

15c HOOK-UPS! HOOK-UPS!! HOOK-UPS!!! MAY 3

BIGGEST AND BEST LIST OF PROGRAMS 1924

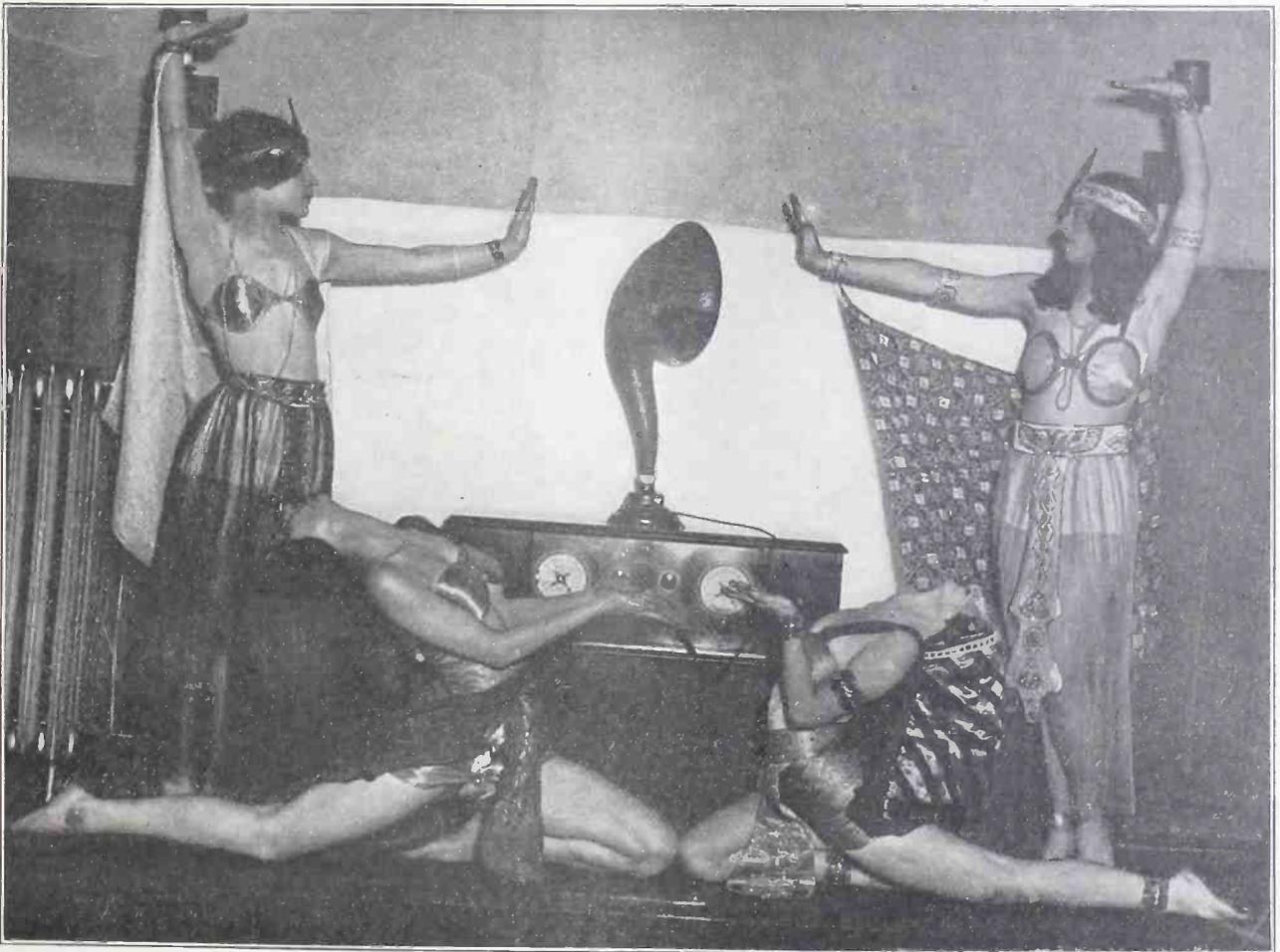
RADIO WORLD

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Vol. 5, No. 6 195-110

ILLUSTRATED

EVERY WEEK



(International Newsreel)

CLASSIC DANCERS have followed the fox-trotters in utilizing broadcast music. These graceful damsels, who are learning the fine points of their art at a fashionable studio, are portraying Supplication and Forgiveness with an Oriental atmosphere. A Super-Heterodyne affords opportunity for picking up any station in the United States broadcasting classical dance music at the moment. The school consults RADIO WORLD'S list of advance programs as its authority.

NEUTRAD CIRCUIT'S GREAT FEAT

A THREE-TUBE TRANSCONTINENTAL REFLEX



Approved by Over 200 Experts
New Crosley Engineering Achievement

A three tube set with five tube efficiency—the greatest selectivity with the minimum effort—positive calibration to any wave length between 200 and 600 meters. These are only a few of the many advantages offered in the remarkable new Crosley Trirdyn Radio Receiver.

It was only after a year of constant experimenting that our engineering department perfected this exceptional receiver. Thorough tests proved to us that it would outperform any receiver ever before produced. But we were not satisfied with our own opinion. So we shipped out 200 of these sets to experts in every part of the United States. Their criticisms are one and the same—"tried out your new Trirdyn Receiver Saturday night and logged 13 stations, among them Cuba, New York and Omaha, between 9 and 10 o'clock. The set was very selective. During the time this test was on local station KSD was operating and we went through them without any difficulty or interference whatever. The range of the local station was not more than three points variation in the dial setting."

"Tried one of these sets out and obtained wonderful results. Were able to log all stations which we heard very successfully. This set should go over big. The set has wonderful volume and is selective"—etc.

This new Crosley triumph is called the Trirdyn because of its original combination of three "R's"—Radio frequency amplification, Regeneration and Reflex. The first tube incorporates non-oscillating, non-radiating tuned radio frequency amplification; the second tube, a regenerative detector reflexed back on the first tube for one stage of audio frequency amplification. Then it has a third tube which acts as a straight audio frequency amplifier. It uses the ultra selective aperiodic antenna circuit and external selector coil, which adds to its wonderful selectivity.

