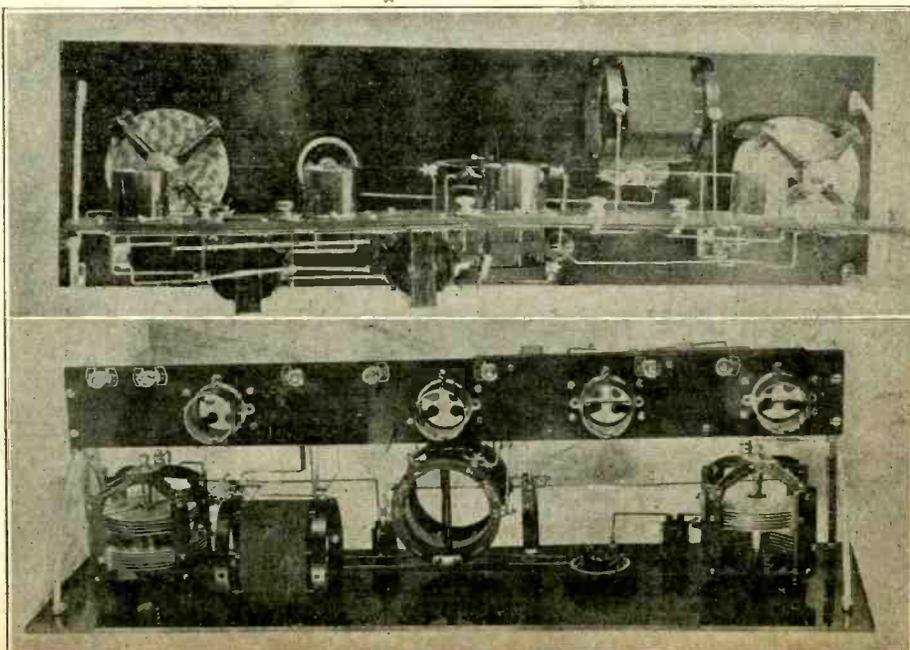


THE PANEL as arranged for use of a combination subpanel and socket slab, which is bakelite. The dial centers are 3 1/2" from panel top and bottom. The left dial center is 3" from panel left, the middle shaft 12" from left, the other 3" from right. The rheostats, switches and jacks are disposed accordingly. These dials are Apex.

tickler, while the remaining one controls the condenser that tunes the secondary of the 3-circuit coupler, of which the tickler is one part. With the RF coil mounted horizontally and the coupler upright, about 6" separating their nearest points, one may begin the wiring with assurance of safety. If a sub-panel is used that serves both as the baseboard and the gang socket arrangement, then due care must be exercised to achieve the nearest approach to no magnetic coupling. In fact the coupling may be zero indeed, but it requires work and the time is well spent. Besides, a handsome interior results.

Facts About the Loop

These considerations arise only when an optional outdoor aerial is to be used. If only loop reception is required, then there will be no RF transformer, and no stray coupling danger. The choice rests with the home constructor himself. On loop alone he can receive all stations in the local territory that any other receiver will bring in. If the loop is a fairly large one, so much the better. Volume will be enormous on powerful local stations. On other stations it will be good. As for distance, it is quite possible to achieve several hundred miles, using only the loop. In fact, distant stations hard to bring in on an outdoor aerial may come in at times



THIS relative position of RFT and coupler occasioned harmful magnetic coupling and the RFT had to be shifted. The unsuccessful position is shown in two views.

BROADCAST PROGRAMS

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

Friday, April 17

WOAW, Omaha, Neb., 562 (C. S. T.)—4 P. M., matinee program. 5:45, news. 6, story hour, Doris Claire Secord. 6:30, Harry Brader, violinist; Frank Strawn, pianist. 7:15, sports, Ivan L. Gaddis. 9, "Burlington Route," Dr. G. E. Condra. 10:30, Robison orch.

WEMC, Berrien Springs, Mich., 286 (E. S. T.)—9 P. M., radio lighthouse choir, Mr. Cecil Woods, baritone; Miss Mary Lamson, reader; Miss Martha Hutchinson, soprano; Bible chat, Mr. Orville Dunn.

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

WOI, Ames, Iowa, 776 (C. S. T.)—9:30 A. M., weather. 12:30 P. M., college; weather; markets; Professor T. R. Agg, "Highways of Tomorrow." 9:30, weather.

WOS, Jefferson City, Mo., 440.9 (C. S. T.)—8 P. M., "Homing Pigeons," Frank H. Hollman; "Corn Growing in Missouri," Samuel M. Jordan; original poems, LeRoy H. Kelsey; music.

WHAS, Louisville, Ky., 399.8 (C. S. T.)—4 P. M., concert from Louisville Conservatory of Music, organ, police bulletins, weather, readings, news. 4:55, markets. 5, time. 7:30, Original Kentucky Night Owls; tenor solos, William Rinehart, accompanied by Mrs. Fred Brockman; news, time.

WWJ, Detroit, Mich., 352.7 (E. S. T.)—8 A. M., exercises. 9:30, tonight's dinner, woman's editor. 10:25, weather. 11:55, time. 12 M., Good Friday services. 3, Detroit News orch. 3:50, weather. 3:55, markets. 6, concert. 8, Fox Brothers orch. 9, Goldkette's Victor Recording orch.

WDAF, Kansas City, Mo., 365.6 (C. S. T.)—3:30 P. M., Star's radio trio. 5:50, marketgram, weather, time, road report. 6, school of the air, piano tuning in number, Tell-Me-a-Story Lady, Trianon ensemble. 8, popular program. 11:45, "Merry Old Chief," Plantation Players.

WHO, Des Moines, Iowa, 526 (C. S. T.)—7:30 P. M., Hapac Grotto quartet; Veda Phillips pianist. 11, dance program.

WEAF, New York, N. Y., 492 (E. S. T.)—6:45 A. M., "Health Drill." 11, Milton Katz, pianist; "Outdoor Talk"; markets, weather. 4 P. M., Irving Listengart, violinist; talk to children. 6, music from Hotel Waldorf-Astoria; Aline Hurrell, soprano; Premier Male quartet; "Sir Hobgoblin," Blanche Elizabeth Wade; "The Happiness Candy Boys"; Spear & Co. entertainers; Lido Venice orch.

WQJ, Chicago, Ill., 448 (C. S. T.)—11 A. M., Fred Mann's menu. 3 P. M., Josephine Naylor, "A Cotton Wedding Anniversary"; Wynn Ferguson, "Bridge Lessons"; Mrs. Harry T. Sanger, "Hawaiian Islands," 7, Rainbo Garden orch.; Henrietta Nolan, violinist; Otis Pike Jester, soprano; Mary Thrash House, pianist. 10, Rainbo Skylarks; Larry Brundage, Harry Kraemer, harmony singers; West Brothers, Hawaiian steel guitar; Ziegler Sisters; Nate Caldwell, pianologues; Lauretta Giles, soprano. 1 A. M., Ralph Williams, Gingerman; the Little Skylarks.

WEEI, Boston, Mass., 476 (E. S. T.)—6:45 A. M., exercises. 1 P. M., luncheon, Boston Chamber of Commerce. 3:15, Noah's Arkadians. 6:30, Big Brother Club. 7:15, Cuffe entertainers. 7:45, historical talk. 7:55, news flashes. 8, musicale. 8:30, musicale. 9, Atwater-Kent Artists. 10, Silvertown orch.

WGN, Chicago, Ill., 370 (C. S. T.)—9:31 A. M., time. 9:35, quotations. 10, quotations. 11, quotations, weather, market. 11:30, quotations. 11:56, time. 12 M., quotations. 12:10 P. M., quotations. 12:30, quotations. 12:40, Drake concert ensemble, Blackstone string quintet. 1, quotations. 1:25, quotations. 2:30, Lyon and Healy concert hall. 3, Rocking Chair Time. 5, quotations. 5:30, Skeezix Time for Children. 5:57, time. 6, organ, Edwin Stanley Seder. 6:30, Drake concert ensemble, Blackstone string quintet. 8, classic hour. 10, Drake hotel orch.

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, fashions, Jean Mowat. 4:30, pupils of Bush conservatory. 6, organ. 6:30, Hotel LaSalle orch. 6:50, Family Altar league. 8, weekly Wide-Awake club. 8:30, musical geography, Mr. and Mrs. Marx E. Oberndorfer. 9, Edward G. Taylor. 9:15, Mae Graves Atkins program.

WGR, Buffalo, N. Y., 319 (E. S. T.)—10:45 A. M., cooking school, Betty Crocker. 6:30 P. M., Buffalo Trust hour. 8, "Madame Butterfly." 9, Woodside male chorus. 10, recital, Muriel Frankenstein. 10:30, Jack Little and Paul Small, record artists.

WLW, Cincinnati, O., 423 (C. S. T.)—10:45 A. M., weather and business reports. 11:55, time. 12:15

P. M., dance by the Ahaus orch. 1:30, business reports and stock quotations.

WAHG, Long Island, N. Y., 316 (E. S. T.)—11:55 A. M., time, weather. 12:05 P. M., Brooklyn Fed. of Churches. 8, Irving Firstenberg, pianist. 8:15, Morningside string quartet. 8:35, Genevieve Williams, soprano. 8:50, M. Lamberti, cellist. 9:20, Genevieve Williams, soprano. 9:30, Sterling male quartet. 9:40, Morningside string quartet. 9:55, time, weather. 10:05, Wm. F. Diehl, radio engineer. 10:20, Sterling male quartet. 10:30, Ascutto Brothers orch.

WPG, Atlantic City, N. J., 299.8 (E. S. T.)—7 P. M., Hotel Ambassador dinner music. 9, studio recital. 10, Paul Whiteman's Hotel Traymore dance orch.

WCCO, St. Paul, Minn., 416.4 (C. S. T.)—9:30 A. M., news. 9:40, weather; markets. 10, markets. 10:30, markets. 10:45, home service talk, Betty Crocker. 11:30, markets. 1:30 P. M., weather; markets. 2, "Men's Garden Club," William R. Kueffner. 3, markets. 4, Readers' club. 5:30, children's hour. 6, Nicollel Hotel orch. 6:30, Joseph Kimball, baritone; Miss Grace Hake, pianist; Mrs. Eleanor Freemantel, accompanist. 7:30, lecture. 7:45, lecture. 8, "Enoch Arden," musical setting, Richard Strauss; John De O. Briggs, reader; Miss Marjorie Winslow, pianist. 9, weather; "The F. & R. Family." 10, Nankin Cafe orch.; Russell Murphy, baritone; Miss Ruth McKibben, accompanist; Don Harris, pianist.

WOC, Davenport, Iowa, 484 (C. S. T.)—12:57 P. M., time. 1, Radio Farm school. 2, quotations. 3, "Home Management," "Aunt Jane." 4, Crescent orch. 5:45, chimes. 6, police reports; bulletins. 6:30, Sandman's Visit, Val McLaughlin. 8, boys' choir from Sacred Heart Cathedral. 9, Kaaba Temple Shrine band; weather.

WAAM, Newark, N. J., 263 (E. S. T.)—11 A. M., happy hour program. 11:15, radio cooking school. 11:30, happy hour program continued.

W P. M., sports, Major Tate. 7:15, Jolly Bill Steinke's International Night. 8, Belmore Gold, piano and Max Speiser, violin. 8:15, Dick Finch and Ben Friedman. 8:30, Johnson Howard and Mable Carrson. 8:45, Hilda White Kierman, a radio trick. 9, Vivi trio. 9:30, Victor Wilbur, tenor. 9:45, Egyptian radiolians. 10:30, Elizabeth Town Players Club.

WJY, New York City, 405 (E. S. T.)—8:15 P. M., Baltimore and Ohio Glee Club. 8:45, "Surgery at Sea," Dr. C. Harris. 9, Serenaders quartet. 9:20, The Texans. 9:45, Isobel Small, soprano; Keith McLeod, accompanist. 10, Monte Carlo Virginians.

WJZ, New York City, 455 (E. S. T.)—10 A. M., Mrs. Julian Heath. 10:20, books, Grace Isobel Colbron. 10:30, health and beauty, Ruth Champenois. 10:40, arts and decorations. 10:50, fashions. 11, "Right Job For Your Daughter," Helen Hoerle. 1 P. M., Hotel Ambassador trio. 4, Richard Franklin, pianist. 4:15, Corinne Cooper McIlroy, soprano. 4:30, Hotel Ambassador orch. 5:30, agricultural reports, farm and home market reports, closing quotations Stock Exchange, foreign exchange quotations, news. 7, Hotel Commodore orch. 8, Journal review. 8:10, WYU air college. 8:40, "Father and the Boys," comedy by WGY Players. 10:45, Beaux Arts orch.

WRC, Washington, D. C., 469 (E. S. T.)—1 to 2 P. M., Vincent Lopez orch. 4, fashion. 4:10, piano recital by Eleanor Glynn. 4:20, "Beauty and Personality" by Elsie Pierce. 4:30, Meyer Davis' trio. 6, children's hour.

WLIT, Philadelphia, Pa., 395 (E. S. T.)—12:02 P. M., daily almanac. 12:05, organ recital, Arcadia orch. 2-3, Arcadia concert orch., playlet. 4:30, dance music. 7:30, Dream Daddy. 8, fifteen minutes with the new books and authors. 8:15, Pennsylvania Railroad Glee Club, artist recital from the studio. 10, meeting of Morning Glory Club, Arcadia dance orch., Lenni Heights minstrels, Elk's new home program. 1 A. M., sign off in code.

WGBS, New York City, 316 (E. S. T.)—10 A. M., timely talks with Terese. 10:10, Rosalie Blanchard, soprano. 10:20, reducing exercises. 10:30, Rosalie Blanchard. 10:40, fashion talk. 10:50, Rosalie Blanchard. 1:30 P. M., scripture reading. 1:35, Virginia Le Fevre, "Songs My Mother Sang," with Samuel Tinney, tenor. 3, Madeline Thayer and Terese Rose Nagel, the radio colyumists. 3:10, Howard Kirsch, violinist. 3:20, Spanish lessons. 3:30, Howard Kirsch. 3:40, Dr. Alfred G. Robyn. 3:50, Howard Kirsch. 6, Uncle Gebebe. 6:25, Sue Hastings, marionettes. 6:30, Clarence Williams, entertainers. 7, Herman Bernard, "What's Your Radio Problem." 7:10, Clarence Williams.

WIP, Philadelphia, Pa., 509 (E. S. T.)—7 A. M., exercises. 1 P. M., Gimbel Tea Room orch. 1:30, weather. 3, hints to housewives, Mrs. Anna B. Scott. 3:15, Eleanor Batroff, soprano; Mildred L. Lamb, pianist; Arthur E. Catanach, tenor; Flora Ripka, piano. 4, "Fear," Dr. Edward Lodholz. 6, weather. 6:05, Knight's Singing orch. 6:45, markets. 7, Uncle Wip's bedtime story.

WEAR, Cleveland, Ohio, 390 (E. S. T.)—7 P. M., Bedford Glens dance orch.; Gertrude Lance, pianist; Brunswick trio; Master Michael Burke, juvenile tenor.

WGY, Schenectady, N. Y., 379.5 (E. S. T.)—2 P. M., music; "Curtains and Rugs," Sally Davidson. 6:30, Sunday school lesson. 7, Albany Strand theatre orch. 7:30, health talk. 7:40, Wittstein's dance orch. 8:40, "Rip Van Winkle," WGY Players. 10:30, 10th Infantry band, Smith's singing orch., Ralph Jones, George W. Decker.

WOR, Newark, N. J., 405 (E. S. T.)—6:45 A. M., physical exercises. 2:30 P. M., Kathryn Hennen,

soprano. 2:45, C. H. Galligan, H. A., criminal investigator talk. 3, Milton Spiro, violinist. 3:15, Kathryn Hennen, soprano. 3:30, James Albert Wales, travel talk. 3:45, Milton Spiro, violinist. 6:15, "Music While You Dine," Hotel Lorraine orch. 6:30, "Man in Moon" stories. 7, "Music While You Dine," Hotel Lorraine orch.

WBZ, New England, 333.3 (E. S. T.)—11:55 A. M., time; weather; stocks. 7 P. M., market report. 7:05, bedtime story.

WHN, New York City, 360 (E. S. T.)—2:15 P. M., Bernard Seaman, jazz pianist. 2:30, orch. 3, Richard B. Gilbert with Ruth Wimp, popular songs. 3:45, Larry Moen and Harold Flavin, pianologue. 3:55, Mrs. J. Robert Hewitt, contralto. 4:05, Andy Razaf with Edgar Dowell. 4:15, Congress of States, Mrs. Thos. J. Vivian, pres. 4:20, Judith Roth, popular songs. 4:30, Uncle Robert's chat to children and grown folks. 5, orch. 6:30, violin solos by Olcott Vail. 7, Hotel Alamac dance orch. 7:30, health talk by Dr. Landis. 7:35, Club Moritz orch. 8:05, Comm. Francis D. Gallatin, pres. Park Board, talk on "Work of Dept. of Parks in Connection with Arbor Day." 8:15, Nat Grossman and Bernie Osborn, songs. 8:30, Ethel Raye, soprano. 8:45, Melody Four male quartet. 9, "The Lure of Maine," 9:10, Ray Klages with Stephen Levitz, songs. 9:30, Dan Gregory and his Crystal Palace orch. 10, Estelle Crossman, pianist. 10:15, Chas. Tobias, vaudeville headliner, songs. 10:25, "Storage Batteries," by H. B. Shontz. 10:30, Roseland dance orch. 11, standing by for DX fans. 11:30, Club Alabam orch. 12, Parody Club revue and orch.

WNYC, New York City, 526 (E. S. T.)—6:30 P. M., Club Arcady orch. 7:30, police alarms. 7:35, resume of meeting of the Board of Estimate. 7:45, Rudolph Joskowitz, violinist. 8, "The Staten Island Tunnel," by Arthur S. Tuttle. 8:15, Rudolph Jockowitz, violinist. 8:30, Bertha Donnelly, soprano. 8:45, "Man Among the Microbes," by Professor William W. Brown. 9, hour of German music. 10:10, Professor J. G. Carter Troop, lecture service. 10:30, police alarms and weather.

WOO, Philadelphia, Pa., 508.2 (E. S. T.)—11 A. M., grand organ. 11:30, weather. 11:55, time. 12 M., Golden's Crystal Tea Room orch. 4:40 P. M., police reports. 4:45, grand organ and trumpets. 7:30, Hotel Adelphia French Room orch. 8:30, cantata, "The Risen King." 9, WOO orch. 9:55, time. 10:03, grand organ recital. 10:30, Vincent Rizzo and his Hotel Sylvania orch.

KSAC, Manhattan, Kans., 341 (C. S. T.)—9 A. M., exercises of rural schols. 12:35 P. M., reading, weather; Planting Soybeans, L. E. Willoughby; question box; Worms in Young Chicks, D. J. Taylor. 7:20, Radio College quartet. 7:30, Soil Bacteria and Plant Food, F. L. Gaines. 7:40, Radio College quartet. 7:50, Birds Value to Agriculture, J. A. Ackert.

KTHS, Hot Springs, Ark., 374.8 (C. S. T.)—8:30 P. M., Fischer trio. 9, New Arlington Hotel orch. 10, Jack O'Lantern orch.

KFRG, San Francisco, Calif., 268 (P. S. T.)—6 P. M., Hotel Whitcomb orch. 6:30, Bem's Hotel Whitcomb Little Symphony. 8, Symphony, Hotel Whitcomb. 9, one act play, Theatre Arts Club; Emile H. Ravegno, baritone; Gladys Boys, pianist; Bernadette Austin, pianist. 10, Paul Kelli's orch.; Paul Nelson, pianist.

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, concert. 7:15, market, weather, news, police reports. 8, lecture, University of Oregon. 10:30, Hoot Owls.

KGO, Oakland, Cal., 361.2 (P. C. T.)—11:10 A. M., homemaking talk, Prudence Penny. 11:30, concert. 1:30 P. M., stocks, weather. 3, music, speaker. 4, orch of Hotel St. Francis. 5:30, girls' half hour, Esther Wood Schneider. 6:45, stocks, weather, news.

KFI, Los Angeles, Cal., 467 (P. S. T.)—5 P. M., news. 5:30, Examiner program. 6:45 radiatorial. 7, Examiner program. 8, Herald program. 9, Apollo male quartet. 10, Tilda Rohr, contralto, assisted by Carl Miller, pianist.

KNX, Los Angeles, Cal., 337 (P. S. T.)—11:30 A. M., Estelle Lawton Lindsay's talk to women 6:15 P. M., Beverly Ridge Co. program. 7:30, Eastern Outfitting Co. program. 8, West Coast Theatres. 9, feature program. 11, Cocoanut Grove orch.

KOA, Denver, Col., 323 (M. T.)—12:20 P. M., organ. 1, quotations. 3, matinee. 6, stocks; news. 6:40, book of knowledge program. 8, Rialto theatre orch. 8:10, studio program; Rev. Ignatius Groll, piano.

KPO, San Francisco, Cal., 429.5 (P. S. T.)—10 A. M., cooking and household management, Mrs. Belle DeGraf. 7, daily dozen. 10:30, the local theatres. 12 M., time; scripture reading. 12:45 P. M., Commonwealth Club luncheon. 1, Fairmont Hotel orch. 4:30, Fairmont Hotel orch. 5:30, markets. 6:30, the local theatres. 8, Wurlitzer night.

KOB, State College, N. M., 348.6 (M. S. T.)—7:30 P. M., Mrs. J. W. Christie, soprano; Mrs. Herman Rosch, piano; Negro Spirituals, Mrs. J. W. Christie.

KDKA, Pittsburgh, Pa., 326 (E. S. T.)—7 A. M., exercises. 8, exercises. 9:45, markets. 11:55, time. 12 M., weather; markets. 12:20 P. M., Sunday school lesson. 3:30, quotations. 6:15, concert. 7:15, markets. 7:30, Daddy Winkum's magical rhyme machine. 7:45, "New Books," Mr. Frederick P. Mover. 8, Bond Club dinner. 9:55, time; weather.

KHJ, Los Angeles, Cal., 405.2 (P. S. T.)—12:30 P. M., Tommy Tibbets orch. 2:30, matinee pro-

Radon (a radium derivative) costs \$5,00,000 an ounce. An advertising page in
RADIO WORLD costs \$2.40 per page per Thousand—the high and
low for best results.

gram. 6, Art Hickman's orch. 6:30, children's program. 7:30, weekly talk on "The Romance of the Santa Fe Trail." 8, Western Auto Supply Company program. 10, Art Hickman's dance orch.

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

KFAE, State College of Washington, 348.6 (P. S. T.)—7-9 P. M., vocal duets, Constance Grace and Margaret Burge; vocal solos, Constance Grace; Glee Club orch.; saxophone solos, Vincent Hiden; talk on failure of the blossoms, Prof. O. M. Morris; travels of a Polish girl; Planning Green Feed for Next Winter, W. D. Buchanan.

KYW, Chicago, Ill., 536 (C. S. T.)—6:30 A. M., morning exercises. 9:30, late news; stocks. 11:35, table talk. 6 P. M., news; Dun's Review, and Bradstreet's Weekly Review. 7, children's bedtime story. 7:30, dinner concert. 9, midnight revue.