The Crosley Trirdyn in range, volume and selectivity is the equal of any five tube receiver on the market. Greater volume will, of course, be obtained through the use of storage battery tubes, but it will function well in any type and can be used with either indoor or outdoor antenna.

The opinions of many experts have convinced us that the Trirdyn is the best receiver ever offered the public regardless of price.

Practically every radio dealer can furnish you Crosley Radio Sets, including not only the Trirdyn, but the Model 51, a two tube set for only \$18.00; the Model V, a single tube receiver, at \$16.00; the Model VI at \$24.00; the Super VI at \$29.00; the Model X-J at \$55.00 and the Super X-J at \$65.00.

All Crosley regenerative sets are licensed under Armstrong U. S. Patent No. 1,113,149.

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RADIO WORLD

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Resistance and Impedance-Coupled AF

By *Thomas W. Benson*

A. M. I. R. E.

IN Fig. 1 herewith is shown a standard impedance-coupled circuit for audio frequency amplification. As shown, a high impedance is connected in the plate circuit with a fixed condenser between the plate end of the impedance and the grid of the next tube. This impedance should be at least twice that of the plate filament impedance of the tube to minimize distortion.

The theory of the operation of this circuit is similar to the phenomena encountered in the use of tuned plate radio frequency amplifiers. Any variation in the resistance of the tube, due to fluctuations of the grid potential, will result in variations in the drop of potential across the impedance which will be impressed upon the grid of the second tube and will be again amplified. So much for the theory. The practical application of this method is interesting.

Authorities all agree that this method is less efficient than step-up transformer coupling. It may not give as loud signals as transformer-coupling, but it gives less distortion. Essentially it is a one-to-one transformer and if the impedance is high enough, will not have a sharp resonance peak and will, therefore, amplify with equal efficiency currents at all frequencies within the range of audibility.

It is a simple matter indeed to try this form of coupling. Should you have a transformer coupled unit at hand simply disconnect the secondary of the transformers completely and run a wire from the plate terminal of the transformer to a fixed condenser having a capacity of .006 or better, run it also from the other terminal of the condenser to the grid of the next tube. This connection is shown in Fig. 2 where it will also be noted a high resistance grid leak is connected to the grid of the amplifier tube. This prevents the tube from blocking due to accumulation of negative charges

on the grid. With some tubes a 2-megohm leak will keep it clear without draining excessive energy, but the higher leak is advised.

impedances for the construction of an impedance-coupled amplifier. Just connect them up as shown in Fig. 1. It is not necessary to remove the primary winding, but make sure the secondary winding is not open, by connecting a phone and battery in series with it to test for an open circuit. The coils should be mounted at right angles and the grid leads be kept as short as possible to obtain best results. A little experimenting with condenser capacities in the grid leads will sometimes improve the operation of the set.

Now let us consider resistance coupling.

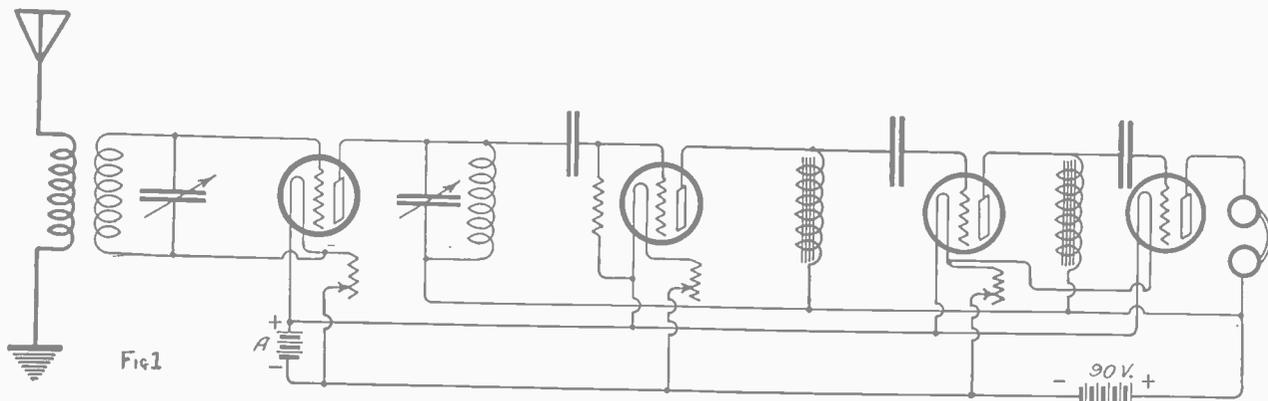
Here again authorities agree that this form of coupling, although free from distortion, is the least efficient of the three forms and that a resistance of 10,000 to 100,000 ohms, preferably the higher, gives best results. My experience with this form of amplifier indicates they are wrong on the value of the resistance and I am almost convinced it is as good as transformer coupling.

The circuit is identical to impedance coupling. As a matter of fact the resistance unit is simply a high impedance, but it has the disadvantage of limiting the plate current, whereas the inductive impedance has a lower direct current resistance and permits a higher voltage to be applied to the plate with a given B battery voltage.

The circuit is shown in Fig. 3. The resistances I have used are regular 2-megohm leaks. The grid leaks are also 2 megohms. The grid condensers may be from .002 upwards, and simply function to keep the positive B off the grid of the tube and to pass the audio frequency currents to the grid.