CKAC, Montreal, Que., 411 (E. S. T.)—1:45 P. M., Harry Salter trio. 4, weather, stocks. 4:30, no lessons.

CNRE, Edmonton, Alta., 516.9 (M. T.)—7:30 P. M., children's half hour, the farmer. 8:30, Moonlight Serenaders' orch.

CNRT, Toronto, Ont., 356 (E. S. T.)—6:30 P. M., King Edward Hotel concert orch. 8:30, Aeolian male quartet. 10:30, King Edward Hotel dance orch.

CNRA, Moncton, N. B., 313 (A. S. T.)—7:30 P. M., bedtime stories, Uncle Alf. 8, markets. 8:30, L'Assumption band, Moncton Acadian male choir.

Saturday, April 18

WGN, Chicago, Ill., 370 (C. S. T.)—9:31 A. M., time. 9:35, quotations. 10, quotations. 11, quotations, weather, market. 11:30, quotations. 11:56, time. 12 M., quotations. 12:10 P. M., quotations. 12:30, quotations. 12:40, Drake concert ensemble. Blackstone string quintet. 1, quotations. 1:25, quotations. 2:30, Lyon and Healy concert hall. 3, Rocking Chair Time. 5, quotations. 5:30, Skeezi Time for Children. 5:57, time. 6, organ, Edwin Stanley Seder. 6:30, Drake concert ensemble. Blackstone string quintet. 8, classic hour. 10, Drake hotel orch.

WOS, Jefferson City, Mo., 440.9 (C. S. T.)—8 P. M., music.

WHAS, Louisville, Ky., 399.8 (C. S. T.)—4 P. M., concert from Louisville Conservatory of Music, organ, police bulletins, weather, readings, news. 4:55, markets. 5, time. 7:30, concert by Louisville Conservatory of Music, news, time.

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

WDAF, Kansas City, Mo., 365.6 (C. S. T.)—3:30 P. M., Star's radio orch. 5:50, marketgram, weather, time, road report. 6, school of air; piano tuning-in; Roger W. Babson, doctor of business; Tell-Me-a-Story Lady, Trianon ensemble. 11:45, "Merry Old Chief," Plantation Players; Kuhn's orch, Campbell's Kansas City Club orch.

WBBR, New York, N. Y., 272.6 (E. S. T.)—8 P. M., Carl Park, violinist. 8:10, soprano, Mrs. L. M. Brown. 8:20, Bible questions and answers. 8:40, soprano, Mrs. L. M. Brown. 8:50, Carl Park.

WOAW, Omaha, Neb., 526 (C. S. T.)—12:30 P. M., horticultural program. 5:45, news. 6, dramatic hour. 6:45, Robison orch. 7:30, address. 9, Omaha Printing Co. program. 11, Nightingale orch. 11:30, Arthur Hays, organist.

WMC, Memphis, Tenn., 499.7 (E. S. T.)—7:30 P. M., news.

WOI, Ames, Iowa, 270 (C. S. T.)—9:30 A. M., weather. 12:30 P. M., chimes, weather, markets, Professor F. P. Reed, "Activities at Iowa State Fair." 9:30, weather.

WEEI, Boston, Mass., 476 (E. S. T.)—6:45 A. M., exercises.

WMAQ, Chicago, Ill., 447.5 (C. S. T.)—6 P. M., Salvation Army band. 6:50, "Daddy." 8, Russell Pratt and Fred Daw. 8:30, "Mount Rainier," Dr. O. C. Schneider. 9, Chicago theatre revue.

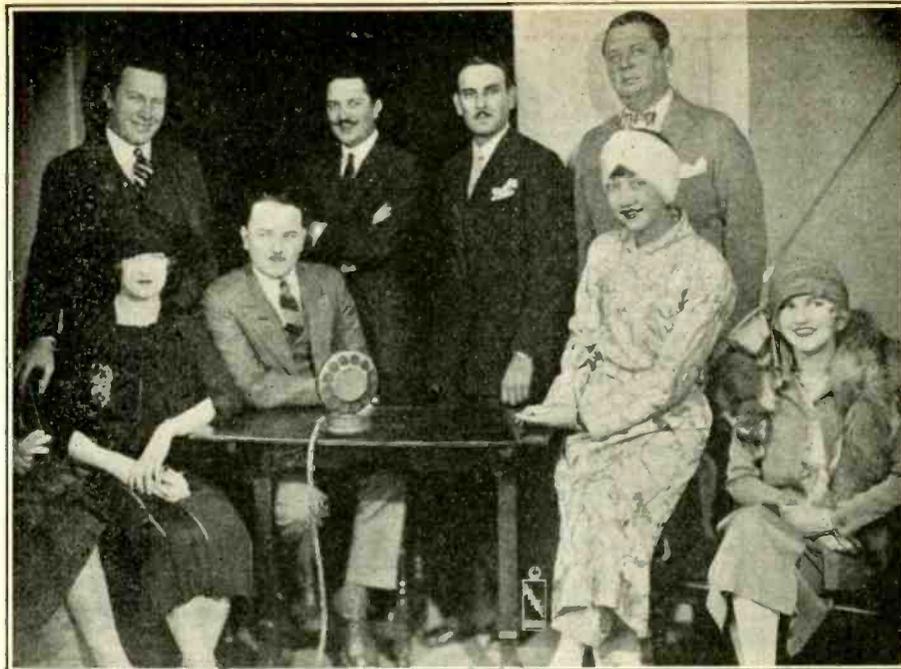
WEAF, New York, N. Y., 492 (E. S. T.)—6:45 A. M., health drill. 4 P. M., Bud Fisher's Happy Players. 6, music from Hotel Waldorf-Astoria, synagogue services of United Synagogue of America, Vee Lawnhurst, pianist; Charles Harrison and Maine group, Myrtle Stitt Mason, contralto; Huyler's Foremost Four, Bergen Male quartet, Carl Schaiowitz, violinist; Vincent Lopez orch.

WCCO, St. Paul, Minn., 416.4 (C. S. T.)—9:30 A. M., news. 9:40, weather; markets. 10, markets. 10:30, markets. 10:45, home service talk, Betty Crocker. 11:30, markets. 12:30 P. M., markets. 2:30, Minn. Loan & Trust orch. 8, "Fire-side Philosophies," Rev. Roy L. Smith. 8:30, Osman Temple Shrine band. 9, weather. 10, Minneapolis Athletic Club orch.; Ada Mary Porter, contralto; Mrs. Eleanor Freemantel, accompanist; Dave Rubinoff, violinist; Grace Larusson, accompanist.

WOC, Davenport, Iowa, 484 (C. S. T.)—12:57 P. M., time. 1, weather; quotations. 5:45, chimes, 6, police reports; bulletins. 6:30, Sandman's Visit, Val McLaughlin. 6:50, Sunday school lesson, Rev. M. A. Getzdaner. 9, Citizens Trust & Savings Bank program; weather. 11, LeClaire Hotel orch.; Peter MacArthur, baritone.

WRC, Washington, D. C., 469 (E. S. T.)—4:30 to 5:30 P. M., Meyer Davis' orch. 6:45, children's hour. 7, Boernstein orch. 7:45, Bible talk. 8, Wurlitzer musicale. 8:30, to be announced. 10, Vincent Lopez orch. 10:30, Crandall's Saturday Nighters. 12, Sidney Seidenman's orch.

WJZ, New York City, 455 (E. S. T.)—1 P. M., Erdody's Park Lane orch. 4:30, Sherry's tea music. 5:30, State and Federal agricultural re-



MOVIE players were the guests of Announcer Quinn A. Ryan in his afternoon "Rocking Chair Time" at WGN, the "Chicago Tribune" station on the Drake Hotel. Seated, left to right: Kathryn McGuire, Buster Keaton's leading woman; Mr. A. Ryan, Anna May Wong, of Douglas Fairbanks' "The Thief of Bagdad"; and Ena Gregory. Standing, left to right: Jack Daugherty, Universal player, husband of Barbara La Marr; Bryant Washburn, Famous-Players actor; Carl Miller, Chaplin's leading man in "A Woman of Paris"; and Harry Tighe, Universal director. (Drake Studio).

ports, stock quotations, foreign exchange quotations, news. 7, Freddie Rich orch. 8, Wurlitzer's musicale. 8:30, Silvio Sidoli, baritone. 10:30, Joseph Knecht's orch.

WLIT, Philadelphia, Pa., 395 (E. S. T.)—12:02 P. M., daily almanac. 12:05, organ recital, Arcadia concert orch. 2:3, Arcadia concert orch., recital by Regina C. Marsh, contralto; Henry Winder, tenor. 4:30, dance music. 7:30, Arcadia concert orch.

WGBS, New York City, 316 (E. S. T.)—10 A. M., timely talks. 10:10, Eleanor Schorer's Kiddie Klub program. 10:40, Mme. Geo. 1:30 P. M., scripture reading. 1:35, Jack Cohen, pianist, and Peter Ward, tenor. 3, interview with Dean Gildersleeve of Barnard College, by Terese Rose Nagel. 3:10, Greek Games chorus. 3:20, Miss Mansfield, Greek Games talk. 3:30, Greek Games chorus. 3:40, health week talk. 3:50, Greek Games chorus. 6, Uncle Geebec. 6:30, Cameo Collegians. 7, John Regan, sports talk. 7:10, Cameo Collegians. 7:30, Ritz-Carlton concert orch. 8:30, Hosrof Bagraduni, Armenian tenor. 9, to be announced. 9:15, Arlene Felker, lyric soprano. 9:30, Sam Comly "Inside Movie Chats." 9:45, J. Raferty, "The Play Contest." 9:55, Harry Schyde, basso. 10:15, Kenneth Burdick, original songs. 10:45, Vaughn De Leath, entertainer. 11:15, Bottsford and Swift, banjo and piano duos. 11:30, Bob Emmerick, entertainer. 11:50, Bottsford and Swift.

WLW, Cincinnati, Ohio, 423 (C. S. T.)—8 A. M., exercises. 10:45, weather, business reports. 11:55, time. 1:30 P. M., business reports. 3, dance program. 6, concert; instrumental trio, Lafafone, E. D. Leonard. 7, Morton High School band; Miss Helen Eichhorn, pianist.

WGY, Schenectady, N. Y., 379.5 (E. S. T.)—8 P. M., French program; address, Aime LeBlanc. 9:30, Romano's orch.

WIP, Philadelphia, Pa., 509 (E. S. T.)—7 A. M., exercises. 1 P. M., organ, Karl Bonawitz. 1:30, weather. 3, Carlton Dancing Academy orch. 4, Jean Stadler, pianist. 6, weather. 6:05, Charles Higgins, accompanied by Billie McKee. 6:15, Hotel St. James orch. 6:45, markets. 7, Uncle Wip's bedtime story. 8, "Practical Disinfection," Louis Gershenfeld. 8:15, Hebrew music program. 8:45, "A Chapel in Every Home," Joseph R. Wilson. 9, National Convention of Workers Edu. Bureau. 10:05, Benjamin Franklin dance orch. 11:05 organ, Karl Bonawitz.

WAHG, Long Island, N. Y., 316 (E. S. T.)—12 M., special midnight program; Smith's Paramount orch.

WBZ, New England, 333.3 (E. S. T.)—11:55 A. M., time, weather. 6 P. M., Hotel Lenox ensemble. 7, markets. 7:05, bedtime story. 7:15, "U. S. Naval History," E. S. R. Brandt; "The Farmer and the Weather Man." 7:30, Miss Gerlynde Isabelle Havens, soprano; Mrs. Inez Momm, pianist. 8, Old North Church services. 9:30, Hotel Brunswick orch. 9:55, time, weather. 10:05, Ben Rosenberg, baritone.

WPG, Atlantic City, N. J., 299.8 (E. S. T.)—6:30 P. M., Knickerbocker Hotel dance orch. 9, Princeton University Glee Club. 10, Hotel Knickerbocker dance music. 11, Paul Whiteman's Hotel Traymore dance orch.

WHN, New York City, 360 (E. S. T.)—2:15 P. M., Lillian Abbott, soprano. 2:30, Harriet Davis Kennedy, dramatic reader. 2:45, "Royal Ramblers," Leo Uhlig, leader. 3:45, Harold Gottlieb, accordion solos. 4, Eleen May, soprano. 4:15, Rita and Alice Coakley, harmony singers. 4:30, Rubey Cowan, popular songs. 4:45, Milton Yorkman, lyric tenor. 5, Broadway Melody Boys. 6:30, violin solos by Olcott Vail. 7, Hotel Alamac dance

orch. 7:30, health talk by Dr. Landis. 7:35, Hotel Carlton Terrace orch. 8, Estelle Crossman, pianist. 8:15, Philip Krumholtz, tenor. 8:30, Strand Roof orch. 9, Madeline Randolph, songs and ukulele. 9:15, Robert F. Campbell, baritone. 9:30, annual entertainment and dance of the Tobacco Ass'n of America, N. Y. branch. 10, signing off for DX fans.

WBZ, New England, 333.3 (E. S. T.)—11:55 A. M., time; weather. 6 P. M., Leo Reisman's Hotel Lenox ensemble. 7, market report. 7:05, bedtime story. 7:15, sketches from United States Naval history; "The Farmer and the Weather Man." 7:30, Geraldine Isabelle Havens, soprano, and Mrs. Inez Momm, pianist. 8, broadcast of special services from the Old North Church, Boston. 9:30, Hotel Brunswick orch. 9:55, time, weather. 10, concert by Ben Rosenberg, baritone.

WNYC, New York City, 526 (E. S. T.)—7 P. M., The Chateau Four. 7:30, police alarms. 7:35, "Progress of the City of New York," by Mayor John F. Hylan. 7:50, The Chateau Four. 8:30, Harold Gottlieb, accordion and violin solos. 8:45, U. S. Department of Agriculture. 9, Police quartet. 9:30, annual Jeffersonian dinner; Senator Copeland will speak.

WOR, Newark, N. J., 405 (E. S. T.)—6:45 A. M., physical exercises. 2:30 P. M., Fanny Horowitz, pianist. 2:45, Mischa Goodman, violinist. 3, Fanny Horowitz, pianist. 3:15, Eleanor Emeline Starkey, soprano. 3:30, Mischa Goodman, violinist. 3:45, Eleanor Emeline Starkey, soprano. 6:15, "Music While You Dine," Al Maken and his Villa Francaise orch. 7, concert by the Frankie Fay trio. 7:30, The Commanders orch. 8, South Side high school orch. 8:30, joint recital by Leon Carson, tenor, and Joseph M. Burnett, baritone. 9, Dr. George William Gilmore in a talk entitled "Why We Dig." 9:15, bullet-proof vest test. 9:30, joint recital by Leon Carson, tenor, and Joseph M. Barnett, baritone. 10, program by the Moscow Art trio. 10:30, Judith Roth and James Brennan. 11, Ciro's orch.

WCR, Buffalo, N. Y., 319 (E. S. T.)—2:30 P. M., concert.

KHJ, Los Angeles, Cal., 405.2 (P. S. T.)—12:30 P. M., Marie L. SeLegue, soprano; John B. Sonntag, harp guitar and Ray Angermayer, steel guitar. 2:30, Pacific States Electric concert. 6, children's program. 7:30, Y. M. C. A. program. 8, Newberry Electric concert. 10, Art Hickman's dance orch.

KFOA, Seattle, Wash., 455 (P. S. T.)—4 P. M., The Times, Olympic Hotel concert orch. 6:45, Moran school concert. 8:30, The Times. 10, Eddie Harkness and his orch.

KDKA, Pittsburgh, Pa., 326 (E. S. T.)—9:45 A. M., Stockman reports of the Pittsburgh live-stock markets; general market review and agricultural items. 11:55, time. 12 M., weather; markets. 1:30 P. M., Daugherty's orch. 6, Westinghouse band. 7:30, Wimble, the Wanderer. 7:45, helps to Bible school teacher. Carman Cover Johnson. 8, Sphinx Club, Richard the Riddler. 8:30, Westinghouse band; Hazel King, soprano; Norman O'Hara, tenor. 9:55, time; weather.

KFI, Los Angeles, Cal., 467 (P. S. T.)—5 P. M., news. 5:30, Examiner program. 6:45, radiatorial. 7, Lake Arrowhead orch. 7:45, "The Bookshelf," Miss Nancy. 8, Examiner program. 9, Sunshine Girls trio; Don W. Smith, tenor. 10, Packard Radio Club.

KGO, Oakland, Cal., 361.2 (P. S. T.)—11:30 A. M., concert. 12:30 P. M., stocks, weather. 4, orch. of Hotel St. Francis. 8, Virginia Fischer Griffiths, soprano; Albert W. Gillette, baritone; Dean Donaldson, violinist; Helen Eugenia Merchant, pianiste; Maynard S. Jones, accompanist; harp, Kajetan Attil, San Francisco Symphony

orch.; Ernest Paul Alwyn, euphonium; Allan Wilson, tenor; Donald Jones, saxophone. 10, Halstead orch.

KOA, Denver, Col., 323 (M. T.)—12:20 P. M., organ. 9, stocks. 9, Rainbow-Lane orch.

KSAC, Manhattan, Kans., 341 (C. S. T.)—12:35 P. M., radio question box.

KGW, Portland, Ore., 491.5 (P. S. T.)—11:30 A. M., weather. 12:30 P. M., Rose City trio. 10, Multnomah Hotel strollers.

KFRC, San Francisco, Cal., 268 (P. S. T.)—6:15 P. M., Boob McNut and Elmer Tuggie. 6:30, Ken Dogan's orch.

KTHS, Hot Springs, Ark., 374.8 (C. S. T.)—12:30 P. M., markets, weather, orch. 8:30, Eastman Hotel orch. 9:15, Waterloo Fiddle band. 10:15, New Arlington Hotel orch.

KPO, San Francisco, Cal., 429.5 (P. S. T.)—7 A. M., daily dozen. 10:30, the local theatres. 12 M., time, scripture reading. 1 P. M., Fairmont Hotel orch. 5:30, markets. 6:30, the local theatres. 8, Fairmont dance orch.

KYW, Chicago, Ill., 536 (C. S. T.)—6:30 A. M., morning exercises. 9:30, late news; stock market. 10:30, Farm and Home service. 11:55, table talk. 1:30 P. M., "Saturday Frolic." 6:02, news; stocks. 7, children's bedtime story. 7, dinner concert. 8, musical program.

KDKA, East Pittsburgh, Pa., 309 (E. S. T.)—9:45 A. M., stock reports. 12 M., weather; stock reports. 1:30 P. M., luncheon concert by Daugherty's orch. 6, dinner concert by the Westinghouse band. 7:30, Wimble, the Wanderer. 7:45, last minute helps to the Bible School Teacher. 8, the senior meeting of the Pittsburgh Sun Radio Sphinx Club. 8:30, concert by the Westinghouse band. 9:55, time; weather.

CNRO, Ottawa, Ont., 435 (E. S. T.)—7:30 P. M., bedtime story, Lullaby, Aunt Agnes. 8, Chateau Laurier concert orch. 8:30, Madame Bertha Pinco, soprano; CNRO Harmonica Band; monologue, Mr. Norman Wolfe; Mr. W. A. Tucker, bass; Mr. V. Lanctot, accordion; comedy, Mr. Bob Giddens; "Mining Talcum," Dr. M. E. Wilson; Chateau Laurier dance orch.

CKAC, Montreal, Que., 411 (E. S. T.)—7 P. M., kiddies stories. 7:30, Windsor Hotel orch. 8:30, concert. 10:30, Windsor Hotel Red Jackets.

PWX, Havana, Cuba, 400 (E. S. T.)—8:30 to 11:30 P. M., piano solo by J. M. Gonzalo Rossi, baritone; Alonso Murla, tenor; Nena Guerra, soprano, and Fausto Alvarez, tenor; talk on Cuba; piano solo by J. M. Gonzalo; Antonio Plana, baritone; Nena Guerra, soprano; Alvarez, tenor, and Plana, baritone; talk on Cuba; piano solo by J. M. Gonzalo; Antonio Plana, baritone; Vicente Gonzalez, guitar; Fausto Alvarez, tenor.

Sunday, April 19

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.

WEAR, Cleveland, O., 390 (E. S. T.)—2:15 P. M., Allen Theatre orch. 3:30, Hotel Cleveland orch. 9, evening hour.

WCAE, Pittsburgh, Pa., 461.3 (E. S. T.)—10:45 A. M., Rodef Shalom temple services. 3 P. M., People's Radio church services. 4, Otto Kalteis, piano. 6:30, concert from William Penn Hotel.

WCBD, Zion, Ill., 344.6 (C. S. T.)—8 P. M., the mixed quartet; Miss Sweeney and Mrs. Crowe, soprano and contralto; Mrs. Ruth Pihl, soprano; Chester Bagg, barytone; Paul Stewart, cornet; Wm. C. Dunn, euphonium; L. J. Hire, viola; Bessie Wiedman, piano; Mrs. Mary Bagg, reader.

WOS, Jefferson City, Mo., 440.9 (C. S. T.)—7:30 P. M., services of First Christian church, Rev. Robert M. Talbert.

WWJ, Detroit, Mich., 352.7 (E. S. T.)—11 A. M., services at St. Paul's Episcopal Cathedral. 2 P. M., Detroit News orch., Charles A. Payne, speaker. 7:20, "Roxy and His Gang." 9:15, organ.

WOAI, San Antonio, Tex., 394.5 (C. S. T.)—11 A. M., services of First Presbyterian church, Dr. P. B. Hill, pastor. 7:30 P. M., services of Central Christian church, Dr. Hugh McLellan, pastor. 9:30, 15th Field Artillery band.

WEEL, Boston, Mass., 476 (E. S. T.)—3:45 P. M., men's conference Y. M. C. A. 7:20, "Roxy and His Gang." 9:20, organ.

WOAW, Omaha, Neb., 526 (C. S. T.)—9 A. M., Rev. R. R. Brown. 2:15 P. M., W. C. Kuehn program. 6, Bible study, Mrs. Carl R. Gray. 9, music, Benson Methodist Episcopal church.

WHO, Des Moines, Iowa, 526 (C. S. T.)—11 A. M., University Church of Christ sermon, service. 4 P. M., Dean Holmes Cooper program. 7:30, Reese-Hughes orch.

WIP, Philadelphia, Pa., 509 (E. S. T.)—10:45 A. M., service from Holy Trinity church, Rev. Floyd W. Tomkins. 3:30 P. M., Philadelphia Music League concert.

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

WHAS, Louisville, Ky., 399.8 (C. S. T.)—9:57 A. M., organ. 10, Broadway Christian church service, Rev. Dr. W. N. Briney, pastor; H. W. Long, organist. 4 P. M., Vesper song service of First Unitarian church.

WBBR, New York, N. Y., 272.6 (E. S. T.)—10 A. M., Watchtower orch. 10:20, Mrs. L. M. Brown, soprano. 10:30, "The Resurrection," Mr. E. J. Coward. 11, Mrs. L. M. Brown, soprano. 11:10, Watchtower orch. 9 P. M., Instrumental trio. 9:15, I. B. S. A. choral singers; "Coming Back From Hell," Mr. Norman Woodworth. 10, I. B. S. A. choral singers. 10:05, cello solos, Mr. H. Griggs. 10:15, Instrumental trio. 10:25, choral singers.

WDAF, Kansas City, Mo., 365.6 (C. S. T.)—4 P. M., Kansas City Symphony orch. 5, Sunday school lesson, Dr. Walter L. Wilson.

WEAF, New York City, 492 (E. S. T.)—3:5 P. M., "Sunday Hymn Sing" and Interdenominational services under the auspices of the Greater New York Federation of Churches. Rev. Wm. B.

Millar, presiding officer. Music by the Aida Brass quartet, Federation radio male and mixed quartet; Arthur Billings Hunt, baritone; address by Rev. Edward W. Miller. 7:20-9:15, musical program by "Roxy and His Gang" from Capitol theatre. 9:15-10:15, organ recital direct from the Chapel at Columbia University.

WLW, Cincinnati, Ohio, 422.3 (C. S. T.)—9:30 A. M., Sunday school. 11, services from the Church of the Covenant; Dr. Frank Stevenson, minister. 7:30 P. M., service from the First Presbyterian church of Walnut Hills. 8:30, concert by the Western and Southern orch; recital, Carl Wunderlich, zither.

WGR, Buffalo, N. Y., 319 (E. S. T.)—3 P. M., Vesper services by the Lay Evangelist Club. 4, organ recital by Robert Demming. 7:15, pre-service organ recital. 7:30, evening service, Rev. R. J. MacAlpine, D.D., minister.

WPG, Atlantic City, N. J., 299.8 (E. S. T.)—3:15 P. M., organ recital, auditorium of Atlantic City high school. 4:15, St. James Episcopal Church. 10, combined choir of Fire M. E. Church.

WGY, Schenectady, N. Y., 379.5 (E. S. T.)—10:30 A. M., service of Madison Avenue Reformed Church. 3:35 P. M., WGY Symphony orch. 7:30, service of Madison Ave. Reformed Church. 9, American orch. 10, violin recital.

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.

KYW, Chicago, Ill., 536 (C. S. T.)—11 A. M., Central Church service. 4 P. M., studio concert broadcast. 7, Chicago Sunday Evening Club service.

KGO, Oakland, Cal., 361.2 (P. S. T.)—11 A. M., St. Luke's Episcopal church service, Rev. W. W. Jennings, rector. 3:30 P. M., KGO Little Symphony orch. 8, St. Luke's Episcopal church service.

KNX, Los Angeles, Cal., 337 (P. S. T.)—10 A. M., First Presbyterian church. 5 P. M., Radio Sunset service, Rev. Charles F. Asked, Rev. Frank Dyer, D. D. 7, First Presbyterian church. 8, Ambassador concert orch. 9, R. C. Durant program.

KFI, Los Angeles, Cal., 467 (P. S. T.)—10 A. M., services of L. A. Church Fed., Dr. Campbell Coyle. 11, Temple Baptist church service, Dr. J. Whitcomb Brougher. 4 P. M., vesper services. 6:45, radiatorial; "Music of Russia," Harold Isbell. 7, program, Grauman Theatrical Enterprises. 8, Virginia Flohri-soprano. 9, Examiner program. 10, Hennessy's Packard Eight orch.

KPO, San Francisco, Cal., 429.5 (P. S. T.)—8 A. M., the "funnies," Mr. Scotty." 10:30, the local theatres. 11, services, Dr. C. E. Tingley; Alice Dyer, soprano; Theodore J. Irwin, organ. 6:30 P. M., the local theatres. 7:30, States Restaurant orch. 8:30, Fairmont Hotel orch.

Monday, April 20

WGN, Chicago, Ill., 370 (C. S. T.)—9:31 A. M., time. 9:35, quotations. 10, quotations. 11, quotations, weather, market. 11:30, quotations. 11:56, time. 12 M., quotations. 12:10 P. M., quotations. 12:30, quotations. 12:40, Drake concert ensemble, Blackstone string quintet. 1, quotations. 1:25, quotations. 2:30, Lyon and Healy concert hall. 3, Rocking Chair Time. 5, quotations. 5:30, Skeezix Time for Children. 5:57, time. 6, organ, Edwin Stanley Seder. 6:30, Drake concert ensemble, Blackstone string quintet. 8, classic hour. 10, Drake hotel orch.

WEAR, Cleveland, O., 390 (E. S. T.)—7 P. M., musical program direct from Loew's State Theatre.

WOAW, Omaha, Neb., 526 (C. S. T.)—12:30 P. M., Royal Fontelle orch. 5:45, news. 6, Arthur Hays, organist. 6:45, Ray Muzzy's orch. 9, Hannan-an Brunt Co. program.

WGST, Atlanta, Ga., 270 (E. S. T.)—9 P. M., Georgia Tech. Glee Club orch.

WCBD, Zion, Ill., 344.6 (C. S. T.)—8 P. M., Mrs. H. E. Mayfield, soprano; J. D. Thomas, barytone; Gerald Mason, cornet; Daniel Mason, trombone; Edwin Randall, flute; Clarence Dulmage, reader; John Mehaffey, piano.

WOS, Jefferson City, Mo., 440.9 (C. S. T.)—8 P. M., address, Hon. Charles A. Lee; music, Stephens College.

WCAE, Pittsburgh, Pa., 461.3 (E. S. T.)—12:30 P. M., news, weather, library news. 4:30, markets, the Sunshine Girl. 6:30, concert from William Penn Hotel. 7:30, Uncle Kaybee. 7:45, police reports. 8:30, artists from King School of Oratory. 9, A. & P. Gypsy String ensemble. 11, The Press-Kaybee, Blackstone theatre orch.

WMAK, Lockport, N. Y., 265.5 (E. S. T.)—8 P. M., Rialto Six orch. 11:30, Loew's State Theatre.

WHO, Des Moines, Iowa, 526 (C. S. T.)—7:30 P. M., Stewart Watson, baritone; Helen Birmingham, pianist. 8, Dean Holmes Cowper program. 11:15, organ, L. Carlos Heier.

WHAS, Louisville, Ky., 399.8 (C. S. T.)—4 P. M., concert from Louisville Conservatory of Music, concert of Kentucky Society. William Burke, baritone; "Skeets" Miller; Maj. Charles Dobbs, address; police bulletins, weather, readings, news. 4:55, markets. 5, time.

WPG, Atlantic City, N. J., 299.8 (E. S. T.)—7 P. M., Hotel Traymore dinner music. 8, Chalfonte-Haddon Hall trio.

WGR, Buffalo, N. Y., 319 (E. S. T.)—10:45 A. M., Gold Medal home service talk. 4:30 P. M., "Children's Week." 6, Jack Little and Paul Small, Cameo record artists. 6:30, concert by M. A. Schmitt radio orch. 7:50, address, "The Living Room." 8, Twentieth Century orch. 9, recital by Dr. F. T. Egner. 9:30, University of Buffalo Women's Glee Club.

WGY, Schenectady, N. Y., 379.5 (E. S. T.)—2 P. M., music, talk, "Becoming Clothes for the Stout Person," by Prof. Beatrice Hunter. 6:30, Hotel Ten Eyck trio. 7, sport review. 7:30, Georgine Servoss choral club.

WBBR, New York, N. Y., 272.6 (E. S. T.)—8

P. M., Syrian music, Toufic Moubaid, Elizabeth Awad. 8:10, Ruth de Boer, contralto. 8:20, world news digest. 8:40, Ruth de Boer. 8:50, Syrian music.

WDAF, Kansas City, Mo., 365.6 (C. S. T.)—3:30 P. M., Newman and Royal theatres. 5, Boy Scout program. 5:50, marketgram; weather; time; road report. 6, piano tuning in; reading, Miss Cecile Burton; Tell-Me-a-Story Lady; Trianon ensemble. 8, Ivanhoe band. 11:45, "Merry Old Chief," Plantation players.

WEAF, New York City, 492 (E. S. T.)—6:45-7:45 A. M., physical exercises. 4:5 P. M., Jeanette Baranello, soprano; Dorothy Ellen Cole, reader; elementary French lessons by William Doub-Kerr. 6:11:30, Waldorf-Astoria orch.; Juan Pulido, baritone; musical program direct from the Mark Strand theatre, New York City; "Tower Health Talk" by Metropolitan Life Insurance Co.; A. & P. Gypsies; "Blue Ribbon Quartet"; Dorothy Miller Duckwitz, pianist; Ben Bernie's orch.

WLW, Cincinnati, Ohio, 422.3 (C. S. T.)—8 A. M., setting up exercises. 10:45, weather and business reports. 11:55, time. 12:15 P. M., noon day services. 1:30, business reports. 3, market reports. 4, Babson reports, recital by pupils of Helen Abecherle. 6, WLW dinner hour concert. 6:45, market reports. 10:30, Y. P. L. of Fort Thomas presents scene from "Daddy Longlegs." 11, Alvin Roehr's music makers.

KSAC, Manhattan, Kans., 341 (C. S. T.)—9 A. M., exercises of rural schools. 12:35 P. M., reading, weather, cattle lice, J. W. Lumb; question box; helps for sheep clubs, M. H. Coe. 7:20, songs, Ethyl Robinson. 7:30, sheep farming, H. E. Reed. 7:40, songs, Ethyl Robinson. 7:50, marketing dairy products, N. E. Olson.

KFI, Los Angeles, Cal., 467 (P. S. T.)—5 P. M., news. 5:30, Examiner program. 6:45, radiatorial. 7, Herald program. 8, Mildred Masser, female baritone, Francis Long, Franz Wilke, yodeller. 9, The Mozart instrumental trio, Apollo Male quartet. 10, Examiner program.

KNX, Los Angeles, Cal., 337 (P. S. T.)—12 P. M., West Coast Theatres. 8, feature program. 10, Silvertown orch., Lillian May Challenger, soloist. 11, Cocanut Grove orch.

KGO, Oakland, Cal., 361.2 (P. S. T.)—9 A. M., music, lectures, Cal. State Dept. of Ed. 10:40, classroom instruction. 11:30, concert. 1:30 P. M., stocks, weather. 3, music, speaker. 4, Halstead's dance orch. 5:30, Aunt Betty stories. 6:45, stocks, weather, news. 8, Arion trio; "Lady Bird Beetles," Professor E. O. Essig; "A Lesson in English," Wilda Wilson church; Albertine Richards Nash, psychologist; new books, Joseph Henry Jackson. 10, Halstead's orch.

KPO, San Francisco, Cal., 429.5 (P. S. T.)—10:30 A. M., the local theatres. 12 M., time, scripture reading. 1 P. M., Fairmont Hotel orch. 4:30, Fairmont Hotel orch. 5:30, book of knowledge. 5:30, markets. 6:30, the local theatres. 6:30, States Restaurant orch. 7, Fairmont Hotel orch. 8, Theodore J. Irwin, organist; Mme. Louise Brekeny, contralto. 9, Joseph George Jacobson, violin. 10, Johnny Buick's Amphians.

KOB, State College, New Mexico, 348.6 (M. S. T.)—7:30-8:30 P. M., radio talk: "First Aid, Medical and Surgical," Dr. T. C. Sexton.

KFAE, State College of Washington, 348.6 (C. S. T.)—7:30 P. M., violin solos, Evelyn Sparling; the farm machinery situation, Prof. C. C. Johnson; advantages of home ownership, Prof. Stanley A. Smith; working for better health, Miss Mary Sutherland; the world conflict of color, Dr. Fred R. Yoder; soprano solos, Agnes Dilt.

CNRO, Ottawa, Ont., 435 (E. S. T.)—8:30 P. M., music; address, Rt. Hon. W. L. Mackenzie King.

CNRA, Moncton, N. B., 313 (A. S. T.)—8:30 P. M., music; address, Hon. Peter J. enoit.

Tuesday, April 21

WGN, Chicago, Ill., 370 (C. S. T.)—9:31 A. M., time. 9:35, quotations. 10, quotations. 11, quotations, weather, market. 11:30, quotations. 11:56, time. 12 M., quotations. 12:10 P. M., quotations. 12:30, quotations. 12:40, Drake concert ensemble, Blackstone string quintet. 1, quotations. 1:25, quotations. 2:30, Lyon and Healy concert hall. 3, Rocking Chair Time. 5, quotations. 5:30, Skeezix Time for Children. 5:57, time. 6, organ, Edwin Stanley Seder. 6:30, Drake concert ensemble, Blackstone string quintet. 8, classic hour. 10, Drake hotel orch.

WEAR, Cleveland, O., 390 (E. S. T.)—7 P. M., Metcalf Memorial organ recital. 8, program arranged by WEAF.

WOAW, Omaha, Neb., 526 (C. S. T.)—12:30 P. M., horticultural program. 5:45, news. 6, "Advice to Lovelorn." Cynthia Grey. 6:25, WOAW's remote control studio. 9, Helen Mackin, pianist. 10:30, Nightingale orch.

WCAE, Pittsburgh, Pa., 461.3 (E. S. T.)—12:30 P. M., news, weather. 4:30, markets, the Sunshine Girl. 6:30, concert from William Penn Hotel. 7:30, Uncle Kaybee. 7:45, police reports. 8:30, "Gold Dust Twins." 9, "The Eveready Hour." 10, concert.

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

WHAS, Louisville, Ky., 399.8 (C. S. T.)—4 P. M., concert from Louisville Conservatory of Music, organ, police bulletins, weather, readings, news. 4:55, markets. 5, time. 7:30, Carl Zoeller's Melodists. 8:30, concert, sopranos: Mrs. Ethel Robertson Freyman, Mrs. Elmer Graham; contralto, Mrs. Edwin Horn; reader, Mrs. George J. Sutterlin; tenors, Joseph J. Eisenbeis, George J. Sutterlin; baritones, William G. Meyer, R. C. Riebel; basses, Arthur Almstedt, Ed. H. Pfeiffer; accompanists, Mrs. A. R. Kimmerling, Miss Elizabeth Moore, Miss Charlotte Merklein.

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

WDAF, Kansas City, Mo., 365.6 (C. S. T.)—3:30 P. M., Star's radio trio. 5, pupils of Alice Von. 5:50, marketgram; weather; time; road re-

port. 6, piano tuning in; Tell-Me-a-Story Lady; piano lessons; Miss Maudelien Littlefield; Trianon ensemble. 11:45, Newman Theatre.

WEAF, New York City, 492 (E. S. T.)—6:45-7:45 A. M., physical exercises. 11-12, musical program; Board of Education lecture; motion picture forecast by Adele Woodard; market and weather reports. 4:5 P. M., musical program, women's program under the auspices of the United Synagogue of America. 6-12, Waldorf-Astoria orch.; Marian Cara, coloratura soprano; talk; Eagle Neutrodyne trio; financial discussion by Dudley F. Fowler; "The Gold Dust Twins"; "Eveready Hour"; Level Club entertainment.

WLW, Cincinnati, Ohio, 422.3 (C. S. T.)—8 A. M., setting up exercises. 10:45, weather, business reports. 11:55, time. 12:45 P. M., "Request Program," Clifford Lang, pianist; recital by Delta Omicron Sorority. 1:30, business reports. 3, market reports. 4, piano pupils of Leo Stoffregen and William Kyle. 6, WLW dinner hour concert. 6:45, market reports. 8, the Famous Lyric Male quartet. 8:15, special feature. 8:30, continuation of the concert by the Lyric Male quartet. 9, the Formica Concert orch; the Crosley Hello Boys.

WPC, Atlantic City, N. J., 299.8 (E. S. T.)—7 P. M., Hotel Ambassador dinner music. 9, Hotel Ambassador concert ensemble. 10, Paul Whiteman's Hotel Traymore dance orch.

WGR, Buffalo, N. Y., 319 (E. S. T.)—10:45 A. M., address, "The Dining Room." 11, Mrs. Katherine Norton Britt. 8 P. M., joint broadcasting with WEAF.

WGY, Schenectady, N. Y., 379.5 (E. S. T.)—2 P. M., music; one-act play, "The Mouse Trap," by Harry Bond players. 2:30, organ selections. 6:30, New Kenmore Hotel orch. 7:30, address; "Early Spring Vegetation in the Eastern States," Harry Knute Svenson. 7:45, WGY orch. 8, program of soprano, baritone and piano solos. 9, Brunswick hour of music. 10, travelogue, "Over the Seven Seas." 10:30, Meyer Davis orch. 11:30, organ program.

KNX, Los Angeles, Cal., 337 (P. S. T.)—9 A. M., State Board of Ed. 1 P. M., Beverly Hills Nurseries, Mr. Chenoweth. 4, Helens household hints. 6:30, Globe Ice Cream Co. program. 7:30, styles, Myer Siegel. 7:45, "Health," Dr. Robert T. Williams. 8, Bank program. 9, Independent Furniture Mfg. Co. 10, Abe Lyman's orch.

KSAC, Manhattan, Kans., 341 (C. S. T.)—9 A. M., exercises of rural schools. 12:35 P. M., reading, weather, chick troubles, J. H. McAdams; question box; terminal livestock market, E. A. Stokdyk. 7:20, Radio College quartet. 7:30, alfalfa for dairy cows, J. B. Fitch. 7:40, Radio College quartet. 7:50, poultry houses, D. J. Taylor.

KFI, Los Angeles, Cal., 467 (P. S. T.)—5 P. M., news. 5:30, Examiner program. 6:45, radiatorial. 7, Dan MacFarland, organist. 8, Examiner program. 9, program National Music Co. 10, Way Watts, Billy Hall, Polly Grant Hall, Dorothy Cleveland and William Mays.

KGO, Oakland, Cal., 361.2 (P. S. T.)—11:30 A. M., concert. 1:30 P. M., stocks, weather. 4, orch of Hotel St. Francis. 6:45, stocks, weather, news. 8, Winifred Eva Cameron, flutist; Julia Phillips Page, contralto; Bernard O'Brien, baritone; "The Spirit of Service Clubs," Frank Marshall; Mary Anderson Johnson, soprano; Mabel M. Cameron, harp; "A Vacation Experience," Earle P. Cochran; Gwyn Jones Tebault, contralto; Robert Kourke, violin; Elbert Cowan, organ; William Carruth, piano; California Male quartet; trombone, Carlton Jones; Marjorie Miller, contralto; stories, Wilda Wilson Church. 10, Halstead's orch.

KPO, San Francisco, Cal., 429.5 (P. S. T.)—7 A. M., daily dozen. 10:30, the local theatres. 11, cooking and household management, Mrs. Belle DeGraf. 12 M., time, scripture reading. 1 P. M., Fairmont Hotel orch. 4:30, Fairmont Hotel orch. 5:30, book of knowledge. 6:30, the local theatres. 6:30, States Restaurant orch. 7, Fairmont Hotel orch. 8, Mme. Pearl Ladd, soprano. 10, Johnny Buick's Amphians.

KFMQ, Fayetteville, Ark., 299.8 (E. S. T.)—9 P. M., Owen Mitchell orch.

CNRA, Moncton, N. B., 313 (A. S. T.)—8:30 P. M., St. John, N. B., artists; CNRA orch.

CNRR, Regina, Sask., 439 (M. T.)—8 P. M., bedtime tale; W. H. Buckley, pianoforte; Hon. Chas. A. Dunning, address.

Wednesday, April 22

WGN, Chicago, Ill., 370 (C. S. T.)—9:31 A. M., time. 9:35, quotations. 10, quotations. 11, quotations, weather, market. 11:30, quotations. 11:56, time. 12 M., quotations. 12:10 P. M., quotations. 12:30, quotations. 12:40, Drake concert ensemble, Blackstone string quintet. 1, quotations. 1:25, quotations. 2:30, Lyon and Healy concert hall. 3, Rocking Chair Time. 5, quotations. 5:30, Skeezix Time for Children. 5:57, time. 6, organ, Edwin Stanley Seder. 6:30, Drake concert ensemble, Blackstone string quintet. 8, classic hour. 10, Drake hotel orch.

WEAR, Cleveland, O., 390 (E. S. T.)—6:45 P. M., Hotel Cleveland orch.

WOS, Jefferson City, Mo., 440.9 (C. S. T.)—8 P. M., "Tomato Culture," by E. M. Page; music; poems, Prof. Justice.

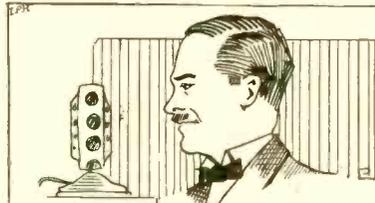
WEAO, Columbus, Ohio, 293.9 (C. S. T.)—8 P. M., Negro musicians of Ohio State.

WCAE, Pittsburgh, Pa., 461.3 (E. S. T.)—12:30 P. M., news; weather. 4:30, markets; Uncle Kaybee. 6:30, concert from William Penn Hotel. 7:30, The Sunshine Girl. 7:45, police reports. 8:30, concert.

WHAS, Louisville, Ky., 399.8 (C. S. T.)—4 P. M., concert from Louisville Conservatory of Music, organ, police bulletins, weather, readings, news. 4:55, markets. 5, time. 7:30, K. & I. Railroad orch, news, time.

WHO, Des Moines, Iowa, 526 (C. S. T.)—6:30 P. M., Reese-Hughes orch. 7:30, Chamber of Commerce Glee Club. 9, Des Moines theatre

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WJZ
with Irving Hoffman
Radio World Cartoonist



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symphonie orch. 9:45, Bankers' Life Radio orch. **WDAF, Kansas City, Mo., 365.6 (C. S. T.)**—3:30 P. M., Star's radio trio. 5:50, marketgram; weather; time; road report. 6, piano tuning in; Tell-Me-a-Story Lady; Trianon ensemble. 8, Star's Radio orch. 11:45, "Merry Old Chief," Plantation players.

WEAF, New York City, 492 (E. S. T.)—6:45-7:45 A. M., physical exercises. 11-12, Irving

Cohen, violinist; young mother's program; market and weather reports. 2:30 P. M., opening home game New York Giants: Giants vs. Boston at Polo Ground, New York. 4, Joy Babcock, violinist; Phyllis Blum, soprano; children's stories. 6-12, Waldorf-Astoria orch.; Synagogue services under the direction of the United Synagogue of America; "Romance of Jewelry" by Lawrence S. Mears; U. S. Marine band; "Ipana Hour"; Royal Little Symphony orch; Meyer Davis' Lido Venice orch.

WMAK, Lockport, N. Y., 265.5 (E. S. T.)—8 P. M., musical. 11:30, Loew's State theatre, Buffalo, N. Y.

WLW, Cincinnati, Ohio, 422.3 (C. S. T.)—8 A. M., setting up exercises. 10:45, weather and business reports. 11:55, time. 12:15 P. M., piano selections; Mu Phi Epsilon concert. 1:30, business reports. 3, market reports. 4, program for the "Shut-Ins." 6, WLW dinner hour concert. 6:45, market reports. 10, the Rainbow String orch.; songs by Larsch Ferguson, baritone; violin obligatos by Harry Luduke; violin solos by Dorothy Robb; the Rainbow String orch.; piano selections by Missouri Kinney, with songs by Marion Early.