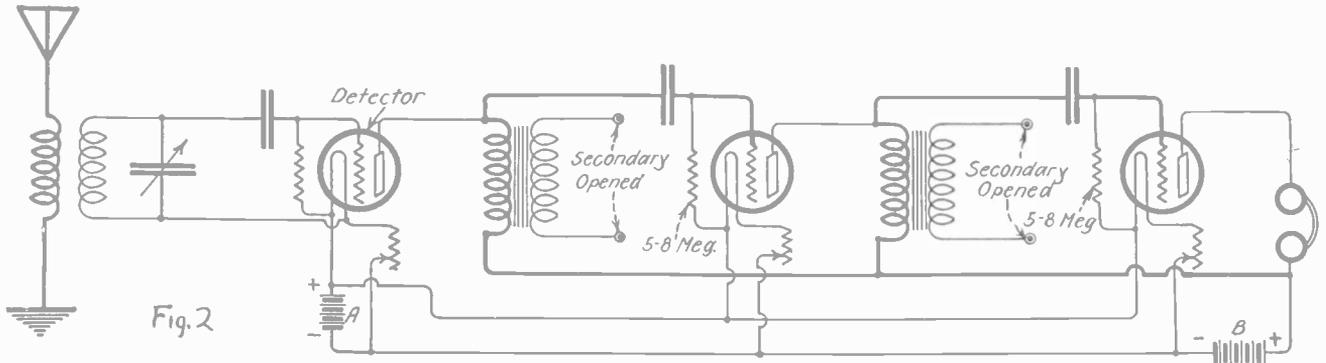
This form of coupling is extremely cheap and permits of the shortest leads possible, as shown in Fig. 4, where the arrangement of leaks and condenser as used by the writer is outlined. The tubes are mounted on a shelf,

(Concluded on next page)



STANDARD impedance-coupled circuit for radio-frequency amplification. Although not always as loud as the circuit using step-up transformers, this method gives less distortion and amplifies efficiently currents at all frequencies within the range of audibility. The impedances are shown at right, between the tubes. Choke coils constitute the impedance.

How to Omit Transformer's Secondary



THIS SHOWS how the ordinary step-up transformer can be used in circuit shown in Fig. 1.

(Continued from preceding page)

screws go through the terminals of the socket, through the shelf and condenser below and into the terminal of the grid leak mounts. The one screw serves to hold the socket in place, mount, and make connections to condenser and grid leaks. Shorter leads are thus impossible.

The writer originally built a two-stage amplifier with resistance coupling in the first stage and a high ratio transformer coupling in the second. As an experiment, the transformer was cut out and resistance coupling put in. If there was any drop in volume it was not noticed. On the strength of this test a five-tube set was built, using the anti-regenerative principle of radio frequency amplification with resistance coupling on the audio end and its volume is perfectly satisfactory and, above all, clear and distortionless.

The regulation 90 volts are used with all of them. Of course adding another B battery would increase the volume, but why bother? It is as loud as could be desired and one set using four tubes.

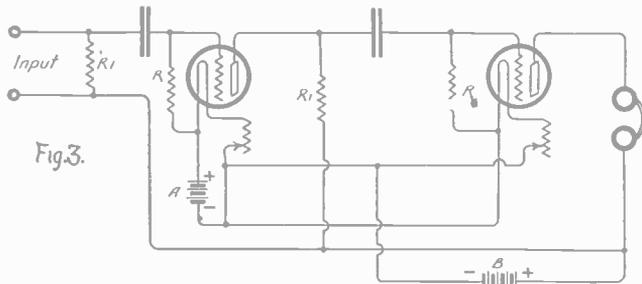


Fig. 3.

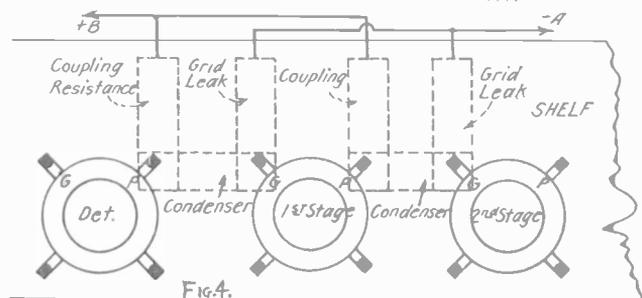


Fig. 4.

FIG. 3 shows resistance coupled audio-frequency amplification. Fig. 4 shows layout of parts in the same circuit.

Bishop Lauds Church Radio Station

BISHOP THOMAS NICHOLSON of the Methodist Episcopal Church, with headquarters in Chicago, issued a statement urging the establishing of church radio stations. Bishop Nicholson says that radio has unbounded possibilities for good. He maintains the radio will not keep people away from church, as is sometimes said, but "will enable thousands to hear religious messages who could never otherwise hear them." Continuing, the Bishop says:

"Radio would even be a money saver, although I am not advocating its establishment for that purpose; it would be cheaper for persons living in inaccessible sections to own receiving instruments than to pay home missionaries to hunt them out.

"I favor the radio, not for denominational propaganda, but for broadcasting messages helpful to all who may listen in."

BY NAHAN FRANKO

Renowned New York Orchestra Leader

Modern Music Misses the Happy Medium

IN music today it is a case of too much jazz or too much symphony. Radio audiences know this. There is nothing in between. There are hundreds of wonderful compositions that are never heard any more. Not that jazz or symphony is not all right but there should be a happy medium. I have such confidence in the real good taste of our public that if it came to a test, I am sure the legitimate music would win out over jazz.

All music is good, but it depends how it is played. It loses its beauty when jazzed and ceases to be elevating. You can jazz anything, even "Chopin's Funeral March," but they lose all aspects of art and it becomes a sacrilege.

Pig May Sign Off

THE impresario of station KFNF, Shenandoah, Iowa, is striving to educate Penelope, a pig, the station's mascot, so that she will be able to give a flourishing signing-off call as a characteristic feature of the station. WLAG, Minneapolis, has a rooster that sometimes crows at the end of the program.

Canada Big Buyer

THERE were 184,965 pounds of radio apparatus exported during January, valued at \$331,849, according to figures just made public by the Department of Commerce. Of this amount by far the largest went to Canada, with a value of \$160,282.

A Transcontinental Reflex

By Byrt Caldwell

ONE of the most efficient of the present-day circuits is the reflex. There are several reasons for the high efficiency of the reflex, chief of which, of course, is that one or more tubes of each set is used twice. Then, too, the tubes are used only as amplifiers. A tube will not act most efficiently as a detector and amplifier at the same time.

The fact that a crystal rectifier is used is the reason for the wonderful quality of music that is given by this receiver. This kind of reflex does not radiate.

The diagram above the lay-out of the panel, which is size 7" x 18". In preparing the panel it is a good idea to cut a piece of paper to the size of the panel, and then mark all of the points on the paper. Use this as a template in marking the panel.

After the panel is made and fastened to the base, place the apparatus as follows: The variocoupler, which may be any one of the standard couplers on the market, is placed at the extreme left of the panel. Next to this on the right is the .0005 tuning condenser, and to the right of this is the .0003 condenser. The tube sockets are next put in place. The first is placed between the two variable condensers. The second is placed to the right of the .0003 condenser, and the last is placed between the two bezels. (The bezels are only used for the sake of a neat-appearing panel.)

The two radio frequency transformers are next placed so that the P on the transformer is next to the plate connection of the sockets of their respective tubes. These may be of any good make on the market. Now place the two audio transformers at right angles to each other, and so that the leads to the grids of the second and third tubes may be as short as possible. The crystal should preferably be of the fixed type. Connect it between the secondary of the second transformer and the primary of the first audio transformer. The by-pass condensers are fixed, with mica dielectric. A rheostat is used only on the last tube. A single circuit is used for the phones.

A nordinary regenerative set will often work if the connections are carefully made, but a reflex set must be wired with heavy wire (bus wire) and all connections must be soldered. In making the connections, think them out before you put the wires in place, so that you can get the shortest connection possible, without running two wires parallel for any considerable distance. If a flux is used, use plain rosin, and not muriatic acid, nor any of the soldering paste.

The three-tube reflex is equal to receivers using five and six tubes. It is an ideal receiver for the person for whom it is impossible to erect an outdoor antenna. Under good conditions, and with an indoor loop, stations up to a thousand miles can be heard on the loud speaker. With an outdoor antenna, transcontinental loud speaker reception is possible.

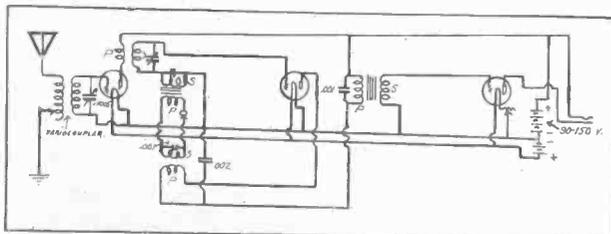


FIG. 1. Wiring diagram of three-tube reflex circuit using a fixed crystal as the rectifier. In this circuit Caldwell does not use a tube for both detection and amplification because tubes work best when only detecting or amplifying.



MRS. TERESA SIMPSON, ninety-three-year-old radio fan, of Monroe City, Mo., celebrates her birthday by listening in with her great granddaughter to musical programs broadcast by distant stations. Mrs. Simpson taught the little girl how to tune in, so now she brings in the DX. Grandma frowns but the girl is happy as they listen to a bedtime story.

India Takes to Radio

CATALOGS and price lists for American receiving sets and parts for amateur assembling are wanted by radio enthusiasts in India. Firms interested are requested to send such literature to the American Trade Commissioner, James E. Miller, Esq., Room 29, Grosvenor House, 21 Old Court House Street, Calcutta, India, who will be glad to make it available to those interested.

British Interest in Radio Increasing

ENTHUSIASM for radio telephony continues to grow throughout Great Britain, according to Acting Commercial Attache Hugh A. Butler. Up to March 1, 1924, over 600,000 licenses for receiving sets had been issued.

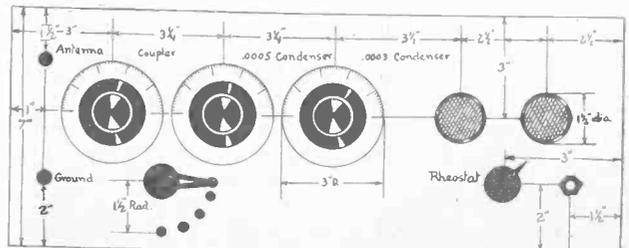


FIG. 2. Panel layout giving exact drilling dimensions and location of dials. The overall size of the panel is 7 x 18 inches. A template made from this drawing will facilitate drilling holes for the transcontinental reflex.

Adventures with the Neutrad Unit

By

Walt S. Thompson

DUE to the interest manifested in the Neutrad Unit described by the writer in the April 12, 1924, issue of RADIO WORLD, further details concerning its construction and operation are given.

One of the Neutrad Units constructed by the writer is shown in Fig. 1 and Fig. 2 in which each piece of apparatus is given a designating letter corresponding to the letters in the following list of necessary materials and in the circuit diagrams:

L₁, L₂—Primary and secondary windings of the special honeycomb wound coupler.

C—14 plate variable air condenser (vernier).

L₃—Special honeycomb wound coil.

C₁—Neutralizing condenser.

S—Tube socket.

V—Vacuum tube.

E—Front panel, 7" x 5½".

F—Binding post panel.

G—Flexible flat cord.

H—Hardwood base, 7" x 5½".

R₁—Rheostat.

Binding posts, wire, etc.

Although the coupler may be wound on bakelite tubes as described in the April 12 issue of RADIO WORLD, it will pay the builder to take the extra trouble to wind this coil honeycomb style as illustrated by Fig. 3. The first requisite is a round, wooden winding form I, about 2" in diameter and 6" long. Near the end of this winding form mark off the circumference into nineteen equal parts and drive a nail into the form at each of these division marks. This will make a row of nineteen nails equally spaced. Drive another row of nineteen nails about one-half inch from the first row as shown by Fig. 3. Number these nails from 1 to 19. The windings should all be of No. 22 D.C.C. wire. Start winding by fixing one end of the wire to a brad driven into the end of the wooden form. Then bring the spool end of the wire between nails 19 and 1 over to the left hand row of nails, then winding around the form go outside of nails 1 and 2 on the left hand row across to the right hand row and outside of nails 6 and 7, back to the left hand row and outside of nails 11 and 12, across to the right hand row and outside of nails 16 and 17, back to the left hand row and outside of nails 2 and 3, etc. Continue winding in this manner until ten turns have been completed for the primary winding L₁. Leave a three-inch loop for connecting the primary and start winding the secondary directly over the primary in the same manner. This winding should consist of seventy turns, being different from that required when using bakelite tubes, due to the smaller diameter of the coils.