WGR, Buffalo, N. Y., 319 (E. S. T.)—10:45 A. M., Gold Medal home service talk. 11, address, "Beautiful Kitchens." 7:20, "Children's Week" 9, concert by the Adam, Meldrum and Anderson Co. 10, recital by Cantor Benjamin Levite. 10:30, concert by the National Vaudeville Exchange.

WGY, Schenectady, N. Y., 379.5 (E. S. T.)—11:55 A. M., time. 12:30 P. M., stocks. 12:40, produce market report. 12:45, weather. 6, stock quotations; news. 6:30, program for children. 6:45, adventure story from "Youth's Companion." 7, program by Albany Strand Theatre orch.

KFAE, State College of Washington, 348.6 (P. S. T.)—7-9 P. M., Two Wooing Scenes from Shakespeare; soprano solos from Shakespeare's time; scenes from Shakespeare; gardening, Prof. Chester L. Vincent; historical styles of domestic architecture, Prof. Fred G. Rounds; growing corn, Leonard Hegnauer; Treadwell's orch., popular selections.

KGO, Oakland, Cal., 361.2 (P. S. T.)—11:30 A. M., concert. 1:30, stocks, 3, music. 4, orch. of Hotel St. Francis. 6:45, stocks, weather, news.

KNX, Los Angeles, Cal., 337 (P. S. T.)—7 P. M., Ambassador concert orch. 8, bank program. 9, Clear Lake Beach Co. program. 10, Hollywoodland dance orch.

KFI, Los Angeles, Cal., 467 (P. S. T.)—5 P. M., news. 5:30, Examiner program. 6:45, radiatorial. 7, detective stories. 7:20, Hebrew melody. 7:30, The Lyric trio. 8, Herald program. 9, Examiner program. 10, Patrick-Marsh orch.

KSAC, Manhattan, Kans., 341 (C. S. T.)—9 A. M., exercises of rural schools. 12:35 P. M., reading, weather, suggestions for dairymen, J. W. Linn; question box; landscape suggestions, Ray Wick. 7:20, instrumental trio. 7:30, types of pavement, C. H. Scholer. 7:40, instrumental trio. 7:50, farm tractor, W. H. Sanders.

KPO, San Francisco, Cal., 429.5 (P. S. T.)—7 A. M., daily dozen. 10:30, the local theatres. 12 M., time, scripture reading. 1 P. M., Fairmont Hotel orch. 4:30, Fairmont Hotel orch. 5:30, markets, book of knowledge. 6:30, the local theatres. 6:30, States Restaurant orch. 7, Fairmont Hotel orch. 7:30, Conn Co. program. 8, Atwater Kent, instrumental program. 9, California Club. 10, Johnny Buick's Amphians.

CNRO, Ottawa, Ont., 435 (E. S. T.)—7 P. M., talk for boys and girls, Uncle Dick. 7:30, markets. 7:45, Lawrence Burpee's book talk. 8, Chateau Laurier concert orch. 8:30, St. Paul's Methodist Church choir; Chateau Laurier dance orch.

Thursday, April 23

WGN, Chicago, Ill., 370 (C. S. T.)—9:31 A. M., time. 9:35, quotations. 10, quotations. 11, quotations, weather, market. 11:30, quotations. 11:56, time. 12 M., quotations. 12:10 P. M., quotations. 12:30, quotations. 12:40, Drake concert ensemble, Blackstone string quintet. 1, quotations. 1:25, quotations. 2:30, Lyon and Healy concert hall. 3, Rocking Chair Time. 5, quotations. 5:30, Skeezix Time for Children. 5:57, time. 6, organ, Edwin Stanley Seder. 6:30, Drake concert ensemble, Blackstone string quintet. 8, classic hour. 10, Drake hotel orch.

WEAR, Cleveland, O., 390 (E. S. T.)—7 P. M., Metcalf Memorial organ recital. 8, program arranged by WEAF. 10, Crystal Slipper dance orch.

WCAE, Pittsburgh, Pa., 461.3 (E. S. T.)—12:30 P. M., news, weather. 4:30, markets, the Sunshine Girl. 6:30, concert from William Penn Hotel. 7:30, Uncle Kaybee. 8, concert. 9, concert. 9 Silvertown orch. 10, Atwater Kent, Radio artists. 10:30, Nixon Restaurant orch.

WGST, Atlanta, Ga., 270 (E. S. T.)—7 P. M., German music by Dr. J. B. Crenshaw; H. R. Bates, baritone; Miss Helen Bates, soprano; address, Dr. M. L. Brittain.

WOAW, Omaha, Neb., 526 (C. S. T.)—12:30 P. M., horticultural program. 5:45, news. 6, child's story hour, Grace Sorenson. 6:45, Royal Fontelle orch. 9, Auto Electric and Radio Corp. program. 10:30, Nightingale orch.

WEAO, Columbus, Ohio, 293.9 (E. S. T.)—8 P. M., chimes, A. P. McManigal; address, John W. Jones; ladies' orch.

WOAI, San Antonio, Tex., 394.5 (C. S. T.)—9:30 P. M., Jimmie Joy's orch.

WCBD, Zion, Ill., 344.6 (C. S. T.)—8 P. M., the mixed quartet; Mrs. Mayfield, soprano; E. B. Paxton, barytone; Mrs. G. R. Sparrow, contralto; Celestial Bells; Fred Fassen, organist; Mrs. Hester Robinson, reader; Ruth Petrie, piano.

WMAK, Lockport, N. Y., 265.5 (E. S. T.)—12 M., Whiteman's midnight serenaders.

WHAS, Louisville, Ky., 399.8 (C. S. T.)—4 P. M., concert from Louisville Conservatory of Music; selections played on Alamo Theatre organ; police bulletins; weather; editorials; news. 4:55, mar-

Permanent Schedule of Hours on Air

Time given is Eastern Standard and always P. M. For conversion to Central Standard Time subtract one hour; Mountain Time, two hours; Pacific Time, three hours.

| Station | Meters | Saturday | Sunday | Monday | Tuesday | Wednesday | Thursday | Friday |
|----------------------------|--------|-------------|-------------|-------------|-------------|-----------------|-------------|-------------|
| KDKA, E. Pittsburgh, Pa. | 309 | 7:30-9:55 | 4:00-8:45 | 6:15-9:55 | 6:15-12:00 | 6:15-9:55 | 6:15-12:00 | 6:15-9:55 |
| KFAE, Pullman, Wash. | 348 | Silent | Silent | 10:30-11:30 | Silent | 10:30-11:30 | Silent | 10:30-11:30 |
| KFI, Los Angeles, Calif. | 468 | 9:45-2:00 | 7:00-2:00 | 9:45-2:00 | 9:45-2:00 | 9:45-3:00 | 9:45-2:00 | 9:45-3:00 |
| KFKX, Hastings, Neb. | 288 | Silent | Silent | 10:30-12:00 | Silent | 10:30-12:00 | Silent | 10:30-12:00 |
| KFNF, Shenandoah, Ia. | 266 | 7:30-10:00 | 7:30-9:00 | 7:30-9:00 | Silent | 7:30-10:00 | 7:30-10:00 | 7:30-10:00 |
| KFOA, Seattle, Wash. | 454 | 9:45-2:00 | Silent | 9:45-1:00 | 9:45-2:00 | 9:45-1:00 | Silent | 9:45-2:00 |
| KFPT, Salt Lake City | 461 | 10:00-12:00 | 11:00-12:00 | 10:00-11:00 | 10:00-11:00 | 10:00-11:00 | 10:00-11:00 | 10:00-12:00 |
| KFRU, Bristow, Okla. | 394 | 10:00-1:00 | 6:00-7:00 | 8:00-11:30 | 11:30-1:00 | 9:00-11:20 | 11:30-12:30 | 12:00-2:00 |
| KFUO, St. Louis, Mo. | 545 | Silent | 10:15-11:15 | Silent | Silent | 10:15-11:15 | Silent | Silent |
| KGO, Oakland, Calif. | 361 | 11:00-3:00 | 6:30-10:30 | 11:00-3:00 | 11:00-3:00 | Silent | 11:00-3:00 | Silent |
| KGW, Portland, Ore. | 491 | 1:00-3:00 | 6:00-10:00 | Silent | 11:00-3:00 | 11:00-3:00 | 11:00-3:00 | 11:00-3:30 |
| KHJ, Los Angeles, Calif. | 495 | 11:00-3:00 | 11:00-1:00 | Silent | 11:00-2:00 | 11:00-1:00 | 11:00-2:00 | 10:45-2:00 |
| KJS, Los Angeles, Calif. | 293 | Silent | 10:15-12:30 | Silent | 11:00-12:00 | Silent | 11:00-12:00 | Silent |
| KLX, Oakland, Calif. | 508 | Silent | Silent | 9:00-2:00 | 9:00-10:00 | 9:00-2:30 | Silent | 9:00-1:30 |
| KNX, Hollywood, Calif. | 336 | 9:15-4:00 | 10:00-2:00 | 9:15-3:00 | 9:30-3:00 | 9:15-3:00 | 9:30-2:00 | 9:30-3:00 |
| KOA, Denver, Colo. | 322 | 11:00-2:00 | 6:00-11:45 | 10:00-11:00 | Silent | 10:00-2:00 | Silent | 10:00-11:00 |
| KOB, State College, N. M. | 348 | Silent | Silent | 9:30-10:30 | Silent | 9:30-10:30 | Silent | 9:30-10:30 |
| KPO, San Francisco, Calif. | 429 | 11:00-3:00 | 11:30-1:00 | 10:00-1:00 | 10:00-2:00 | 9:30-2:00 | 11:00-2:00 | 11:00-3:00 |
| KSAC, Manhattan, Kan. | 340 | Silent | 9:00-10:00 | 8:20-9:00 | 8:20-9:00 | 8:20-9:00 | 8:20-9:00 | 8:20-9:00 |
| KSD, St. Louis, Mo. | 454 | 8:00-11:00 | Silent | 9:00-12:00 | 7:00-12:00 | 7:00-8:00 | Silent | 9:00-12:00 |
| KTHS, Hot Springs, Ark. | 374 | 9:30-12:00 | 9:30-12:15 | 9:30-2:15 | 9:30-11:00 | 9:30-12:00 | 9:30-2:15 | 9:30-11:30 |
| KTW, Seattle, Wash. | 455 | Silent | 10:00-12:30 | Silent | Silent | Silent | Silent | Silent |
| KYW, Chicago | 535 | 8:00-3:00 | 8:00-10:00 | Silent | 8:00-3:30 | 8:00-3:30 | 8:00-3:30 | 8:00-3:30 |
| NAA, Radio, Va. | 434 | Silent | Silent | 7:45-8:00 | 7:45-8:00 | 7:25-7:40 | 7:45-8:00 | 7:45-8:00 |
| WAHG, Richmond, N. Y. | 315 | 12:00-2:00 | Silent | 8:00-2:00 | Silent | 8:00-11:30 | Silent | 8:00-11:30 |
| WBAF, Fort Worth, Tex. | 475 | 8:00-9:00 | 12:00-1:00 | 8:00-11:45 | 8:30-11:45 | 8:30-11:45 | 8:30-11:45 | 8:30-11:45 |
| WBAR, Sisiht, Wis. | 406 | Silent | 11:00-12:00 | 10:00-11:00 | Silent | 9:00-10:00 | 8:30-9:30 | Silent |
| WBVA, Columbus, O. | 293 | Silent | Silent | 8:00-9:00 | Silent | Silent | Silent | 8:00-9:00 |
| WBBG, Mattapoisett, Mass. | 248 | Silent | Silent | 8:00-10:00 | Silent | 8:00-9:00 | Silent | 7:00-2:00 |
| WBBM, Chicago | 226 | Silent | 9:00-10:00 | Silent | 9:00-10:00 | Silent | 9:00-10:00 | Silent |
| WBBR, Staten Island, N. Y. | 272 | 8:00-9:45 | 9:00-10:20 | 8:00-8:50 | Silent | Silent | 8:00-8:50 | Silent |
| WBCN, Chicago | 266 | 7:00-2:00 | 5:00-1:00 | Silent | 7:00-2:30 | 7:00-11:15 | 7:00-2:00 | 7:00-2:00 |
| WBZ, Springfield, Mass. | 333 | 6:00-11:00 | 7:00-11:00 | 6:00-11:00 | 6:00-9:55 | 6:00-11:00 | 6:00-12:45 | 7:05-8:05 |
| WCAE, Pittsburgh, Pa. | 461 | 6:30-9:30 | 4:00-7:30 | 6:30-12:00 | 6:30-12:00 | 6:30-10:00 | 6:30-11:00 | 6:30-10:00 |
| WCAL, Northfield, Minn. | 336 | 1:00-2:00 | 9:30-11:00 | 12:00-1:00 | Silent | Silent | 10:00-11:00 | 9:30-10:30 |
| WCAP, Washington, D. C. | 468 | Silent | 6:20-10:15 | 7:00-11:30 | Silent | 6:00-12:00 | Silent | 7:30-12:00 |
| WCAU, Philadelphia, Pa. | 278 | Silent | 5:30-9:30 | Silent | 7:30-9:30 | 8:00-11:10 | 7:30-11:00 | 7:00-10:00 |
| WCBD, Zion, Ill. | 344 | Silent | 3:30-10:00 | 9:00-11:30 | Silent | Silent | 9:00-11:30 | Silent |
| WCCO, Minn.-St. Paul | 416 | 9:00-12:00 | 5:10-10:15 | 9:00-12:00 | 7:30-11:00 | 8:00-1:30 | 8:00-11:00 | 7:30-1:00 |
| WCX, Detroit | 516 | 6:00-7:00 | Silent | 6:00-9:30 | 6:00-11:00 | 6:00-9:30 | 6:00-7:00 | 6:00-11:00 |
| WDAF, Kansas City, Mo. | 365 | 7:00-2:00 | 5:00-6:30 | 7:00-2:00 | 7:00-2:00 | 7:00-10:15 | 7:00-2:00 | 7:00-2:00 |
| WDWF, Providence, R. I. | 440 | Silent | 5:00-6:45 | Silent | 9:00-10:30 | Silent | Silent | Silent |
| WEAF, New York | 491 | 6:00-12:30 | 8:15-10:15 | 6:00-11:30 | 6:00-10:00 | 6:00-12:00 | 6:00-12:00 | 6:00-12:00 |
| WEAO, Columbus, O. | 293 | 8:00-9:00 | Silent | Silent | Silent | 9:00-10:20 | Silent | Silent |
| WEAR, Cleveland, O. | 389 | Silent | 3:30-5:00 | 7:00-8:00 | 7:30-10:00 | 7:00-8:00 | 7:00-10:00 | 7:00-10:00 |
| WEBB, Chicago | 370 | 8:00-1:00 | 8:00-10:00 | Silent | 8:00-1:00 | 8:00-1:00 | 8:00-1:00 | 8:00-1:00 |
| WEBJ, New York | 233 | Silent | Silent | Silent | 7:00-9:00 | 7:00-9:00 | Silent | 7:00-9:00 |
| WEBW, Beloit, Wis. | 268 | Silent | 5:30-6:30 | Silent | 9:00-10:00 | Silent | 8:30-9:30 | Silent |
| WEEL, Boston, Mass. | 475 | Silent | 3:45-10:15 | 6:30-10:00 | 6:30-11:00 | 6:30-12:00 | 6:30-11:00 | 6:30-10:30 |
| WEMC, Berrien Sp., Mich. | 285 | Silent | 9:15-11:00 | 9:15-10:15 | Silent | 9:15-10:15 | Silent | 10:00-11:45 |
| WFAA, Dallas, Tex. | 475 | 9:30-1:00 | 7:00-12:00 | 7:30-10:30 | 7:30-1:00 | Silent | 7:30-1:00 | 7:30-10:30 |
| WFBH, New York | 272 | 6:00-8:45 | 6:00-8:30 | 6:00-1:15 | 6:00-11:30 | 6:15-1:15 | 6:00-12:30 | 6:00-1:30 |
| WFI, Philadelphia | 394 | 6:30-9:00 | 4:30-5:30 | 6:30-8:00 | 6:30-11:00 | 6:30-8:00 | 6:30-10:00 | 6:30-8:00 |
| WGBS, New York | 315 | 6:00-12:00 | 3:30-3:45 | 6:00-7:30 | 6:00-10:00 | Silent | 6:00-11:00 | 6:00-7:30 |
| WGN, Chicago | 370 | 7:30-12:00 | 3:00-11:00 | Silent | 7:00-12:00 | 7:00-12:00 | 7:00-12:00 | 7:00-12:00 |
| WGR, Buffalo, N. Y. | 319 | 4:00-7:30 | 4:00-8:30 | 8:15-11:00 | 6:00-11:30 | 8:00-11:00 | 6:00-11:00 | 6:30-11:00 |
| WGST, Atlanta, Ga. | 270 | Silent | Silent | 10:00-11:00 | Silent | Silent | 8:00-9:00 | Silent |
| WGY, Schenectady, N. Y. | 379 | 9:30-12:00 | 3:35-11:00 | 6:40-9:00 | 6:30-12:30 | Silent | 6:30-11:30 | 7:00-11:30 |
| WHA, Madison, Wis. | 535 | Silent | Silent | 8:45-9:45 | Silent | 10:00-11:00 | Silent | 8:45-9:45 |
| WHAD, Milwaukee, Wis. | 275 | Silent | Silent | 8:30-9:30 | Silent | 9:00-10:00 | Silent | 9:00-10:00 |
| WHAS, Louisville, Ky. | 399 | 8:30-10:00 | 5:00-6:00 | Silent | 8:30-10:00 | 8:30-10:00 | 8:30-10:00 | 8:30-10:00 |
| WHAZ, Troy, N. Y. | 379 | Silent | Silent | 9:00-10:00 | Silent | Silent | Silent | Silent |
| WHB, Kansas City, Mo. | 365 | Silent | 9:00-2:00 | 8:00-9:00 | 9:00-11:15 | 8:00-9:00 | 8:00-11:00 | 8:00-9:00 |
| WHK, Cleveland, O. | 273 | 6:00-1:00 | 7:30-11:00 | 6:00-7:30 | 6:30-7:30 | 6:00-7:30 | 6:00-11:30 | 6:00-10:00 |
| WHN, New York | 361 | 6:30-12:30 | 3:00-12:45 | 6:30-1:00 | 6:30-12:30 | 6:30-12:30 | 6:30-12:30 | 6:30-12:30 |
| WHO, Des Moines, Ia. | 526 | Silent | 5:00-9:30 | 8:30-1:00 | Silent | 7:30-12:00 | 6:05-7:30 | 6:05-7:30 |
| WIP, Philadelphia | 508 | 6:05-12:05 | 3:15-9:30 | 6:05-7:30 | 6:00-12:00 | 6:05-7:05 | 6:05-12:00 | 6:05-7:30 |
| WJAR, Providence, R. I. | 305 | 7:10-8:10 | 7:20-10:15 | 8:00-9:00 | 8:30-11:00 | 8:00-9:00 | 8:30-11:00 | 7:30-11:00 |
| WJAS, Pittsburgh | 275 | Silent | Silent | 8:30-11:00 | 8:30-11:00 | 8:30-11:00 | 8:30-11:00 | 7:30-10:00 |
| WJJD, Mooseheart, Ill. | 402 | 8:15-1:00 | Silent | 8:15-9:15 | 8:15-9:15 | 8:15-9:15 | Silent | 8:15-9:15 |
| WJY, New York | 305 | Silent | Silent | Silent | 8:15-11:00 | Silent | 7:30-10:00 | 8:30-9:30 |
| WJZ, New York | 454 | 7:00-11:30 | 4:00-8:30 | 7:00-10:00 | 7:00-10:20 | 7:00-10:30 | 7:00-12:00 | 7:00-11:30 |
| WKAR, Lansing, Mich. | 285 | 12:30-2:30 | Silent | 7:00-8:00 | Silent | 8:00-9:15 | Silent | 7:00-8:00 |
| WLBL, Stevens Pt., Wis. | 278 | 1:00-2:00 | Silent | Silent | 9:00-10:00 | Silent | Silent | Silent |
| WLIT, Philadelphia | 394 | 7:30-8:30 | 2:00-3:30 | 7:30-11:02 | 7:30-8:56 | 7:30-11:03 | 7:30-8:30 | 7:30-11:03 |
| WLS, Chicago | 344 | 9:00-1:00 | 7:30-9:00 | Silent | 7:30-2:00 | 7:30-1:00 | 7:30-9:00 | 7:30-12:00 |
| WLW, Cincinnati | 422 | 9:00-11:00 | 8:30-11:00 | 9:00-11:00 | 9:00-11:00 | 9:00-11:00 | 12:00-2:00 | Silent |
| WMAK, Lockport, N. Y. | 265 | Silent | Silent | 8:00-9:00 | Silent | Silent | 12:00-1:00 | Silent |
| WMAQ, Chicago | 447 | 7:00-11:00 | Silent | Silent | 7:00-11:00 | 7:00-11:00 | 7:00-11:00 | 7:00-11:00 |
| WMBF, Miami, Fla. | 384 | 8:00-3:00 | 8:00-3:00 | 8:00-3:00 | 8:00-3:00 | 8:00-3:00 | 8:00-3:00 | 8:00-3:00 |
| WMC, Memphis, Tenn. | 499 | 9:30-10:30 | Silent | 9:30-10:30 | 9:00-1:00 | Silent | 9:30-10:30 | 9:30-1:00 |
| WMH, Cincinnati, O. | 422 | 11:00-1:00 | 7:00-8:30 | 9:00-11:00 | Silent | 9:00-11:00 | 9:00-11:00 | 9:00-11:00 |
| WNAC, Boston | 280 | 10:00-11:00 | 8:30-10:30 | 7:00-11:00 | 9:00-11:00 | 7:00-11:00 | 9:00-11:00 | 7:00-11:00 |
| WNYC, New York | 526 | 6:30-10:20 | 9:00-11:00 | 7:00-10:25 | 7:20-10:20 | 7:30-10:30 | 7:20-9:30 | 7:30-10:20 |
| WOAI, San Antonio, Tex. | 394 | Silent | 8:30-11:30 | Silent | 9:30-11:30 | Silent | 10:30-11:30 | Silent |
| WOAW, Omaha, Neb. | 526 | 7:00-1:00 | 7:00-11:00 | 7:00-12:30 | 7:00-12:30 | Silent | 7:00-12:30 | 7:30-12:30 |
| WOAX, Trenton, N. J. | 240 | Silent | Silent | Silent | 9:15-11:00 | Silent | Silent | 9:00-11:00 |
| WOC, Davenport, Ia. | 483 | 7:30-1:00 | 9:00-12:30 | Silent | 7:30-10:00 | 7:30-11:00 | 7:30-1:00 | 7:30-10:00 |
| WOI, Ames, Ia. | 270 | Silent | Silent | 11:00-12:00 | Silent | Silent | 9:15-10:15 | Silent |
| WOO, Philadelphia | 508 | Silent | 6:05-8:30 | 7:30-11:00 | Silent | 7:30-11:00 | Silent | 7:30-11:00 |
| WOR, Newark, N. J. | 405 | 6:15-7:30 | Silent | 6:15-11:15 | 6:30-6:45 | 6:15-9:45 | 6:15-7:15 | 6:15-7:15 |
| WORD, Batavia, Ill. | 275 | Silent | 8:00-8:50 | 9:00-9:50 | 9:00-9:55 | Silent | 8:00-9:00 | Silent |
| WOS, Jefferson City, Mo. | 440 | Silent | 8:30-9:30 | 9:00-10:00 | Silent | 9:00-10:00 | Silent | 9:00-10:00 |
| WPG, Atlantic City, N. J. | 299 | 9:00-12:00 | 3:15-11:00 | Silent | 7:00-12:00 | Silent | 8:15-12:00 | 7:00-11:00 |
| WQB, Chicago | 447 | 8:00-4:00 | 9:00-11:00 | Silent | 8:00-3:00 | 8:00-3:00 | 8:00-3:00 | 8:00-3:00 |
| WRBC, Valparaiso, Ind. | 278 | Silent | 8:30-9:00 | 8:30-9:00 | Silent | Silent | Silent | Silent |
| WRC, Washington, D. C. | 468 | 6:45-12:15 | Silent | Silent | 6:45-12:00 | Silent | 6:45-11:30 | Silent |
| WREO, Lansing, Mich. | 285 | Silent | 7:00-8:00 | Silent | 8:15-9:45 | Silent | 8:15-9:45 | Silent |
| WSAC, Clemson Coll., S. | 336 | Silent | Silent | Silent | Silent | 8:00-9:00 | Silent | Silent |
| WSAI, Cincinnati | 325 | 9:00-12:00 | 4:00-5:00 | 7:00-1:00 | 8:00-11:00 | 10:10-1:00 | 8:00-10:00 | Silent |
| WSB, Atlanta, Ga. | 428 | 9:00-1:00 | 8:30-10:15 | 9:00-1:00 | 9:00-1:00 | 1:00:11:45-1:00 | 9:00-1:00 | 9:00-1:00 |
| WSM, Iowa City, Ia. | 483 | 8:30-10:00 | 8:00-10:30 | 8:30-10:00 | Silent | 8:30-10:00 | Silent | Silent |
| WTAM, Cleveland, O. | 389 | 6:00-12:00 | Silent | 6:00-12:00 | 6:00-7:00 | 6:00-1:00 | 6:00-7:00 | 6:00-7:00 |
| WTAS, Elgin, Ill. | 302 | 7:00-1:30 | 7:00-1:30 | 7:00-1:30 | 7:00-1:30 | 7:00-1:30 | 7:00-2:30 | 7:00-1:30 |
| WTAY, Oak Park, Ill. | 250 | 7:16-11:00 | Silent | Silent | 7:10-8:30 | 7:30-11:00 | 7:10-8:30 | 7:10-8:30 |
| WTIC, Hartford, Conn. | 348 | Silent | Silent | Silent | 8:00-9:00 | 8:00-11:00 | Silent | 8:00-9:00 |
| WWJ, Detroit | 352 | 8:30-9:30 | 7:20-10:00 | 6:00-9:30 | 6:00-9:30 | 6:00-11:00 | 6:00-12:30 | 6:00-9:30 |

kets. 5, time. 7:30, concert; Sunday school lesson; welfare talk; news; time.