When the windings have been completed, they

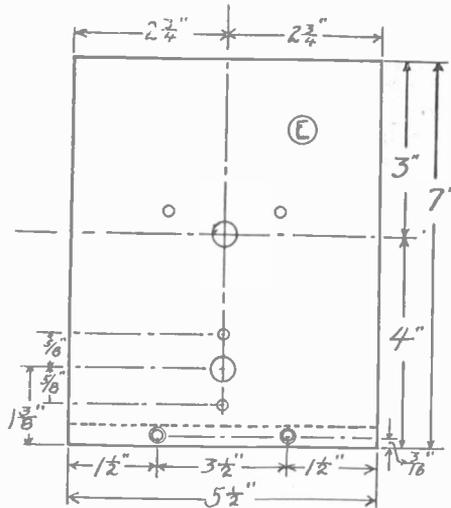


FIG. 4 (Above)

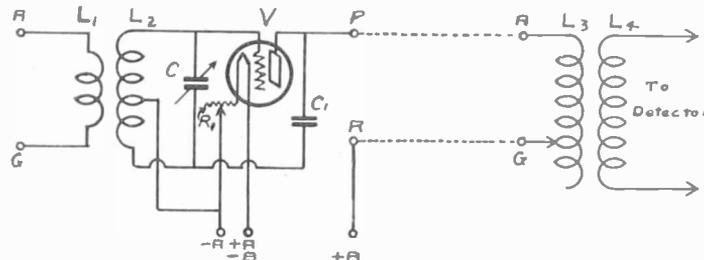


FIG. 5

THE PANEL LAYOUT of the neutrad unit, front angle, is shown in Fig. 4. Fig. 5 details a method for connecting the unit to a coupled circuit receiving set in which L₃ is the primary of the receiving set. In Fig. 6 the diagram is given for a method for connecting the unit to a coupled circuit receiving set in which the primary L₁ is tuned by means of a series condenser. Fig. 7 shows a method for connecting the Neutrad Unit to a receiving set which has an untuned primary, circuit L₁. L₁ may also be a fifteen or twenty turn winding added to the tuning coil L₂.

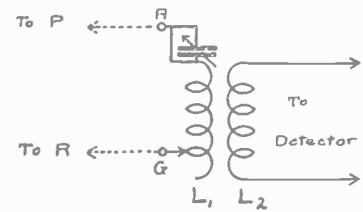


FIG. 6 (Above)

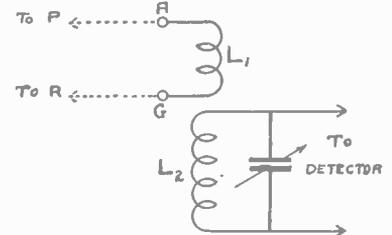


FIG. 7 (Above)

should be given a coat of white shellac such as can be purchased at any radio shop. A good shellac for this purpose can be made by dissolving some old celluloid in a 50-50 mixture of wood alcohol and banana oil. After the shellac has thoroughly dried, remove the nails and gently slide the coupler from the winding form, taking care not to disturb the wires. One method of mounting this coil is shown in Fig. 2, although an ingenious fan can probably find other ways just as satisfactory.

The plate circuit L₃ may be wound in the same manner and should have from fifty to seventy-five turns.

The front panel layout is given in Fig. 4, the dimensions corresponding to the commercial apparatus selected by the writer. If other apparatus is to be used, the mounting holes will, of course, be differently located although the pane size will remain the same.

The flexible cord G was made as previously described, using the two wires from a length of lamp cord and a yard or so of friction tape. The other apparatus can be purchased at any radio shop.

The tube to be used will depend upon the builder's choice, either the UV199 or the UV201A being satisfactory. If separate A and B batteries are to be used, the 199 will, of course, save in upkeep expenses, but if the A and B batteries of the set are to be used, the tube selected should be the same as the amplifier tubes in the set. In the previous article on the Neutrad

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Windings for Neutrad Explained

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Unit, referred to in my introductory remarks, two methods of attaching the unit to a receiving set were illustrated. Figs. 5, 6 and 7 show three more methods by which the unit may be added to a commercial receiver.

If the receiving set is of the coupled circuit type in which the primary is tuned by means of a tap switch and contains no series condenser, the Neutrad Unit may be connected directly to the antenna and ground binding posts of the set as illustrated by Fig. 5. In this case the plate circuit honeycomb coil will not be needed, the primary of the receiving set answering the same purpose.

Before making this connection and that illustrated in Fig. 6, an inspection of the set should be made to insure that the ground binding post is not connected to the filament batteries. If such a connection exists it should be broken as it would short circuit the B battery when the unit is connected.

If the primary of a coupled circuit receiver contains a series condenser, it may be short circuited as illustrated in Fig. 6 and then the Neutrad may again be connected to the antenna and ground binding posts. The correct position for the tap switch in either connection should be found by experiment after the unit has been put in operation.

If the receiver has an untuned primary circuit coupled to a secondary, this winding may be used as the plate coil of the Neutrad Unit by connecting it as illustrated in Fig. 7. In this connection the ground binding post should also be disconnected from the filament battery.

In any receiver which has a tuned grid circuit, a plate circuit winding for the Neutrad Unit may be wound directly over the receiver tuning coil and connected to the unit as illustrated in Fig. 7. This winding, L_1 , should have about fifteen or twenty turns depending upon how near it can be placed to the grid circuit coil, L_2 . By winding these few turns around the receiver tuning coil, the winding of a special plate circuit coil for the Neutrad Unit and the construction of a flexible cable may be eliminated.

Construct a calibration curve for Figs 1. and 2 of the unit. A chart of this kind is a very convenient method of logging various stations, for after a few points have been located the curve may be drawn and from the curve the condenser setting for any station may be found if its wave length is known.

To plot such a curve, a sheet of graph or cross section paper should be procured. Draw the horizontal and vertical lines and place the scale numbers as shown in Fig. 8. Locate a point for every station received. If WGY on 380 meters is received when the condenser is set at 45, place a mark where the horizontal line corresponding to 380 meters meets the vertical line corresponding to a condenser setting of 45. After some ten such points have been located a curve similar to that shown in Fig. 8 may be drawn, from which the condenser setting for any station may be found. Supposing one wishes to locate KDKA on 326 meters. Follow the horizontal line corresponding to 326 meters until it meets the curve and note which vertical line also meets the curve at this point. Follow this vertical line down to the condenser scale from which the condenser setting of 9 can be read. Thus we find that KDKA will be located by setting the Neutrad tuning condenser at 9.