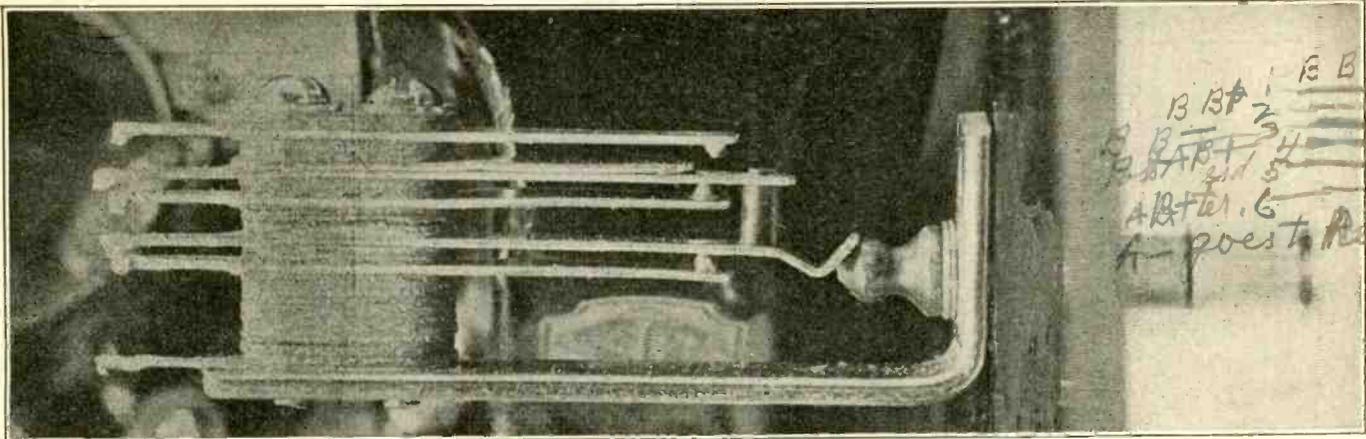
WHO, Des Moines, Iowa, 526 (C. S. T.)—11 P. M., music, Fitch orch.

WBBR, New York, N. Y., 272.6 (E. S. T.)—8 P. M., Hawaiian quintet. 8:10, Fred Franz, tenor. 8:20, Eric Howlett, Hawaiian guitarist. 8:30, Sunday school lesson, Mr. S. M. Van Sipma. 8:50, Hawaiian quintet.

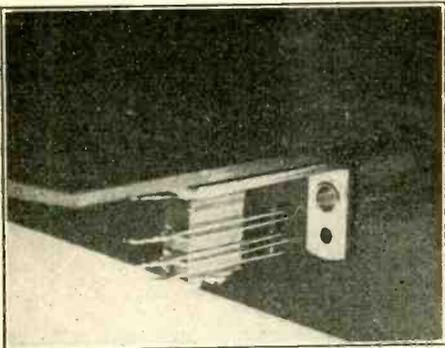
WDAF, Kansas City, Mo., 365.6 (C. S. T.)—3:30 P. M., Star's radio orch. 5:50, market; weather; time; road report. 6, piano tuning in; Louis Mecker, literary talk; Tell-Me-a-Story Lady; Trianon ensemble. 11:45, "Merry Old Chief," Plantation players; Kuhn's orch.; Campbell's Kansas City Club orch.

WEAF, New York City, 492 (E. S. T.)—6:45-7:45 A. M., physical exercises

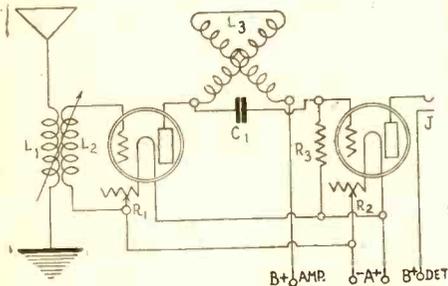
How a Filament Jack Works



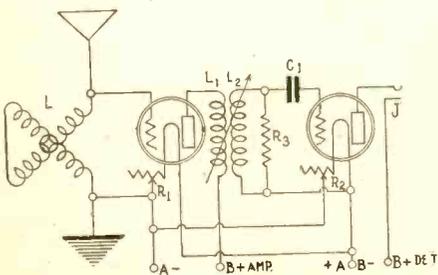
A FILAMENT-CONTROL JACK lights the tubes when the plug is inserted, as well as making the plate and B battery connections. With a pencil mark the springs and frame, top to bottom, 1, 2, 3, 4, 5 and 6. Note that 2 is a double contact (under the top spring) but counts only as one. The connections are 1, B battery positive binding post of set; 2, B battery positive; 3, one terminal of a by-pass condenser (other terminal of condenser to B minus); 4, A battery positive binding post of set; 5, ground; 6, A battery positive. Under this system the A— goes from battery to rheostat to filament minus on socket. (Radio World Staff Photo).



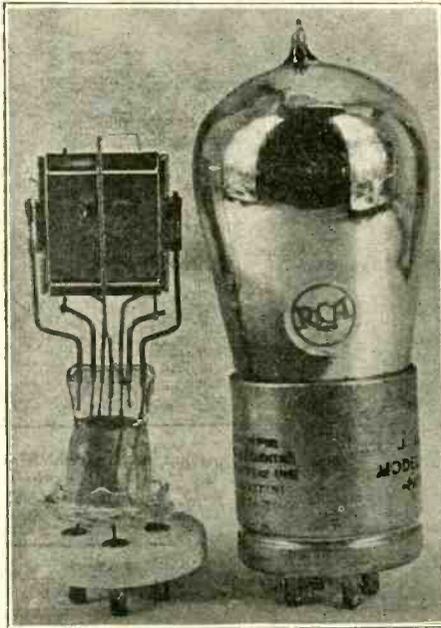
A JACK, of either the filament control variety, as shown above, or of the more common type, may be so placed on the panel as to serve as a baseboard support. This is particularly handy if heavy apparatus is to be baseboard mounted. The panel screws are inserted in the baseboard, as usual, the jack merely serving as additional support. (Radio World Staff Photo).



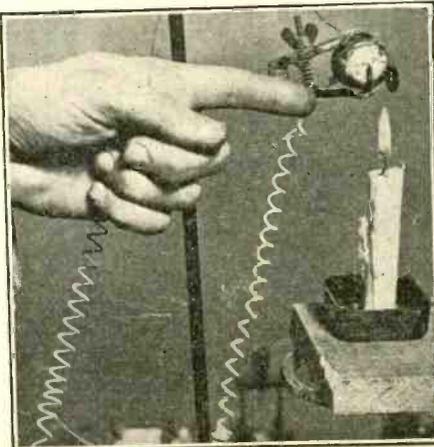
EXCLUSIVELY tuned by inductance, this circuit consists of a coupler in the aerial and a variometer in the plate. The inter-stage coupling is capacitive, the grid condenser being used for this purpose. The circuit is a stage of regenerative RF and a non-regenerative detector. The D coils described in this issue may be used.



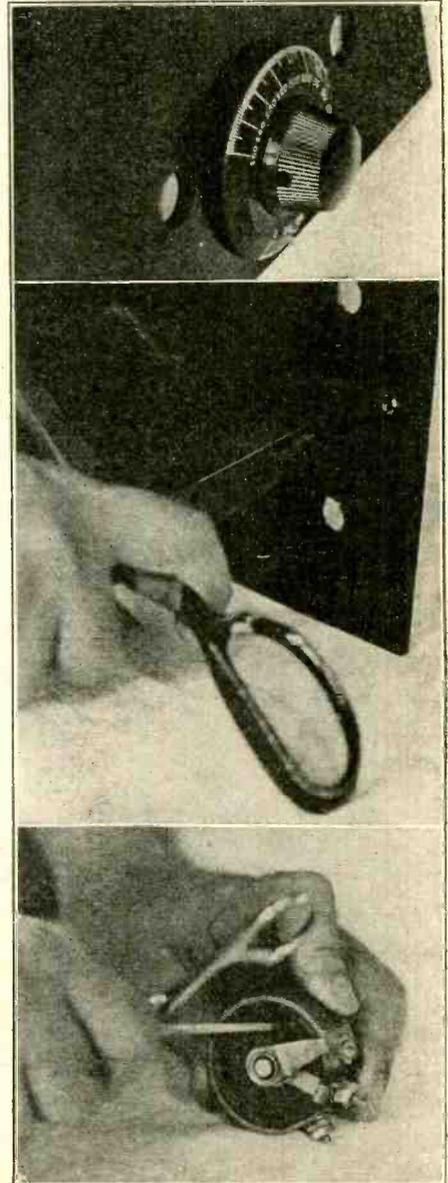
ALSO inductively tuned, this circuit, however, is less selective than the other, due to the absence of regeneration. If D coils are used as described in this issue, L1L2 would be of the coupler variety, with L1 consisting of a single turn of wire per notch, instead of progressively increasing numbers of turns. L2 would be as described in the article.



HERE is a tube, "as is" and with the glass envelope removed. The plate is exposed, the grid hidden by the plate. Note how the filament, plate and grid leads pass downward through the seal to the base terminals. In this seal the transfer of energy takes place from plate to grid when a variometer is inserted in series with the plate lead in the set. This causes regeneration. See L3 in diagram at left. (Radio World Staff Photo).



HEAT causes electrons to flow. Note the two diacs. They are connected to a battery and a milliammeter. Nothing happens. But when the candle is lighted the flame emits electrons that furnish a path for the current between the discs. The experiment was made in Alexander Hamilton High School, New York City. (Kadel & Herbert).

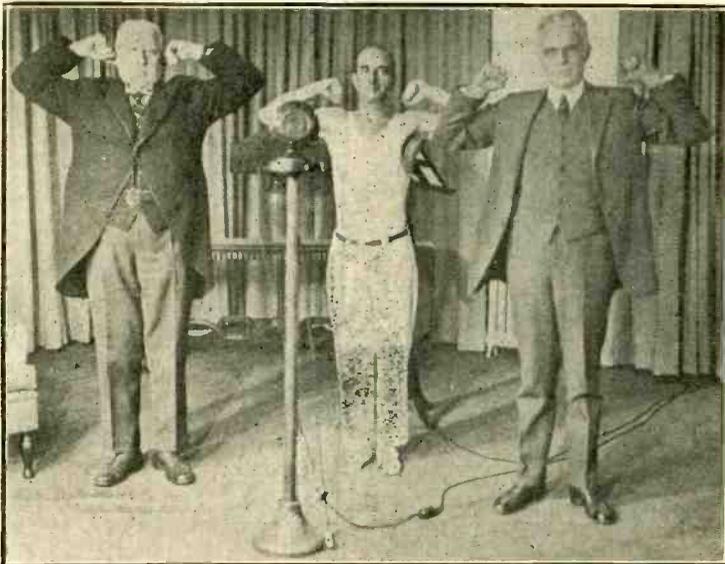


A RHEOSTAT, mounted on a base, causes the traveller arm to miss contact frequently (top photo). This is often due to failure of the panel screwholes to coincide with the holes in the rheostat base. A pair of scissors may be used to enlarge the shaft hole, so the mounting holes will meet those in the rheostat base. Also the rheostat holes may be enlarged, if necessary, as shown in bottom picture. (Radio World Staff Photo).

Set on a Dashboard



WE NOW HAVE a 5-tube Neutrodyne designed for the dashboard of an automobile, which we see being operated by two pretty girls. Note the reflection of one of them in the windshield. (Foto Topics.)



THE METROPOLITAN LIFE INSURANCE CO. has started to broadcast physical culture exercises every morning from WEA, New York City. Several other high-power stations are Enked up with it. Left to right, Haley Fiske, president of the insurance company; Arthur Bagley, physical director; R. L. Cox, vice-president. (Kadel & Herbert.)

Ground DX



UNDERGROUND antenna at the home of Dr. James Harris Rogers, inventor, Hyattsville, Md., by means of which Pacific Coast signals have been heard with great volume. (Underwood and Underwood.)

Ground Transmission Spans Continent in Fine Style

MARYLAND.

AFTER tests carried on for two months, Dr. James Harris Rogers of Hyattsville said that he succeeded in broadcasting as far as the Pacific Coast, about 3,000 miles, with his underground radio transmitting set.

He received a telegram from W. J. Nutt of Signal Station VIEZ, Los Angeles, saying the signals "were coming in finely."

Previous to the tests Dr. Rogers had been able to transmit messages from his underground antennae only as far as Weston, Kan., and Greenville, Texas, distances of 1,300 and 1,200 miles. Dr. Rogers previously succeeded, it was said, in broadcasting as far as Albuquerque, N. M., 2,500 miles.

Dr. Rogers is a pioneer inventor in the field of underground and undersea radio transmission and his successful tests of last week mark the high point of his achievement so far. He expects to have completed the laying of a 600-foot antenna cable, with which he intends to make an effort to do transoceanic broadcasting. He will begin his tests as soon as the cable is laid.

"Mike" Shy



TONY, Tom Mix's horse. (Foto Topics.)

TONY, "the intelligent horse," who sailed for Europe lately, with his master, Tom Mix, did not broadcast from Station WGBS at Gimbel's. He was scheduled to, but at the last minute it was feared that he might become temperamental and refuse to whinny.

The management asked Tom Mix to talk instead of Tony. He told his listeners that when he was a boy and went to the grocer shop, the grocer always threw in a bag of candy for good measure. He said that was why he was taking Tony to Europe—as a sack of candy for the people who had seen him in the pictures. He also said that while Tony was bashful about speaking he didn't mind being seen.

Mr. Mix broadcast at 6:30 p. m. on a Friday night. Herman Bernard, managing editor of RADIO WORLD, who is on the air at WGBS at 6:30 p. m. every Friday with a radio talk, consented to make way for Mr. Mix, and broadcast instead at 7 p. m.



A 5-TUBE non-oscillating receiver, the Stand-ardyne, has been installed in guest rooms of the Biltmore Hotel, New York City. No outdoor aerial is used, but 30 feet of wire is laid under the carpet. The radiator serves as the ground. Note how the coils are placed under the condensers in this reacted circuit. The reactance coils and fixed resistances balance the circuit. (Kadel & Herbert.)

Dancer Rehearses At Home



HARRIET HOOTER, premiere danseuse of "Topsy and Eva," rehearses at her home with the aid of a 5-tube Neutrodyne. (Underwood and Underwood.)

Listening will nearly Supersede Reading, Says Playwright

COSMO HAMILTON, the British novelist and playwright, in an address before the Jackson Heights Press Club at Jackson Heights, N. Y., said the radio, now in its infancy, would profoundly affect writing in the next few years.

Novelists would have to boil their pro-

ductions down from 100,000 words of the present to 5,000 so that they could be read over the radio, he said. In five years, he said, reading would be superseded to a great extent, the public listening to its stories over the radio and seeing its plays in the moving picture theatres.

Literature Wanted

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

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

W. G. Gram, Savoy Court, Lansing, Mich.
E. W. Jones, 1328 Gladys Ave., Lakewood, Ohio.
Inches Hardware Co., dealers, Detroit Ave., Lakewood, Ohio.
R. M. Nanren, 5127 No. 18, Omaha, Neb.
Clarence Schultz, 220 E. 9th St., Mishawaka, Ind.
S. Ito, 212 14th Ave., Seattle, Wash.
Archway Bookstore, dealers, 3rd and Pike Sts., Seattle, Wash.
Elmer N. White, 2926 Bailey Ave., Buffalo, N. Y.
Carlson Bros., Kensington & Bailey, Buffalo, N. Y.
J. C. Brittingham, Jr., Hamlet, N. C.
William Haskell, dealer, Ferguson, Iowa.
Jack Pitman, Box 161, Grafton, W. Va.
Edgar L. Harmon, Milltown, Me.
Arkansas Variety Store, Arkansas City, Ark.
V. Johnson, Sawtelle, Cal.
J. Riedel, 1222 Simpson St., Bronx, New York City.
Art Staberg, Climax, Minn.
Helmer G. Dale, dealer, Climax, Minn.
Joseph Armstrong, 220 Stoddard St., Pittsburgh, Pa.
Ora Wades, La Moille, Ill., Box 43.
Walter C. Crosby, Jamestown, N. Y.
Liquet Electric Co., Dealer, Jamestown, N. Y.
Richard S. Foster, 1604 Laurel Ave., Bridgeport, Conn.
H. C. Schneider, 2012 W. 15th St., Oklahoma City, Okla.
Jones Electric Co., dealers, Parks, Tex.
Ivan Van Winkle, Hyden, Ky.
Ray Bauer, 39 Burbank Ave., Johnson City, N. Y.
J. E. Gryder, P. O. Box 250, Pensacola, Fla.
Johnson & Teegarden, dealers, Clarksville, Pa.
H. W. Codet, Sayre, Pa.
Heckart & Brink, dealers, Waverly, N. Y.
Frank J. Terry, Broadalbin, N. Y.
Edwin A. Redder, 163 Grand Central Ave., Elmira Heights, N. Y.
Thomas Hill, 6 E. 99th St., New York City.
Edward B. Ekstrand, 47 Hancock St., West Somerville, Mass.
G. E. Cuffman, 1025 Pine St., Arkadelphia, Ark.
Roy Page, 2808 Semms Ave., Richmond, Va.
W. E. Dougherty, dealer, Box 44, Ault, Colo.
William F. Nevin, 313 Florida St., San Francisco, Cal.
Lee Sherman, R. F. D. 1, Jakin, Ga.
Andy A. Bashor, Longmont, Colo., Route 5.
F. Yindrock, 421 4th Ave., Dayton, Ky.
Joseph Powell, Lenexa, Kans.
D. J. Hawthorne, La Salle, Ill.
Oscay Perry, Rhinelander, Wisc.
Superior Radio Repair Shop, dealers, Muskogee, Okla.
George G. Moore, 105 E. 6th St., Morris, Minn.
Victor Depow, Butler, Mo.
Central Radio Co., dealers, Lansing, Mich.
F. A. Arghon, Anaconda, Mont.
C. A. Ringlen, Brooklyn, N. Y.
D. R. McCullough, Box 2, Portland, Ohio.
H. Y. Grimes, Ark. Baptist College, Little Rock, Ark.
Harry Kenyon, Berlin Hts., Ohio.
F. R. Frohring, 14905 Lake Shore Blvd., Cleveland, O.
East View Radio Sales & Service, 3698 E. 40th St., Cleveland, O.
Donald E. Reynolds, Sebastopol, Cal., No. 612.
Charles G. Fenn, Lithia, Fla.
Roy S. Davis, Fulton, N. Y., R. No. 2.
Frank Noble, Los Angeles, Cal.
E. E. Nuhntz, Faribault, Minn.
M. C. Jenkins, Jonesboro, La.
A. H. Claton, dealer, Jonesboro, La.
C. W. Richter, Miami, Fla., Box 688.
Samuel De Stein, 120 Second Ave., Pittsburgh, Pa.
H. J. Baier & Son, Cleveland, Ohio.
James F. Smith, dealer, Sylacauga, Ala.
Burton Dry Goods, Hooperstown, Ill.
H. P. Boardman, 123 Cherry St., Burlington, Vt.
M. H. Trappe, Allentown, Pa.
H. F. Freeman, dealer, 731 Walnut St., Allentown, Pa.
Al Phelps, Atlantic, Iowa.
M. J. Isehida Co., dealers, Glen Ullin, N. D.
Wallace-Radio Co., dealers, 2095 Pingree Ave., Detroit, Mich.
C. W. Casper, Marshall, Mich.
Edwin Dewery, 623 Lewis Pl., Scranton, Pa.
W. O. Phillips, Box 264, Beckley, W. Va.
B. H. Munger, 22 Beach Blvd., Hamilton, Ont., Canada.
Jacob Hess, Freeport, Ill.
L. E. Neugebauer, 438 43rd Ave., Milwaukee, Wisc.
A. M. Day, Edentown, N. C.

THE RADIO TRADE

Code of Ethics Adopted by Washington Merchants

By Thomas Stevenson

WASHINGTON.

A CODE of ethics has been adopted by the Radio Merchants' Association of Washington, D. C., as follows:

"1—Appropriation of radio tube type numbers or any substantial or material part thereof, such numbers having been originated by and become identified with the products of certain well-known manufacturers, is a form of unfair competition. For example, WD12, UV199, UV201A, etc., apply to tubes of the Radio Corporation of America, and PV2 applies to tubes manufactured by the DeForest Radio Telephone and Telegraph Co. These type numbers should not be used for advertising tubes of other makes.