By making a calibration chart for the Neutrad Unit, its addition to any receiving set will not complicate the tuning, because its setting can always be deter-

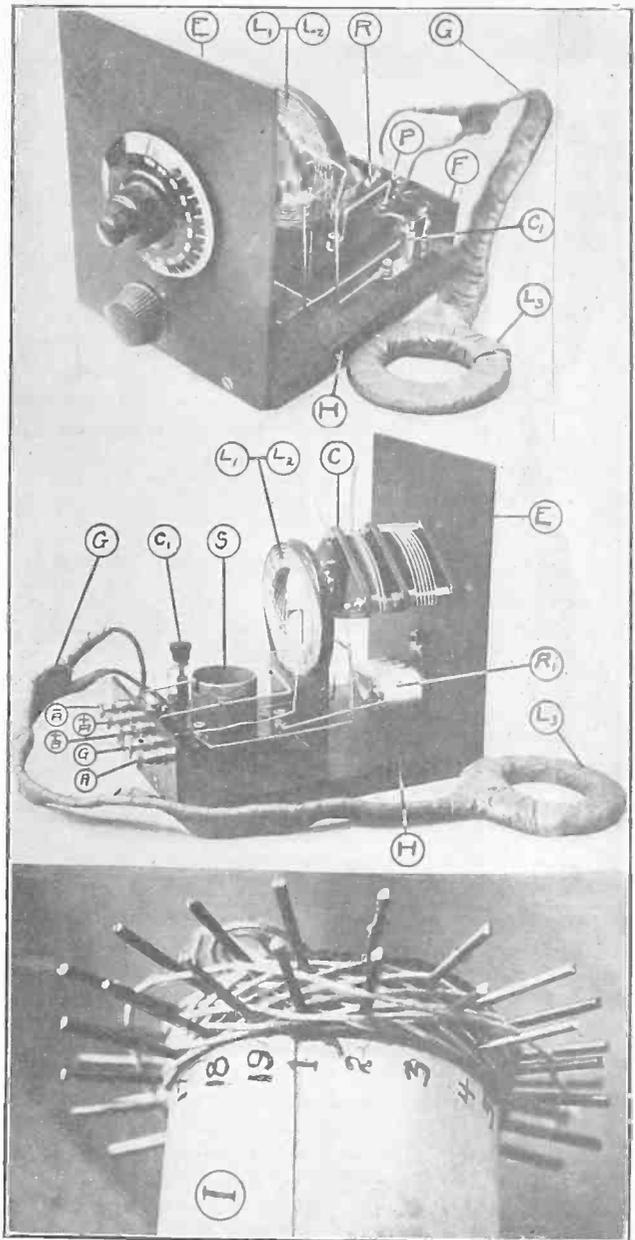


FIG. 1 (at top) shows the neutrad unit, front angle. A side view is shown in Fig. 2 (center). The method of winding the honeycomb coils is revealed in Fig. 3 (bottom).

mined for any desired station before trying to tune in that station. In addition to making a set non radiating, the Neutrad Unit has the following advantages, the writer found:

1. It will make the receiving set more selective.
2. It will decrease the amount of static and other forms of interference.
3. It will increase the receiving range of the receiver.

However, the only signals which will be increased in volume are those which were very weak previous to its installation. The Neutrad Unit should not be expected to increase the volume of local and semi-local stations.

[A full-size reproduction of the calibration curve charted by Mr. Thompson will be published in RADIO WORLD's next issue, May 10.]

Doing Away with the Outdoor Aerial

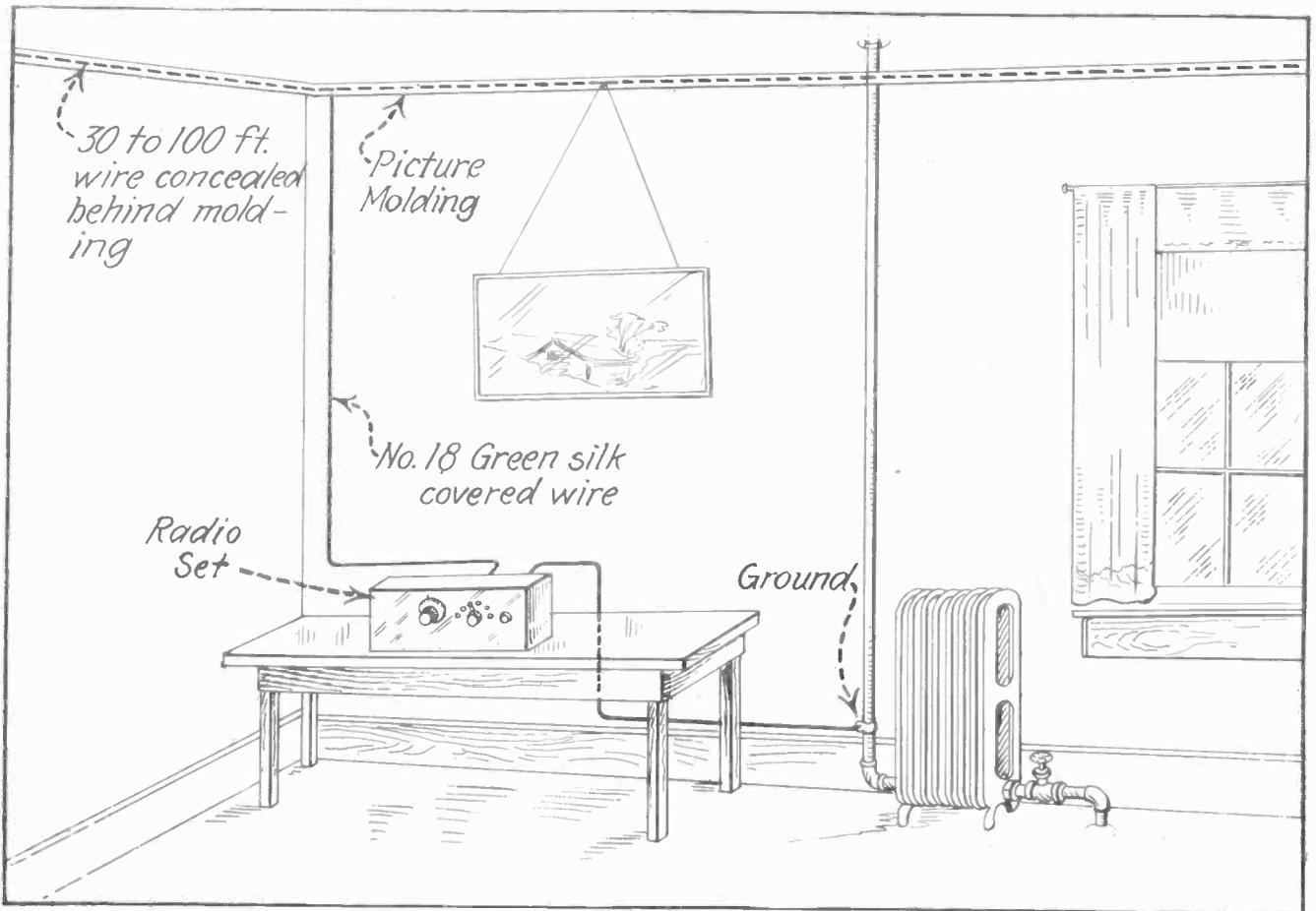


FIG. 1

HOW A CONCEALED INDOOR ANTENNA may be used is shown in the above schematic diagram (Fig. 1). The insulated wire is placed behind the molding and the radiator is used for the ground connection.

By Philip Edelman

A RADIO set can be used without outside aerial. City apartments do not always permit well-located aerials. Results from an indoor aerial will be limited to very short distance if a crystal outfit is used. A one-tube set is the minimum equipment which gives good results on the average indoor installation. With three- to six-tube sets using one, two, or more stages of radio frequency amplification, an indoor set becomes as good as the usual outside aerial outfit.

Concealed Indoor Aerial

One type of concealed indoor aerial is illustrated by Fig. 1. Insulated wire is strung behind the molding of a room, or sometimes is placed under a rug. There are several makeshift variations of this, such as using a metal bed spring, or wires strung inside of an attic.

Using Signal Wires

Signal wires from a doorbell circuit may be used as an aerial. Fig. 2 shows how a subscriber's telephone line can be safely used as an aerial when a mica condenser is inserted in series with one wire and the radio set. Such lines are likely to be noisy from interruptions in the signalling system.

Using Fire Escape

Fig. 3 indicates how a fire escape can be impressed into radio service, as an aerial. It is advisable to use

a variable condenser between the radio set and the fire escape, and the user must as a rule be content with broad tuning.

Phantom, "No-Aerial" Input

Very good results over distances may be had by using a phantom input as indicated in Fig. 4. The first tube has its grid grounded, and no aerial is used. With one, two, or more stages of radio amplification, a phantom input is very effective. There is a small

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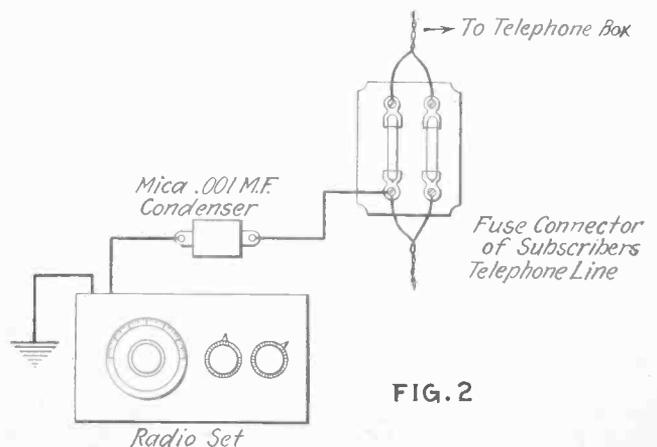


FIG. 2

EVEN the wires of a telephone circuit are an antenna (Fig. 2).

Hook-up Works Without Aerial

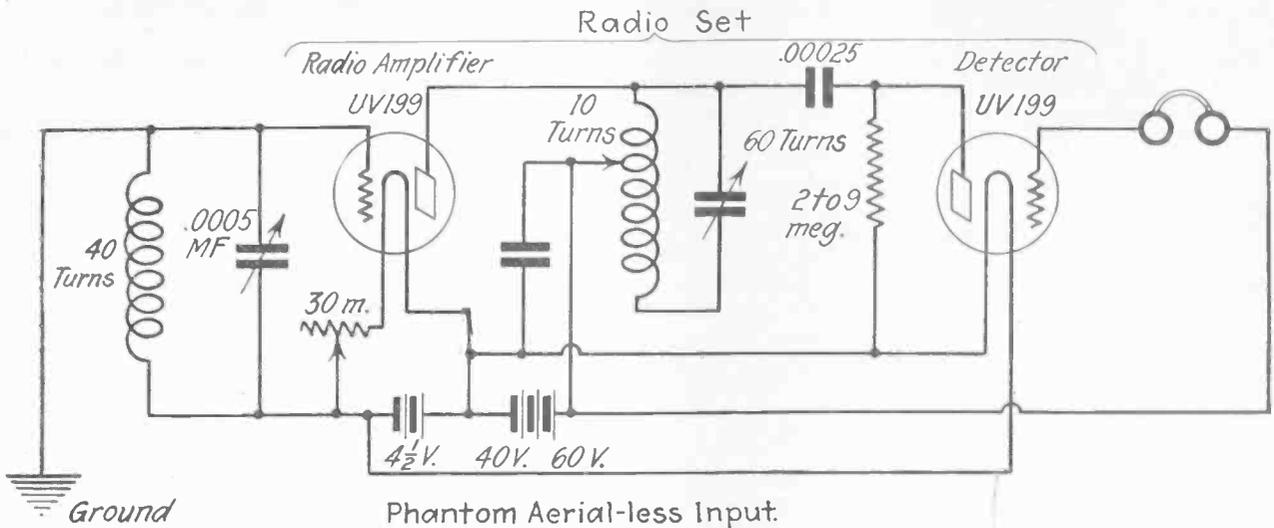


DIAGRAM OF THE PHANTOM RECEIVER that gives good results without any aerial.