"2—Sets built by retail stores and containing certain licensed parts bearing the names of well-known manufacturers of sets using the same circuits, should be advertised and sold in such a way as to make it perfectly clear to the public that they are store-built rather than factory-built. Neutrodyne sets are a case in point.

"3—Claims for radio apparatus, such as distance or loud speaker reception, should in most cases be based on average performance rather than some rare, exceptional feat. If the exceptional instance is featured, the advertising copy should make clear the fact that same result is not to be expected in the average day-to-day performance. Much disappointment and dissatisfaction may be avoided if Radio novices are given some information in advance that atmospheric disturbances, seasons and other conditions affect radio reception.

"4—Merchandise advertised as being reduced from a certain list price and represented as possessing the list price value, should carry all of the advantages, such as factory guarantee and repair privileges to which any purchaser who buys it at the regular list price is entitled. Otherwise the customer is not getting the complete service or value that is included in the regular list price quoted in the advertisement.

"5—Advertisements of radio sets should state what accessories, if any, are included in the price quoted, and if accessories are not included this should be apparent from the wording and arrangement of the copy.

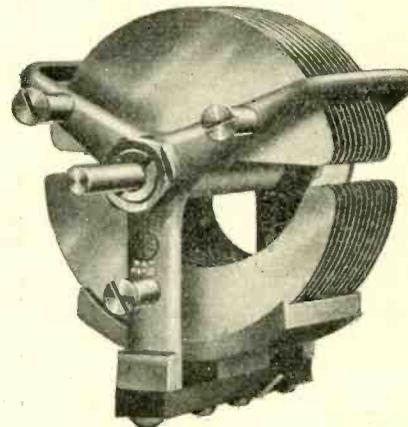
"6—Claims as to batteries and other accessories should accord with such limitations of performance as recognized scientific opinion in the industry has determined that the purchaser may reasonably expect from a particular type of product. Guarantee, refunds and other sales appeals should be free from ambiguity or tricks that sometimes make them the cause of current dissatisfaction and a future distrust of advertising.

"7—When a set is advertised at a reduced price after the model has been discontinued by the factory, it should not be represented as still possessing its regular list price in a way that leads the public to believe that it is securing a much better current value than actually is the case.

"8—When any particular piece of radio merchandising is featured through advertising as a leader, the concern should be required to have a sufficient supply on hand to fill a reasonable public demand."

Tuning Made Easier by Ultra - Low - Loss Condenser

THE Phenix Radio Corporation's variable condenser is a departure in construction. Every detail in the construction of this ultra-low-loss condenser has been designed with one predominating thought in mind—highest possible efficiency by overcoming losses. Special design and cut of stator plates produces a straight line wavelength curve separating stations evenly over



THE ULTRA-LOW-LOSS straight line wavelength condenser.

the dial. Minimum of metal in the field and frame of high resistance material reduce eddy current losses. Monoblock mounting with plates cast into block reduces series resistance and insures perfect contact with all plates. The use of only one strip of insulation answers the function of two and four pieces and reduces leakage losses proportionately. Adjustable ballbearing insures smooth rotation and constant capacity calibration.

The ultra-low-loss condenser is specially designed to simplify accurate tuning. With two stations of known wavelength located on the dial, other stations separated by the same number of meters are the same number of degrees apart on the dial. The dials may therefore be accurately calibrated. The ultra-low-loss condenser was designed by R. E. Lacault, E. E., A. M. I. R. E., originator of the famous Ultradyne Receivers. It is understood that Mr. Lacault will gladly consult with any manufacturer regarding the application of this condenser to any circuit for obtaining maximum efficiency. The condenser is manufactured by the Phenix Radio Corp., 114-A East 25th St., New York City.

(Tested and Approved by RADIO WORLD)

Business Opportunities Radio and Electrical

Rates: 50c a line; Minimum, 2 lines.

HAVE PATENTED RADIO RESONANCE horn, most practical human voice horn ever shown; looking for individual or underwriters with money to place same on market. Box WX, Radio World.

NATIONALLY ADVERTISED RADIO MANUFACTURER of sets, parts, etc., doing a large volume of business, requires additional capital of from \$50,000 to \$100,000; will consent to half partnership to responsible party. Box OO, Radio World.

A PORTABLE THAT GETS MOST DX AND VOLUME POSSIBLE ON TWO TUBES, by Herbert E. Hayden. Profusely illustrated in Radio World dated March 28, April 4 and 11. 15c per copy, or start your subscription with any number. Exactly what you would want for your vacation. Radio World, 1493 Broadway, N. Y.

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.

New Corporations

Edna Radio & Electric Corporation, \$20,000; C. G. Unger, H. M. Rier S. Stern. (Atty. E. A. Dutschman, 44 Court St., Brooklyn, N. Y.)

CAPITAL INCREASES

Aerovox Wireless Co., New York City, 50 shares, \$100 each and 100 common, no par. Increased to 500 shares, of which 400 are common class A, no par.

Federation of Radio Owners, 10,000 shares, \$5 each; 1,000 common \$10 each; active capital, \$10,000 W. H. and M. G. Oppenheim, W. H. Powers. (Atty. E. J. Kelly, 302 Broadway).

Bankruptcy Proceedings

National Airphone Corporation, radio equipment, 16 Hudson Street, New York City, by Louis N. Weiss, for \$350; Frank Garcia, \$465; Chambers Hardware and Tool Corporation, \$87.

RECENT BACK NUMBERS

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

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.

PLEASE publish a 2-stage audio-frequency amplifier diagram? Will this enable me to get greater distance?—Walter Gruber, 101 St. and Riverside Drive, New York City.

For circuit see Fig. 127. Audio amplification will not enable you to receive signals to which the detector, alone, does not respond. To receive signals which the detector tube is incapable of receiving, add radio-frequency amplification, which builds up the strength of the incoming impulses until they are sufficient to affect the detector tube. To build up the volume after the signals have been rectified use audio amplification. As some signals actuate the detector but are not strong enough to operate the phones, AF to this extent adds to practical distance for earphone use.

I AM interested in the 1925 DX Wonder. About its selectivity, can you tune through locals for distant stations? (2) I am unable to locate any of the double condensers in Chicago. Where can I get them? (3) Will the double condensers work with Bremer-Tully coils?
(1) Yes. (2) See advertising columns. (3) Yes, use .0003 or thereabouts, e.g., Bruno No. 18.

I AM using six volts on my oscillator tube without any rheostat. Is this hurting my tube?—Max H. Hopf, Fredericksburg, Texas.
Your tube would have longer life if you used a rheostat. Also this would save A battery.

KINDLY send me the mailing addresses of Charles H. M. White, and Thomas W. Benson.—Anthony Ross, M. E., 8804 Louis Ave., Detroit, Mich.
Address all communications to our contributing staff, care of RADIO WORLD.

CAN you give me the data for some duolateral honeycomb coils used as radio-frequency transformers?—C. S. Phelps, Ultima Thule Radio Service, Lock Box 90, Salineville, Ohio.
See issue of February 14.

CAN you recommend a hook-up for using alternating current to light radio tubes?—L. J. Rippe, 1135 Union Trust Bldg., Cincinnati, Ohio.
While radio tubes may be satisfactorily lighted from alternating house current, for the average person this is inadvisable.

I AM interested in getting great DX. I have a 1-tube single-circuit regenerative set on which during the test last year I was able to receive Europe. I am contemplating adding a 2-stage audio-frequency amplifier. What is the best single circuit regenerative set for DX?—A. A. Woodward, Garden Ave., Mimico, Ont., Canada.
If your main desire is to get DX, add radio-frequency, as in The Diamond, issues of April 4, 11 and 18. This hook-up will also reduce radiating proclivities.

I HAVE three of the old style Federal audio-frequency transformers that have been burned out on the primary windings. Is it worth while to have these transformers rewound or can they be used in any other way in radio in this condition?—Gaston Fawre, Beaumont, Texas.

It will not pay you to have the transformers rewound. You might save the transformers, as they might come in handy in experimenting with choke coil amplification. The secondaries being intact can be used as choke coils in a "choked" audio hookup.

I HAVE two sets of Exide storage batteries purchased about five weeks ago. I now find that I must invest in some sort of a charger and have been told the chemical type is best suited for such batteries. Please tell me how such a charger can be connected up to a 110 volt 60 cycle line and what is the chemical used in the rectifier, also the material from which the electrodes are made.—Reginald Regg, Plainfield, N.J.

The chemical type rectifier finds much favor in the charging of B storage batteries. The rectifier consists of a glass jar filled with a solution of sodium phosphate and water. Some rectifiers use common baking soda. Into this the two electrodes are immersed, one of aluminum and the other of lead. The latter terminal should be connected to the positive terminal of the battery, the remaining side, or aluminum electrode, to the supply source. Using a 100-watt lamp in the circuit the current passed will be in the neighborhood of .25 to .5 amp. The bulb type of charger is also satisfactory.

I HAVE a five-tube set. How much B battery voltage should I use on the detector and the amplifiers? How much below maximum should I permit the B battery voltage to go before replacing batteries? I have had my present tubes more than a year and a half and have been using them rather continuously, perhaps two hours a night during this time. Do you think I ought to replace the tubes?—Wm. Harcourt, Joplin, Mo.

For the set, 22½ volts on the detector and 45 to 90 on the amplifiers, providing you are using the UV200 for detector and 201As for amplifiers. If you use 201A tubes throughout, and the detector voltage in many cases can be increased with something of a gain in volume. It is good practice to discard the B batteries when they have

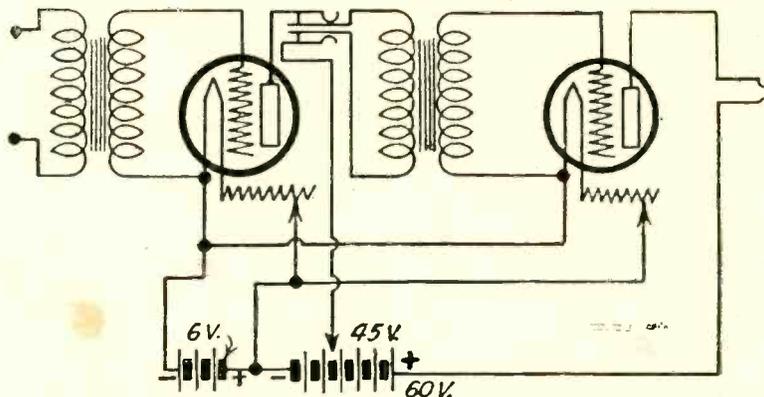


FIG. 127, hookup for adding two-stages of transformer-coupled audio-frequency amplification to any set. Under this system phone service would be obtained from the first audio output (double-circuit jack) and none from the detector stage direct. Storage battery tubes are suggested, but the hook-up works any amplifying tubes.

dropped more than 20 per cent. in voltage. Regarding the replacement of the tubes, if they are of the 201A type it is very possible that they have lost much of their electronic emission. Try some new tubes and see if you don't get a material increase in volume and distance.

MY set is home-made. My aerial measures 100 feet long. The ground being fastened to a water faucet. I am using a Shamrock coupler with Pathe variometer and a Cardwell .0005 condenser. The set brings in the local stations, but is not sharp in tuning. The variometer makes very little difference when it is turned and can practically leave it in one position for all stations. WFAF interferes with WJZ and WNYC and WHN with nearly all the lower stations on the dials. I have not been able to hear any distant stations. My tubes are C 301A type and the B batteries are new.—Walter Frost, Brooklyn, N.Y.
You evidently are not obtaining regeneration, without which, in the circuit you have, you will not obtain selectivity or distant stations. Try reversing the leads to the plate variometer. Also check up the detector tube; possibly it is defective. You might try a .0005 variable condenser in series with the antenna. This will give you better results on the lower wave stations. Possibly you are not burning the detector tube bright enough to enable it to function properly. To be on the safe side check up the voltage of the B batteries.

LATEST PATENTS

WASHINGTON.

PATENTS on radio inventions were granted by the U. S. Patent Office as follows:
RADIO Transmission System (No. 1,531,029), invented by Francis M. Ryan, of East Orange, N. J. A reactive trap circuit having extremely large impedance for undesired energy, but low impedance for energy of the desired frequency.
RADIO Apparatus (No. 1,531,904), invented by C. Rudolph Mueller, of Highland Park, Mich. Provides an inductance coil which will receive one or a plurality of inductance coils which may be easily taken off or put on in a suitable number as conditions may warrant without change in the mounting apparatus.
DOUBLE-Filament Vacuum Tube (No. 1,530,687) invented by Charles Murray, of Washington, D. C. Allows sufficient space between the filaments to prevent the filament not in use from becoming heated from absorption from the one being used.

Coming Events

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

APRIL 18-MAY 2—Radio and Industrial Exposition, Toledo, Ohio.

APRIL 18 TO 25—Minneapolis-St. Paul National Radio Exp., Overland Bldg. Write, N. R. E., 1030 Marshall St., N. E., Minneapolis, Minn.

APRIL 19 TO 23—International Radio Exp., Steel Pier, Atlantic City, N. J. Write Long Amusement Co., Atlantic City, N. J.

APRIL 21 TO 28—Toledo, O., Radio Show.

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 18—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 18—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. 12 TO 17—St. Louis Radio Show, Coliseum. Write Radio Trades Assn., T. P. Convey, Mgr.

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

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

NOV. 19 TO 15—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.

Join RADIO WORLD'S University Club

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

And Get Free Question and Answer Service for the Coming 52 Weeks.

RADIO WORLD, 1493 Broadway, New York City:

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

Name
Street
City and State

A THOUGHT FOR THE WEEK
THE greeting extended to one M. Latour by American radio manufacturers scarcely took the form of "Welcome to our shores!"

RADIO WORLD

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

TELEPHONES: LACKAWANNA 6976 and 2063
 PUBLISHED EVERY WEDNESDAY
 (Dated Saturday of same week)
 FROM PUBLICATION OFFICE
HENNESSY RADIO PUBLICATIONS CORPORATION
 ROLAND BURKE HENNESSY, President
 M. B. HENNESSY, Vice-President
 FRED S. CLARK, Secretary and Manager
 1493 BROADWAY, NEW YORK, N. Y.
 (Putnam Bldg., Times Square and 43rd Street)
 European Representatives: The International News Co.,
 Breains Bldgs., Chancery Lane, London, Eng. Paris,
 France. Brentano's 88 Avenue de l'Opera.

EDITOR, Roland Burke Hennessy
 MANAGING EDITOR, Herman Bernard

SUBSCRIPTION RATES

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

ADVERTISING RATES

| General Advertising | |
|---------------------------|-------------------------|
| 1 Page, 7 1/4" x 11" | 462 lines..... \$300.00 |
| 1/2 Page, 7 1/4" x 5 1/2" | 221 lines..... 150.00 |
| 1/4 Page, 4 1/4" x 11" | 115 lines..... 75.00 |
| 1 Column, 2 1/4" x 11" | 154 lines..... 100.00 |
| 1 Inch | 10.00 |
| Per agate line |75 |

Times Discounts
 52 consecutive issues..... 20%
 26 times consecutively or E. O. W. one year..... 15%
 4 consecutive issues..... 10%
WEEKLY, dated each Saturday, published Wednesday.
 Advertising forms close Tuesday, eleven days in advance of date of issue.

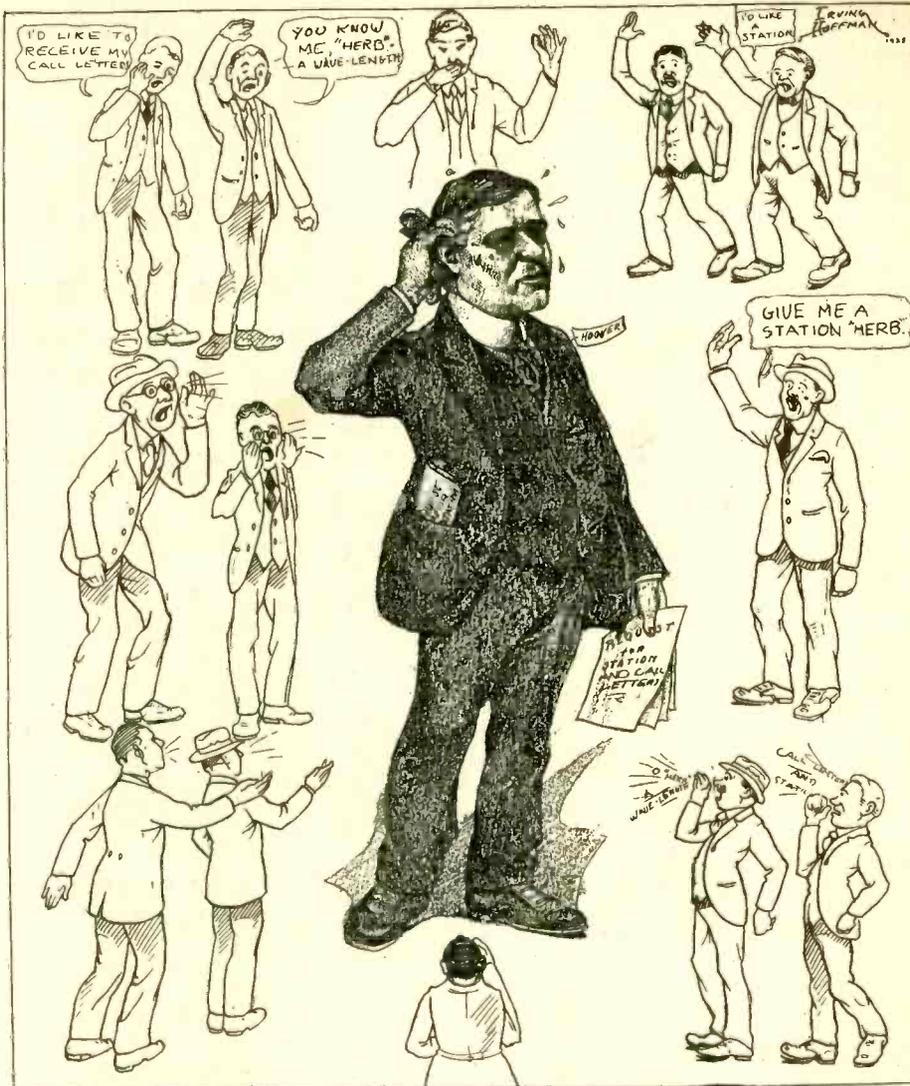
CLASSIFIED ADVERTISEMENTS

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.

APRIL 18, 1925

Something to Worry Over



Entertainers' Contest Stirs Interest

WITH the announcement in last week's issue of RADIO WORLD of the opening of this magazine's 1925 contest to determine the most popular radio entertainer,

as adjudged by our readers, much activity began. The voting coupons of ballots were eagerly sought and within a few days after the issue was in the hands of

the public votes began to pour in. Much interest was manifested in the contest and there was every indication that the balloting this year would be much more active even than the record-breaking voting done last year, when Harry Snodgrass won.

For the benefit of those who may have missed last week's announcement, the salient details are repeated:

Any one is entitled to vote for any radio entertainer. Singers, instrumental musicians, speakers, orchestras, symphonic societies, announcers—these and all others who appear before the microphone are eligible candidates for the gold medal to be awarded to the winner. To vote, tear off the coupon below, filling it out and mailing it properly. The contest closes July 31, 1925, enabling one to cast sixteen votes if one tears a coupon from one issue a week (sixteen Saturdays, April 11 to July 25, inclusive). But you may use as many coupons as you can get. One coupon will count as one vote. If you newly subscribe to RADIO WORLD, or renew a subscription, you may cast the entire number of votes embodied in that subscription, at one fell swoop. For instance, if you subscribe for a year (52 numbers), you may cast 52 votes.

If the result of the contest is a tie, a gold medal will be awarded to all contestants so tied.

From week to week the standing of the contestants will be published.

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. 2, 4-18.

RESULTS

RESULTS EDITOR:

I BOUGHT various radio magazines trying to find the circuits I thought would give me best results. I did not find it until one day I bought RADIO WORLD (the Dec. 27 issue) with the 3-tube Superflex in it. Thanks very much. It is a dandy, the most selective I ever saw and I live in a neighborhood that rendered the set too "sensitive" until I ran a wire from my filament negative to the ground, which gave me more volume, as well as less interference. The volume compares favorably with a 5-tube tuned RF set. I am using a 60 ft. aerial and get everything that could be expected from three 301A tubes. Here are a few of the stations I get on the speaker: KDKA, WTAS, WORD, WDAF, KFNF, WTAY, WLW, KFAB, WREO, KFNG (10-watt), WBCN, WFAA, WSAI, KFRU, KFKB, WOC, WJJD, WHO, WCB, WJY, WCEE, WWJ, WDAE, KOA, KTHS, WQAM, WSB, WTAM, KFGO, WOAW, WMBF, 6KW, KFDL.

I get a great number of others. It's a good little set—and to show my appreciation, I have been saying a good word for your magazine whenever possible. I have not missed a number since Dec. 27.

I had to take 5 turns off the 50-turn RF coil to get down to 250 meters.

H. E. NEWKIRK,
901 W. Garden St.,
Pensacola, Fla.

* * *

RESULTS EDITOR:

I WISH to tell you of the remarkable results which I have gotten from "The World's Simplest Tube Set," by Lieut. Peter V. O'Rourke, published in the December 13 issue of the RADIO WORLD. With this set I have received stations that I have not yet received on my 3-tube, single-circuit regenerative set. I built this set from parts I found around the shop, using a home-made variable grid leak.

I am using a UV200 tube with 20 volts on the plate, with an inside aerial. I have received stations WBQ, KDKA, WCB, WLW, WBZ and WRFO. I think this is DX for the size of the set.

T. C. FARMER,
James Ave.,
Bluefield, W. Va.

Secretary Wilbur Sends His Greetings

DEPARTMENT OF THE NAVY
Office of the Secretary
Washington.

EDITOR, RADIO WORLD:

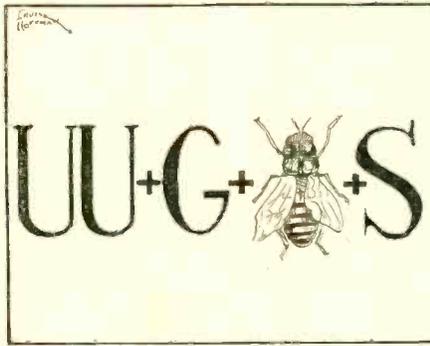
THE Department notes that your issue of April 4, 1925, comprised RADIO WORLD'S Third Anniversary Number. Your success in publishing RADIO WORLD, as evidenced by its three years of circulation, is a matter of satisfaction to the Department because radio is indispensable to the Navy's mission with respect to the National Defense, and anything that serves, however indirectly or unconsciously, to advance the radio art in the United States may also serve to improve the National Defense.

The fostering of popular interest in radio through our periodicals and newspapers will, undoubtedly, result in a more rapid development of the radio art in the United States than would be the case if the interest in this subject were confined entirely to radio professionals.

Respectfully,
CURTIS D. WILBUR,
Secretary of the Navy.

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.

- Lee C. Fultz, 413 Buena Vista, Paris, Ill.
- Graham Jones, 222 So. Penn., Webb City, Mo.
- Max H. Hopf, Harper, Tenn.
- George Hitt, 1001 1/2 E. Randolph St., Huntingdon Park, Los Angeles, Cal.
- Susan Canfield, 117 E. 105th St., New York City.
- Cyril Hall, 1402 St. Germain St., St. Cloud, Minn.
- William Tismer, 21 Chestnut Rd., Verona, N. J.
- J. C. Overstreet, Jr., P. O. Box 250, Plummerville, Ark.
- S. Szurek, 2412 Casmere St., Hamtramck, Mich.
- Willis R. Jones, 1233 Reynold, Shreveport, La.
- William W. Crossley, 601 W. 35th St., New York City.
- Mrs. F. L. Brauner, 442 Laurel St., San Francisco, Cal.
- Arthur De Fraim, 226 3rd St., Harbor Beach, Mich.
- Joseph N. Johnson, 25 Gross St., Fall River, Mass.
- Robert Daw, Colo., Ohio.
- Raymond W. Wahl, Wilmington, Del.
- John W. Murphy, 303 W. 42nd St., New York City.
- William E. Rosenlieb, Box 264, New Matamoras, Ohio.
- W. Harvey Merwin, Jensen, Fla.
- Leonard Browe, R. 2, Box 4, Menomonie, Wisc.
- Edwin Alexander, 401 Choccolocco St., Oxford, Ala.
- Ed. Keafer, 176 B'way, New York City.
- Rodney Wirtz, Box 1862, Bisbee, Ariz.
- Ray Moriarty, 19 South 27th St., Flushing, N.Y.
- Paul Stanton, Vermillion, Kans.
- Mary Adina Mozier, 920 Malewood Ave., Ambridge, Pa.
- S. Steinfield, 5123 Danniell St., New Orleans, La.
- William C. Meyer, 1305 E. 124th Pl., Cleveland, Ohio.
- Tony Peterson, 517 S. N. R. R. Bldg., St. Paul, Minn.

"RADIO NEWS" TO HAVE STATION

A NEW broadcasting station is planned for Manhattan Island. It will be owned by the "Radio News," but will be located atop the Hotel Roosevelt. The call letters WRNY have been reserved for the station by the Department of Commerce. The power will be 500 watts and the wavelength under 275 meters. The moving spirit in the undertaking is Hugo Gernsbach, editor of "Radio News."

New Broadcasters

WASHINGTON.

EIGHT new class A and one class B stations were licensed by the Department of Commerce while one station was transferred from class C to B.

| Call | Station | Meters | Watts |
|------|---|--------|-------|
| WHBX | J. W. Bowser, 206 Greenwood Ave., Punksutawney, Pa. | 212.6 | 50 |
| KFJZ | W. E. Branch, 400 Seventh St., Fort Worth, Texas | 254 | 50 |
| WDBK | M. F. Brox Furniture, Hdw. & Radio Store, 13918 Union St., Cleveland, Ohio | 227 | 100 |
| WBOQ | A. H. Grebe & Co., Inc., 70 Van Wyck Blvd., Richmond Hill, N.Y. | 236 | 100 |
| KFVI | Hdqtrs. Troop, 56th Cavalry Brigade, 305 Sabine St., Houston, Tex. | 248 | 10 |
| WHBV | Fred Ray's Radio Shop, 201 Talbot Ave., Columbus, Ga. | 244 | 20 |
| WHBY | St. Norbert's College, College Ave., West De Pere, Wisc. | 250 | 50 |
| WIBC | L. M. Tate Post No. 39, Vet. of Foreign Wars, 434 2nd Ave., N. St. Petersburg, Fla. | 222 | 100 |

NEW CLASS B STATION

WMCA—Greeley Square Hotel Co., Operators of Hotel McAlpin, 1282 Broadway, New York, N. Y. 340.7 500

TRANSFER FROM CLASS C TO B

KOB—New Mexico College of Agri. & Mech. Arts, State College, New Mexico 348.6 750

Thirty-five class A and two class C stations were deleted during March, as follows:

- KFEX—Augsburg Seminary, Minneapolis, Minn.
- KFBP—Edwin J. Brown, Seattle, Wash.
- WEBX—Ino. Edward Cain, Jr., Nashville, Tenn.
- WPAU—Concordia College, Moorhead, Minn.
- KFRO—Curtis Printing Co., Fort Worth, Texas.
- WCAV—J. C. Dice Electric Co., Little Rock, Ark.
- WMAH—General Supply Co., Lincoln, Nebr.
- KFKV—F. F. Gray, Butte, Mont.
- KNT—Walter Hemrich, Kukak Bay, Alaska.
- KQW—Charles D. Herrold, San Jose, Calif.
- KFOU—Hommel Mfg. Co., Richmond, Calif.
- KFOX—Alfred M. Hubbard, Seattle, Wash.
- WIK—K. & L. Electric Co., McKeesport, Pa.
- WABH—Lake Shore Tire Co., Sandusky, Ohio.
- KFPH—Harold Chas. Mailander, Salt Lake City, Utah.
- KFLE—National Educational Service, Denver, Colo.
- WBBJ—Neel Electric Co., W. Palm Beach, Fla.
- WJAN—Peoria Star Co., Peoria, Ill.
- KFOD—Vern Peters, Wallace, Idaho.
- WGBP—M. L. Price Music Co., Tampa, Fla.
- WCBO—The Radio Shop, Inc., Memphis, Tenn.
- WDBI—Radio Specialty Co., St. Petersburg, Fla.
- KFRC—Radioart Studio, San Francisco, Calif.
- WCBW—George P. Rankin, Jr., Macon, Ga.
- KDZE—Rhodes Department Store, Seattle, Wash.
- KFNZ—Royal Radio Co., Burlingame, Calif.
- KDYM—Savoy Theatre, San Diego, Calif.
- KFRJ—Guy Simmons, Jr., Conway, Ark.
- KDPT—Southern Electrical Co., San Diego, Calif.
- KFHR—Star Elec. & Radio Co., Seattle, Wash.
- KFQN—Third Baptist Church, Portland Oregon.
- WCBV—Tullahoma Radio Club, Tullahoma, Tenn.
- WKAN—United Batter Service Co., Montgomery, Ala.
- WAAN—University of Missouri, Columbia, Mo.
- KFLA—Abner R. Willson, Butte, Mont.
- KFCP—Ralph W. Flygare, Ogden, Utah.
- KWH—Los Angeles Examiner, Los Angeles, Calif.

NEW ZEALAND HEARS WCBZ ZION CITY, ILL.

RADIO station WCBZ, located here, reported that E. H. Scott had cabled from Tasman, New Zealand, that he heard the station on a loud speaker, using only a loop. The message expressed the belief that this was a record for loop reception. Tasman is 8,372 miles from Zion City.

German Has Device to Trap Factory Metal Thieves

WASHINGTON.

RADIO has been put to a new and ingenious use by a German specialty manufacturer, according to advices to the Department of Commerce. This device is known as the radio thief-catcher. Its electrically wired gateway, designed to be placed at the exit of factories and mines. A gate keeper with a pair of head phones listens as every workman passes out through the gateway. The electrical discharge is so adjusted that whenever an

extra amount of metal is brought through the gate a sharp singing noise is heard in the head phones. This device can be so adjusted that the presence of small metal coins, or a pocket knife, would not be noticed, but other metals concealed about any workman over and above these indispensables would be immediately detected. This is supposed to stop the theft of precious metals or tools by employees in large establishments. Many such thefts are committed.

New England Stations Refuse to Split Time on Air

BOSTON.
REPRESENTATIVES of leading New England broadcasting stations declined to be silent for a part of each day to permit two new stations, one in Maine and one at Worcester, to utilize the crowded air. Charles C. Koster, New England radio supervisor, had urged that the time be portioned out between them since none of them broadcasts the whole twenty-four hours of the day.

Speaking in opposition, Walter G. Cowles, of WIIC, Hartford, Conn., declared that the stations regard their wavelengths as exclusive franchises to those air channels and refuse to allow anyone to encroach upon their property rights.

A bill is now before the Maine Legislature for the establishment of a State broadcasting station and another station is being sought for Worcester. While the Department of Commerce is willing to grant these places licenses, it is said that there is no wave length available which would not interfere with existing stations.

The sole co-operation effected was an agreement between WDFW of Providence and WMAF of South Dartmouth, Mass., a summer station, to divide the time between them for the elimination of interference.

Atlantic City War of Stations Taken to Washington

WASHINGTON.
A RADIO war is being staged in Atlantic City between the two local broadcasting stations, WPG, the municipal station, and WHAR, operated by the Seaside Hotel. Representatives from the two stations are in Washington to have the matter straightened out and to alleviate the bad feeling that has arisen over the matter.

The entire trouble started when WHAR put plans into execution to increase its power so as to equal the city station. An argument over the division of the air then arose, and neither station would agree as to which wave length it would use. Criticisms flew back and forth until the government stepped in and suggested that they broadcast on the same wavelength, but at different hours.

Edwin Spence came to the capital for WPG and Harrison Cook, owner of the Seaside, represented his hotel. It is now understood that both wish to retain the wavelengths on which they have been broadcasting for several months—WPG at 300 meters and WHAR at 275. The contention is that if WHAR increases its power to 500 watts from its present 100 it will be impossible to get clear reception if either of the two stations are on the air at the same time.

Programs

(Concluded from page 14)

WCAE, Pittsburgh, Pa., 461.3 (E. S. T.)—12:30 P. M., weather, news, 4:30, Sunshine Girl, markets, 6:30, concert from William Penn Hotel, 7:30, Uncle Kaybee, 7:50, police reports, 8:30, concert from studio of Mme. Wilson-Smith.
 WOS, Jefferson City, Mo., 440.9 (C. S. T.)—8 P. M., "TB Control in Missouri Livestock," Homer A. Wilson; poems, LeRoy H. Kelsey; music, Central Missouri Assoc. for Blind.
 WHAS, Louisville, Ky., 399.8 (C. S. T.)—4 P. M., concert from Louisville Conservatory of Music; organ; police bulletins; weather; readings; news, 4:55, markets, 5, time, 7:30, Glee Club of the Kentucky College; news; time.
 WHO, Des Moines, Iowa, 526 (C. S. T.)—7:30 P. M., circus barker, 8, Des Moines University program, 11, dance program.
 WEAF, New York City, 492 (E. S. T.)—6:45-7:45 A. M., physical exercises, 11-12, Dorothy Wilder, pianist; health talk; market and weather reports, 4-5 P. M., Laidislaw Soucek, tenor; lecture, "In the Footsteps of Balboa," 6-12,

Waldorf-Astoria orch.; Gustav Langenus, clarinet sextette; "Sir Hobgoblin Takes a Ride" by Blanche Elizabeth Wade; "The Happiness Candy Boys"; "Hambone Male Quartette"; Sterling Piano Duo; "The Glorient Girls"; Meyer Davis-Lido Venice orch.

WDAF, Kansas City, Mo., 365.6 (C. S. T.)—3:30 P. M., Star's radio orch. 5:50, marketgram; weather; time; road report, 6, piano tuning in; Tell-Me-a-Story Lady; Trianon Ensemble, 11:45, "Merry Old Chief," Plantation players.

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

WPG, Atlantic City, N. J., 299.8 (E. S. T.)—7 P. M., Hotel Traymore dinner music, 9 P. M., Hotel Ambassador concert orch. 10, Paul White-man's Hotel Traymore dance orch.

WGR, Buffalo, N. Y., 319 (E. S. T.)—10:45 A. M., Gold Medal radio cooking school, 6:30 P. M., Buffalo Trust hour, 8, Jack Little and Paul Small, Cameo record artists, 8:30, "Draperies and Lighting Fixtures," by C. N. Kierst, 8:40, Wm. L. Manning, baritone, 9, recital by Henrietta Hacker and friends, 9:30, Jack Little and Paul Small, Cameo record artists, 10, concert by the Chopin Singing Society.

WGY, Schenectady, N. Y., 379.5 (E. S. T.)—2 P. M., music; health hints, 6:30, International Sunday school lesson, 7, Albany Strand Theatre orch. 7:30, health talk, 7:40, WGY orch. 10:30, Ray Halse orch.

KOB, State College, New Mexico, 348.6 (M. S. T.)—7:30-8:30 P. M., popular science course, lesson No. 15, by Dr. D. S. Robbins. Radio talk, "Timber Resources of New Mexico," by R. E. Marsh.

KFAE, State College of Washington, 348.6 (P. S. T.)—7-9 P. M., bass solos, Harry Isaacs, Seattle; the agricultural profession, Dean Johnson; contralto solos; the petroleum industry, Prof. St. Johns; readings, Edith Armand, Ritzville; violin solo, Ralph Strumshi, Raymond; present day styles of architecture, Prof. Fred G. Rounds; the new books, Miss Webb; color in the kitchen, Miss Gladys Gallup.

KFI, Los Angeles, Cal., 467 (P. S. T.)—5 P. M., news, 5:30, Examiner program, 6:45, radiatorial, 7, Examiner program, 8, Dan MacFarland, organist, 9, Herald program, 10, Lieberman Melody nine.

KSAC, Manhattan, Kan., 341 (C. S. T.)—12:35 P. M., reading; weather; spray dates and materials, L. E. Williams; question box; preventing erosion, E. B. Wells, 7:20, Radio College quartet, 7:30, legume bacteria, P. L. Gaaney, 7:40, Radio College quartet, 7:50, parasites and the public health, J. E. Ackert.

KNX, Los Angeles, Cal., 337 (P. S. T.)—11:30 A. M., Estelle Lawton Lindsay's talk to women, 6:15 P. M., dinner hour program, 7:30, Eastern Co. program, 8, West Coast Theatres, 9, Davis Co. program, 10, feature program, 11, Coconut Grove orch, 12, Night Hawks.

KGO, Oakland, Cal., 361.2 (P. S. T.)—11:10 A. M., Prudence, Penny, home making, 11:30, concert, 1:30 P. M., stocks; weather, 3, music; speaker, 4, orch. of Hotel St. Francis, 5:30, girls' half hour, Esther Wood Schneider, 6:45, stocks; weather; news.

KPO, San Francisco, Cal., 429.5 (P. S. T.)—7 A. M., daily dozen, 10, cooking and household management, Mrs. Belle DeGraf, 10:30, the local theatres, 12 M., time, scripture reading, 12:45 P. M., Commonwealth Club luncheon, 1, Fairmont Hotel orch, 4:30, Fairmont Hotel orch, 5:30, markets, 6:30, the local theatres, 8, Stanford University band.

CNRE, Edmonton, Alta., 516.9 (M. T.)—7:30 P. M., children's hour, the farmer, 8:30, W. H. Fread, Hawaiian guitar and mandolin orch.; E. J. Casey, bass; accompanist, Dennis Clayton; address, Hon. H. Greenfield.

CNRT, Toronto, Ont., 356 (E. S. T.)—6:30 P. M., King Edward Hotel concert orch. 8:30, Miss D. Matthews, soprano; Mr. H. Barnes, violin; A. F. Stillman, tenor; C. E. Simpson, clarinet; Miss E. DeWitt, soprano; address, Hon. G. H. Ferguson; H. Stott, pianoforte; male quartet; K. Schofield, violin, 10:30, King Edward Hotel dance orch.

CNRA, Moncton, N. B., 313 (A. S. T.)—7:30

P. M., bedtime stories, Uncle Alf, 8, markets, 8:30, artists from Sussex, N. B. 10:30, CNRA orch.

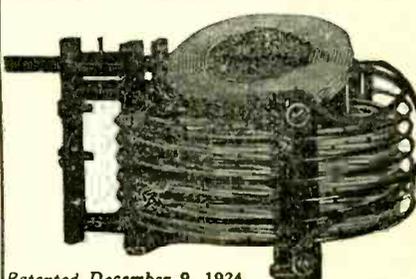
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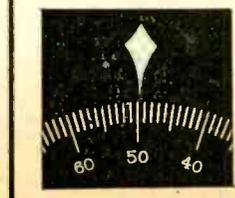
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Radio Movies Are Promised

INVENTION of a device known as "the prismatic ring" will enable radio fans to see the next Olympic Games as well as hear the cheering, was the prediction in a report to the American Chemical Society, in session here, by the inventor, C. Francis Jenkins of Washington, D. C. He also promises that the stay-at homes may see the Presidential inaugural ceremonies from their own fireside; see a distant football, polo, or baseball game as it is happening; a regatta, mardi gras, flower festival or baby parade, while these things are actually happening.

More essentially applied, Mr. Jenkins says that the extension work of the great universities can be more vividly and more retentively brought to the distant farm boy and girl by radio than in any other manner, for the teacher can illustrate his audible instruction to the student in the most inaccessible place.

Has Military Possibilities

In military work the chiefs of army and navy, it is declared, may see at headquarters all that a lens looks upon as it is carried aloft in a scouting airplane.

Mr. Jenkins explained that still pictures are now excellently done both by radio and by wire, and that as the speed of the apparatus is the only difference between stills and movies, the public may confidently expect radio movies soon. It is now a daily laboratory demonstration.

How the System Works

"The prismatic ring as a new contribution to optical science," the report said, adding:

"By means of this prism a tiny point of light is made to travel across a photographic plate in a succession of parallel adjacent lines, the strength of the light constantly changing by reason of the varying strength of the incoming radio signals."

European Broadcasters Plan a Union

A UNION of radio broadcasting concerns in various European countries was formed at a session of the international reunion of the principal broadcasting companies, held in the quarters of the Secretariat of the League of Nations. The union will have headquarters here and the object will be to promote collaboration and good will between the various stations.

There will be a directing committee of nine members who will draw up the rules of the union and establish the headquarters.

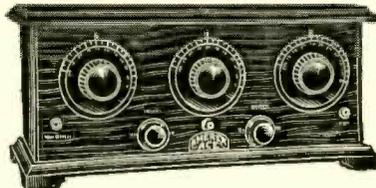
The concerns represented at the second international radiophone conference are the British Broadcasting Company, Delegate Admiral Carpendale; the Radio Company of Paris, Delegate Robert Tabouis; the German Cartel, Delegate Karle Giesecke, and broadcasting societies from Belgium, Czechoslovakia, Spain, Austria, Holland, Norway and Switzerland.

The conference has no connection with the League, meeting at the Secretariat offices through the courtesy of the League.

RADIO MAN-HUNTING, TOPIC AT POLICE CONFERENCE

A MAN-HUNTING by radio, the telegraphing of pictures of criminals, the reduction of fingerprint characteristics to a cipher code for wire and wireless transmission, the use of light armor by policemen, the system of classifying special earmarks which individual criminals leave on their work, and other police problems will be discussed in New York City on May 11, when the International Police Conference organized by Police Commissioner Enright will bring police chiefs to this country from

all parts of the United States and Canada, from Australia, Asia and Europe.



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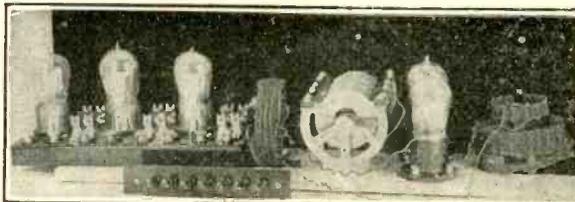
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How to Get the Best Results

(Continued from page 9)

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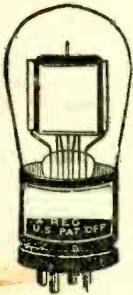
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of the detector and RF sockets. Thus S2 will turn the audio tubes on or off, while not affecting the RF and detector tubes. This is accomplished by joining the open end of S2, the audio switch, to the F plus posts of the two audio sockets. To complete all connections made to battery, one terminal of the loop goes both to the rotor plates of the variable condenser C1 and to the A battery minus, not to the filament side of any rheostat. This same lead, A minus, continues to one terminal of the secondary of the coupler and to the rotor plates of the other variable condenser, C2, the one that tunes the detector stage. One side of the fixed condenser C4 is also connected to negative A, but this may be left for later. The F posts of the two audio transformers, AFT1 and AFT2 in Fig. 1, April 4 issue, are joined by wired connection, and this lead is continued to C minus. The C plus post is connected to A battery minus. This battery should have a maximum voltage of 4½, preferably with a 3-volt post included, the lead from the F posts of the AF transformers going to that tap which produces better results. For 20 1A and 301A tubes, with 90 volts on the plate of the audio amplifiers, 4½ will be found about right. The wiring directions also presuppose the use of the Sodian D21 as detector. Otherwise use the C300 or UV200, for which the same wiring directions hold good. But if any other kind of detector tube is used, the terminal of L2 that goes to battery goes to A plus instead of to A minus.

Fig. 6, published in the April 11 issue, page 7, shows the filament A battery, filament and C battery wiring in picture form, and fully in line with the above directions.

The remaining unconnected terminal of the loop goes to the stator plates of C1 and to the grid post on the RF tube socket. The loop in Fig. 1 is marked L. The socket is designated 1. The plate of this tube is connected to one terminal of the primary, the small winding on the stator form of the coupler. Which terminal that may be will depend on which terminal the negative A battery was connected to on the secondary on that same stator. Usually the lower terminal of the secondary, the one farthest from the primary, is connected to A battery. Therefore the upper terminal of L2 would go to grid of tube 2. The plate lead from tube 1 connects to that terminal of the primary L1 which is next to the grid connection on the secondary. If the battery connection to the secondary was

made to the upper part terminal of that coil, then the B plus connects to the terminal of the secondary which adjoins the A battery connection lead to the secondary. The rule is, keep like potentials together. Grid and plate are at high potential. Batteries are at low potential. Connecting to adjoining terminals either to batteries or to grid and plate solves the problem.

Therefore, the primary L1 being con-

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Tricks in Operation of Loop

nected properly to plate and B plus 90 volts, the lead from the remaining free

end of the secondary L2 is completed. This goes to the stator plates of C2, the variable condenser tuning the detector stage, and also goes to one side of the grid condenser C3. The other side of the grid condenser goes to the grid post of socket 2. No grid leak is provided, as the Sodian tube does not require any. If a leak is used, connect it from the grid post of the detector tube socket to the A battery positive. A special leak mount will be necessary for this.

The plate of the detector tube is connected to one side of the tickler, L3, the other side of which goes to one side of the fixed condenser C4 and to the outside hooked spring of the double-circuit jack J1 (Fig. 1). The other side of C4 goes to negative A battery, this being the connection broached previously. The outside right angle of the jack is joined to B plus detector voltage, which for regenerative use on a Sodian D21 tube should be 45 to 67½ volts. Try various voltages and use the lowest one that gives excellent results. Sometimes, if regeneration is halting, the higher voltage will be necessary, but not usually. The inside springs of the jack J1 go to the primary of AFT1, the spring making contact with the right angle going to the B post, the other inside spring to the P post. Audio transformer designations are P1 or P for beginning of primary; P2 or B, for end of primary; S1 or G for beginning of secondary, and S2, F or A for end of secondary.

The G post of AFT1 goes to the grid post of tube 3, the first audio tube, the F post of AFT1 having been connected to the C minus. The plate of tube 3 goes to P on AFT2 and the B to B plus 90 volts. The G post is joined to the grid or G of the last tube, the F post of AFT2 already is accounted for. The plate of the last tube goes to the spring of J2 and the right angle to B plus 90 volts. That completes the wiring, with one exception.

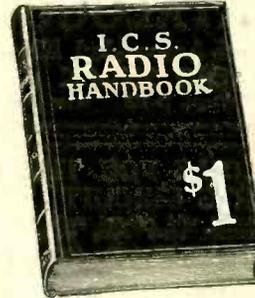
Put a tube in one of the audio-amplifier sockets. See if the detector rheostat governs the tube lighting. Try the switches. If everything is all right, put this same tube in the other audio socket and repeat the process. Then try two tubes at the same time, one in each audio socket. Next remove these tubes and put one in the RF socket. Then try the Sodian or other detector tube in the detector socket. If all the filament controls and battery switches are all right, prepare to tune in. If there is any trouble rectify it by checking back on the wiring and comparing with Figs. 1, 4 and 5 of the April 4 and 11 issues.

Granting that all's well, connect A plus and B minus. The set is now ready for tuning in.

Those who have never before operated

a loop set may expect some surprises. Regeneration may not be well controlled, usually, unless the loop is pointing correctly. Many persons imagine that the broad side of the loop should point toward the station to be received. For instance, suppose the loop were regarded

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How to Point a Coil Antenna

as a carpet beater. That plane (either side) that would be used to beat the carpet, so as to present the broad or

greater surface to the carpet, would not be used for direction in tuning in a station. One of the horizontal crossarms must point toward the station. It makes no difference which end of the horizontal arm is used. Very readily one learns by heart the station directions, guided, if need be, by a compass. Some loops have an enclosed compass on the base. On distant stations a very slight variation of the loop direction may tune the station in or out. This is just what you want, for unless slight variations make themselves felt in the receiver you will not get much DX.

For local reception, and even on some distant stations, the regeneration control will not be critical. This is due to the characteristics of the Sodian tube and to a considerable extent removes the drawback formerly inherent in this type of circuit—critical tuning.

The wiring directions did not include an aerial RFT, so that an outdoor antenna and ground may be employed. If loop reception alone is deemed sufficient, a single-circuit jack may be employed, and placed at the point designated J1 in Fig. 2, page 6, April 4 issue. If the alternate outdoor aerial is to be provided, so that you can get fine quality reception from locals on the loop, without extraneous noises, but can cut in the outdoor antenna for extreme DX, then use a double-circuit jack instead, at this point, and wire as shown in Fig. 5, page 32, April 4 issue.

The panel and baseboard layout, Figs. 2 and 3 in that issue, are based on the use of the conventional wooden baseboard. If panel brackets are to be used, supporting a socket gang that also takes the place of the baseboard and makes for a much more sightly job, then a different panel layout should be used. With the circuit solely a loop set, the aerial coil omitted, no testing is necessary with the bakelite socket gang and subpanel, but if an aerial coil is used, also, then the precautions should be taken as previously outlined.

The set works very well on loop alone, but DX fans will require their outdoor antenna.

[This concludes the 3-part article on How to Build the Diamond of the Air, a 4-Tube DX Loop Set. Part I was published April 4, Part II on April 11].

MARK BACK OF PANEL

WHEN marking a panel for instrument holes, draw all scratch lines on the back. Then you won't have to worry about tediously removing the lines with emery cloth. However, remember that you are working backwards, and before you apply the drill make sure the holes are in the correct positions. It is very easy to make mistakes.

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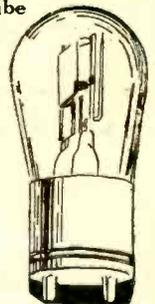
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"Mr. Rothafel, lovingly called Roxy," was the brief introduction given to the Capitol chief. He began, to the delight of his hearers:

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That brought down the house as few performers can bring it down with any joke in the almanac.

"It's got so now I want to get off in a corner all alone and think all these things over," he continued.

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 Nov. 15—A Sturdy Low-Loss Coil, by Lieut. P. V. O'Rourke. An Ultra 2-Tube Receiver, by Byrt C. Caldwell.
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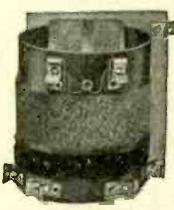
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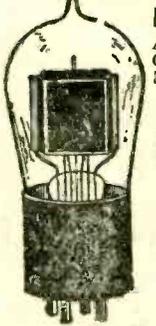
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Matched Characteristics

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RADIO WORLD
1493 BROADWAY NEW YORK CITY

\$1 Charged to see Broadcast Show in Chicago Hotel

CHICAGO.

THE proprietor of stations WTAS and WCEE, Chas. Erbstein, recently finished negotiations for a lease on the Blackstone Hotel, Chicago, for five months, and will offer to patrons an innovation in radio theatricals. Mr. Erbstein has made arrangements to broadcast a nightly show in full view of the audience, charging an admission fee of one dollar to see the show.

It is intended, according to reports that have reached us, that a new program will be given nightly, the performance beginning at 7:30 p. m.

Mr. Erbstein states if this innovation proves a success he will take full advantage of the five-year option which he has on the lease granted him. This experiment by Mr. Erbstein has been the outcome of a novel idea which he tried out on a small scale at Kimball Hall, where

he has his studio. The seating capacity of the hall, which is 500, has been filled nightly to full capacity at one dollar admission. Hundreds have been turned away nightly. This was the direct cause of Mr. Erbstein leasing the Blackstone Hotel from Harry J. Powers, at a flat rental of \$2,000 weekly.

MILLIONS of dollars are at stake and important radio patent rights are involved in a legal battle being waged in the United States District Court in Philadelphia between two of the largest radio manufacturers in the country. The De Forest Radio Company is seeking to have patents granted to Dr. Lee De Forest for an oscillating audion declared valid and a similar patent owned by the Westinghouse Electric and Manufacturing Company declared invalid. Both patents contemplate almost identical audions. The De Forest Company says the United States Court of Appeals of the District of Columbia upheld the De Forest patent and the Westinghouse company maintains the United States Court of Appeals of New York sustained the Edwin H. Armstrong patent, which it owns. The present case hinges whether De Forest or Armstrong invented the oscillating audion.



REDUCES BATTERY CONSUMPTION 50%
INCREASES TONE QUALITY 85%
REDUCES STATIC 60%
MAKES YOUR SET TALK 100%

With Welly's Crystector

The original—beware of imitations. Used instead of detector tube in Neutrodyne and Radio Frequency Sets only. Gives clearer tone, as it is crystal detection instead of tube detection. Price \$4.00. No trouble to install. Absolutely guaranteed to function in your set or money refunded. Send \$4.00, take advantage of this liberal offer.

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DOES YOUR SET DELIVER 100%
 For utmost efficiency install

X-L VARIO DENSERS

SPECIFIED BY SILVER-MARSHALL
 ENDORSED BY RADIO BROADCAST
 TESTED AND APPROVED BY
G. M. WILCOX

Prof. of Physics, Armour Inst. of Technology and other leading radio publications and authorities
 MODEL N—capacity range 1.8 to 20 microfarads for balance in Roberts two tube, Browning-Drake, McMurdo Silvers four tube knock-out, Neutrodyne and tuned radio frequency circuits. Price \$1.00
 MODEL G—capacity range .00016 to .00085 microfarads for the Cockaday circuits, filter and intermediate frequency tuning in super-heterodyne and positive grid bias in all sets. Price \$1.50
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The 5 Tube 'Empire'
At Only \$59.50

-DIRECT TO YOU-
 Complete with 5 Tubes, 4 Batteries and Loud Speaker
Only \$84.50

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Pinchot Appeals Via Radio for School Fund Support

GOVERNOR PINCHOT appealed to Pennsylvania citizens to urge their legislative representatives to vote for appropriations for the public schools and other State activities.

Speaking through station WIP, the Governor reviewed the events at the State Capitol, stating that "more than \$7,000,000 had

been taken away from the amount absolutely needed for the public school system, as well as more than \$3,000,000 from the necessary running expenses of other parts of the State Government."

The Senate restored most of the items cut from the general appropriation bill but the House refused to concur and the bill was thrown into conference.

"This is not a case that should be settled by political manipulation, but by the public sentiment of Pennsylvania," said the Governor. "Unless a question which goes into nearly every household in this Commonwealth can be settled by the will of the people and not by the wire pulling of politicians, we have small right to call ourselves a free people."

"I have never before made such an appeal as this to the men and women of our State. There has never before been such need for it as now."

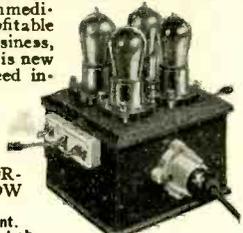
Governor Smith of New York, recently broadcast a plea to voters to back his bills for grade crossing elimination and

A NEW SERVICE

The BROWN TUBE REVIVER rejuvenates worn down tubes in 10½ minutes. An opportunity for you to immediately establish a profitable and substantial business, full or part time. This new absolutely guaranteed instrument priced at \$25.00 complete.

The first cost is the last cost. BE THE FIRST IN YOUR NEIGHBORHOOD. Send NOW for particulars.

Write to nearest point. St. Louis Radio Tube Lab. 8572 Olive St., St. Louis, Mo. THOS. BROWN CO. Pat. Appl'd for) 513-517 Orange St. Newark, N. J., U.S.A.



State income tax reduction. These bills faced defeat before a politically hostile Legislature, but after the broadcasting the bills were enacted.

THE GENUINE LOUDSPEAKER
\$1.50 Vacuum Tubes \$1.50
 C. O. D., JUST PAY POSTMAN
 MONEY BACK GUARANTEE
JAMES H. KONKLE
 192 Market Street Newark, N. J.

Bankrupt Stock
Cunningham Regenerative one tube long range sets, \$10.50 each
Formerly sold at \$32.50
 No Circulars. Order from This Ad. Hurry before they are all gone. Prepaid while they last.
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CRAM'S INTERNATIONAL RADIO ATLAS

This latest and greatest Radio Atlas has four big maps, a list of all the Radio Stations in the United States, Canada, and the entire world, alphabetically arranged by states and cities, latest wavelengths, kilocycles, and names of operators. Liberal space for your private log. Post paid on receipt of 50c. or one sent free with new yearly subscription for Radio World (\$8.00 for 52 nos.), but with no other Premium.

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This SIX MONTHS BLOW-OUT INSURANCE COSTS YOU NOTHING

Yet It Means Satisfactory and Continuous Radio Reception for YOU

Blo-Pruf 501A is a perfect detector, radio frequency amplifier, or audio frequency amplifier.

These tubes are sold direct by mail, price \$3.00 postpaid—the same price as ordinary tubes. When you install Blo-Prufs in your set you are guaranteed against the great loss of blown-out tubes. Order enough for your set now, sending check or money order at \$3.00 each. If the tubes are not entirely up to your expectation return them and your money will be immediately refunded. If a tube blows out inside of six months from any cause it will be immediately exchanged. Don't put off securing these wonder tubes. Act at once! Order Blo-Prufs NOW!

BLO-PRUF TUBES

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Did you get Radio World's Third Anniversary Number dated April 4, 1925?

Some features in that number:
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 Trouble-Shooting for Benson Super-Heterodyne.
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 15c copy, or start your subscription with that number.
RADIO WORLD, 1493 Broadway, New York

COMPLETE 1924 INDEX OF RADIO WORLD

Appeared in RADIO WORLD dated Oct. 18, 1924, and Jan. 10, 1925. 15c per copy. **RADIO WORLD, 1493 Broadway, New York.**

LIST OF STATIONS

Get this roster of American broadcasters, compiled in alphabetical order of call letters. Send 15c for April 4 issue, the great Third Anniversary Number, to Circulation Manager, **RADIO WORLD, 1493 Broadway, New York City.**

RADIO WORLD'S QUICK-ACTION CLASSIFIED ADS.

10 CENTS A WORD. 10 WORDS MINIMUM

BARGAINS—Freshman masterpiece 5 tube, Crosley 1 and 3 tubes, national monodyne 1 tube, receivers alone or complete outfits. Priced right. If interested, write quick. Address, G. Simms, Lake, New York.

WANT TO MAKE MONEY? Of course you do! Fast selling new invention; write quick for territory. Have own business. Konkle, 192 Market St., Newark, N. J.

LOUDSPEAKER ON TWO TUBES accomplished by the Bluebird Reflex, described by Lieut. Peter V. O'Rourke in the Feb. 7 issue of RADIO WORLD. Picture diagram, also schematic diagram, panel and assembly plans. An inexpensive set to make and operate. One stage of tuned RF, crystal detector, one reflexed audio stage and one free audio stage. Selective and good for DX. Send 15c for a copy or start your subscription with the February 7 issue. **RADIO WORLD, 1493 Broadway, New York City.**

NEW FEDERAL No. 59 Radio Receiver for sale, \$65.00. J. W. P. Smithwick, La Grange, N. C.

EARN \$5-\$10 WEEKLY, addressing, mailing circulars. Send stamped envelope for particulars. Palace Mail Co., Toledo, Ohio.

AGENTS—Write for free samples. Sell Madison "Better-Made" Shirts for large Manufacturers direct to wearer. No capital or experience required. Many earn \$100 weekly and bonus. Madison Mfrs., 501 Broadway, New York.

RADIO HOSPITAL. Specialists in Neutrodyne and Superheterodynes. Radio Central, Abilene, Kansas.

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.**

LEARN CODE in one hour. Method now \$1.50 postpaid. H. Anderson, Box 593, Great Falls, Mont.

2650 MILES DISTANCE with one tube. We send complete understandable instructions with panel layout, picture diagrams, etc., for 25c. Or **BIG BOOKLET FREE.** **VESCO RADIO CO.,** Box 117-RW Oakland, California.

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

FOR SALE—New 12 Utradynite kit, \$20.00 B. P. Fisher, Lyons, N. Y.

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.**

Fair Deal Promised Trade Under Latour Patents

THE Latour Corp., 15 Exchange Place, Jersey City., N. J., R. P. Pierson, president, desires to stabilize, not upset, radio patent conditions. The Hazeltine Research Corp. owns all the stock in the Latour Corp. Communications regarding the 88 patents Latour sold to the corporation may be addressed to Mr. Pierson or to Marius Latour.



NOTED French electrophysicist, M. Marius Latour, is a pioneer of radio, having taken out a patent nineteen years ago on negative resistance which is today the basis of amplification used in many receivers. In 1904 Latour was consulting engineer for the General Electric Company, developing electrical commutating machinery, in which work he acquired a world-wide reputation. During the war M. Latour did extensive work on receiving amplification for his country, and developed a three-tube radio frequency receiver, which created a sensation in the Allied Signal Corps. M. Latour is now in this country to help along action on his many radio patent applications. In spite of his years of accomplishments, he is actively engaged in telephone, cable and radio work in Europe. (Kadel & Herbert.)

Priess Claims Some Latour Inventions

WILLIAM A. PRIESS, a former radio inspector of the Port of New York, who served in the navy as a radio engineer during the war, said he would fight in the courts to prove that he had patent rights superior to those of Professor Marius C. A. Latour on some of the fundamental processes in radio broadcasting and reception covered by the Latour patents.

Mr. Priess asserted that he had filed his patents in this country in 1917, months before Latour. He also claims that the idea of "damping" and the use of the potentio-

meter in radio were original with himself, though claimed by Latour.

Professor Latour was asked about the claims of Mr. Priess.

"All I can say is that his statements are

not correct," said Dr. Latour. "I made my inventions in 1916. To aid in prosecuting the war I taught them to hundreds of American engineers in the following year. I understand that Mr. Priess was one of my pupils. But by 1917, the time when he lays claim to them, thousands of persons understood the principles, because they had been taught them in naval schools of the Allies, which had been allowed the use of my patents."

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To Build Your Own Receiver

- Roberts—2 tube, Parts.....\$31.44
- Roberts—4 tube, Parts..... 48.35
- Rasla—1 tube, Parts..... 23.78
- Rasla—2 tube, Parts..... 31.43

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The **DAVEN**
RESISTANCE COUPLED
AMPLIFIER KIT

The wave of public opinion in favor of Resistance Coupled Amplification is firmly established. The

DAVEN RESISTANCE COUPLED AMPLIFIER KIT

is the most ideal for the Home Set Builder to use.

Supplied in 3 or 4 stage Kits without Sockets and Condensers.

Buy of your dealer, the "RESISTOR MANUAL." It's full of information on Resistance Coupling.

Price 25c.

DAVEN RADIO CORP.

"Resistor Specialists"

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BELLTONE
RADIO TUBES
201A 95c

12-199-\$1.50

199 With Standard Base

With Money-Back Guarantee
Mail Orders Promptly Filled

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Room 411, 524 West 42nd Street, 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.

EDISON STORAGE BATTERIES

Suitable for U.V. 199, W.D. 11 and W.D. 12 Tubes.

Especially adapted for use with portable sets.

\$ 1.95 Each Cell

This is an exceptional opportunity to purchase these new cells at little more than the cost of Dry Batteries.

Size—2½x1¼x6 inches high.

Practically indestructible, non-spillable.

All metal nickel-plated case, 1¼ volts per cell.

Weight—One (1) pound per cell.

Three cells will operate a set with 4 U.V. 199 tubes for approximately 20 hours on one charge. Can be recharged with any charger in about five to seven hours.

Mail Orders Filled. Postage 10c. Per Cell Extra.

THE TODD ELECTRIC CO., Inc.

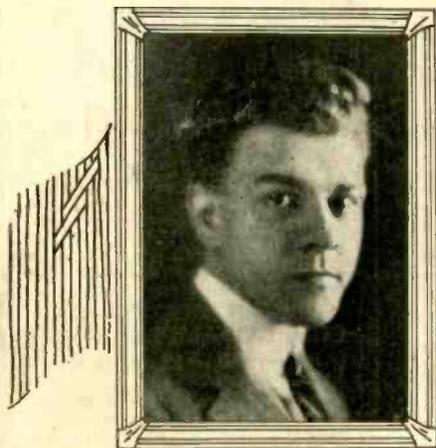
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Quality Parts—Lowest Prices
Complete kit for the Diamond of the Air as specified by Herman Bernard with 7" x 24" mahogany cabinet...\$41.50
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Complete kit for Roberts 4 tube...\$47.50
Todd 100 V. Storage B Battery outlives any set. Better reception assured...\$21.00
Apex Royal brass vernier dials...\$1.55
Brownlie Var. Detector—1st \$2.00 1.80
Bremer-Tully 3-cir. Tuner—1st \$5 3.55
Eastern Coils for 1925 DX set... 5.95
Daven Resistances and Kits, 25% off list

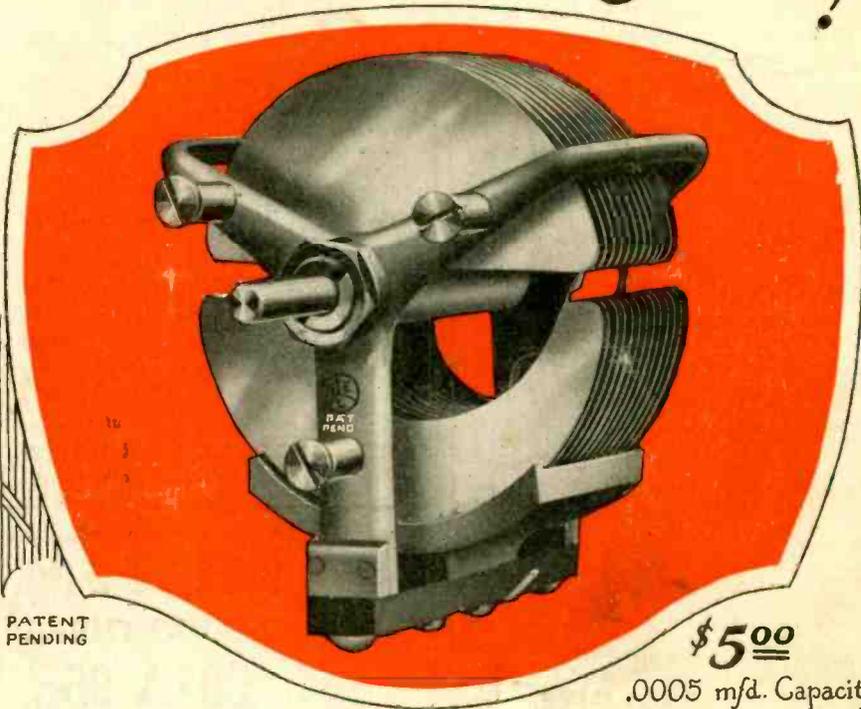
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Therdarsen Transformers 3¼ to 1. \$2.75
Therdarsen Transformers 6 to 1. 2.95
Eastern Coils for Roberts Circuit... 5.95
We sell only merchandise of the highest quality that is guaranteed by the manufacturer. Money refunded if goods are not as represented.
All Bruno Parts in Stock.
20% Discount Off List on All Sets.
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Lacault Scores Again!



PATENT
PENDING



\$5⁰⁰
.0005 mfd. Capacity

The new Ultra-Lowloss condenser is the latest improved radio device designed by R. E. Lacault, formerly Associate Editor of Radio News, the originator of Ultradyne Receivers and now Chief Engineer of Phenix Radio Corporation.

ULTRA-LOWLOSS CONDENSER

LIKE every Lacault development, this new Ultra-Lowloss Condenser represents the pinnacle of ultra efficiency—overcomes losses usually experienced in other condensers.

Special design and cut of stator plates produces a straight line frequency curve, separates the stations of various wave lengths evenly over the dial range, making close tuning positive and easy.

With one station of known frequency located on the dial, other stations separated by the same number of kilocycles are the same number of degrees apart on the dial.

In the Lacault Ultra-Lowloss Condenser losses are reduced to a minimum by use of only one small strip of insulation, by the small amount of high resistance metal in the field and frame, and by a special monoblock mounting of fixed and movable plates.

At your dealer's, otherwise send purchase price and you will be supplied postpaid.

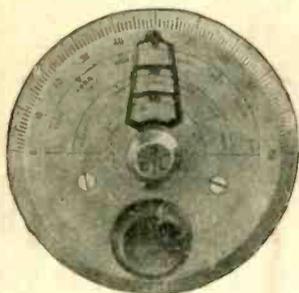
Design of low loss coils furnished free with each condenser for amateur and broadcast frequencies showing which will function most efficiently with the condenser.

To Manufacturers Who Wish to Improve Their Sets

The Ultra-Lowloss Condenser offers manufacturers the opportunity to greatly improve the present operation of their receiving sets.

Mr. Lacault will gladly consult with any manufacturer regarding the application of this condenser to any circuit for obtaining maximum efficiency.

PHENIX RADIO CORP. 116-F East 25th St.
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ULTRA-VERNIER TUNING CONTROL

Simplifies radio tuning. Pencil-record a station on the dial—thereafter, simply turn the finder to your pencil mark to get that station instantly. Easy—quick to mount. Eliminates fumbling, guessing. Furnished clockwise or anti-clockwise in gold or silver finish. Gear ratio 20 to 1.

Silver, \$2.50 : Gold, \$3.50



This seal on a radio product is your assurance of satisfaction and guarantee of Lacault design.