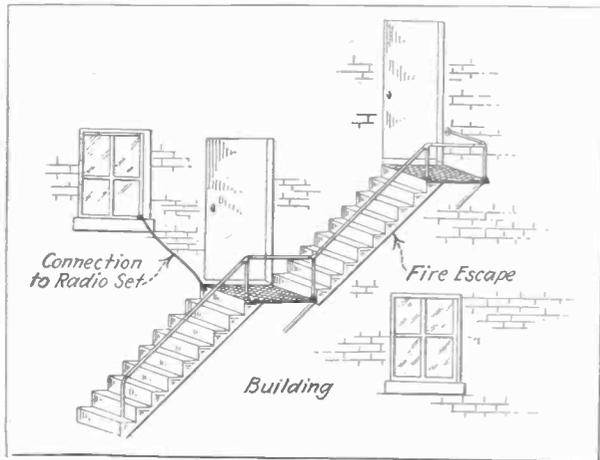


FIG. 3

THE FIRE ESCAPE can be used as an aerial, too (Fig. 3). But care should be exercised so that the wire attached to the fire escape cannot possibly interfere with any one going up or down. A good way to fasten the wire to the fire escape is to clean one of the bars with a file, and use the ordinary ground clamp on it. Where possible, the connection should be made at the farthest point from the ground.

(Continued from preceding page)

condenser effect between the radio set and its batteries with respect to the ground, and if the radio set is a regenerative type, difficulty will be found from body capacity effects in using some outfits this way. In the radio amplifier shown, only a few turns of the tuned second grid input coil are included in the plate output circuit of the first tube, to avoid self oscillation. A phantom input is ordinarily as effective as a good loop and permits sharp tuning without directional selection.

Using Short Indoor Aerial

The usual regenerative set will operate nearly as well as a one-stage radio frequency amplifier set, when a short indoor aerial is used as shown by Fig. 5, employing twenty to thirty feet of insulated wire. Sharp tuning is obtainable. One thing about indoor aerials is that they are often less subject to interference than the average outdoor aerial installation.

Socket Plugs

Various socket plugs employ two small mica condensers to insulate a lighting circuit from a radio set so that the lighting wires can be used as an antenna. This is illustrated in Fig. 6. It is effective in many (Concluded on next page)

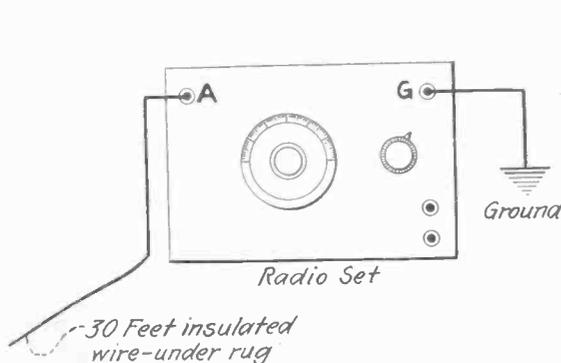


FIG. 5

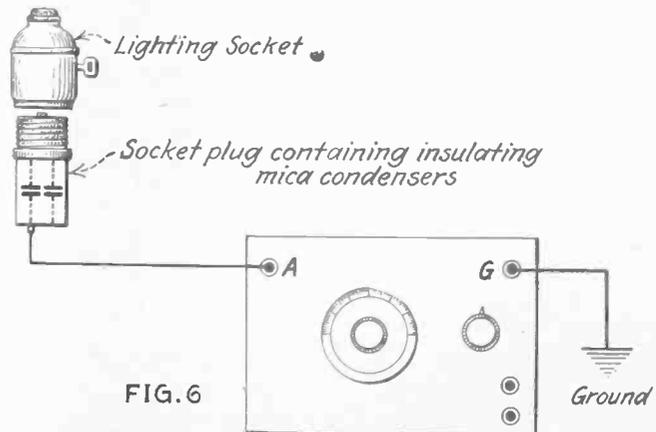


FIG. 6

USE of a short insulated wire as an indoor aerial is effective when employed as shown in Fig. 5. An insulated electric lighting circuit (Fig. 6) also has aerial possibilities.

By HUGO RIESENFELD:

Blaming Radio for Poor Attendance Only an Excuse

Director of Three Large Motion Picture Houses on Broadway

WHEN I look over our records I find that since the advent of broadcasting our attendance has not been affected. During the last few years the pictures have more than doubled their scope. By that I do not mean that our attendance has been doubled, but the more people in general are attending the pictures.

If you visit the opera regularly, you will find that it is the same group of people who attend consistently. The same is true about the concerts. The same faces are always present. With the pictures it is different. New people are attending daily.

While our attendance has not been decreased, and even though more people than ever are attending the motion picture theatres, I feel that if radio had not come into popularity still more people than now would be drawn to the film houses.

When I compare the attendance records during the showing of an exceptionally good picture now with the attendance records of good pictures before radio had its vogue, I find that the results are very favorable. Of course, when we have a poor picture and our atten-

dance falls off, we usually blame it on the weather or any number of things. Now, as an excuse, we can blame it on the radio.

I think the time is not far off when, in an educational respect, radio and the motion picture will co-operate. A lecture by some prominent speaker will be broadcast from a certain city and pictures describing this lecture will be shown simultaneously in motion picture houses in different cities throughout the country. Already experts are experimenting in this direction, and I have seen some of the preliminary results in Paris.

Taken at Her Word

ON April 2 Tamaki Miura, Japanese opera singer, actuated the microphone of station KYW, Chicago. Her voice was heard as far west as Hawaii. She promised every listener who acknowledged reception of the program that she would send an autographed photograph, and up to the present time 10,000 letters have been received.

Aerial Possibilities

(Concluded from preceding page)

localities and very poor in a few instances, or in exceptional cases will not work at all. At best, reception is likely to be bothered from power circuit switching noises. Sometimes this plan works as well as or better than an outside aerial.

Loop

Loops and their directional ability are now well known. A loop gets a very much smaller portion of incoming radio energy than does an aerial. It affords directional selection because it receives best in line with the sending station and not at all when turned at right angles thereto.

Usually loops are used with two or more stages of radio frequency ahead of the receiving set's detector. For relatively short distances, even one tube can be used. Fig. 7 shows how a loop can be connected to the usual receiving set. The loop condenser will sometimes be in series as shown or in other sets may need to be connected in parallel as indicated by Fig. 8. If

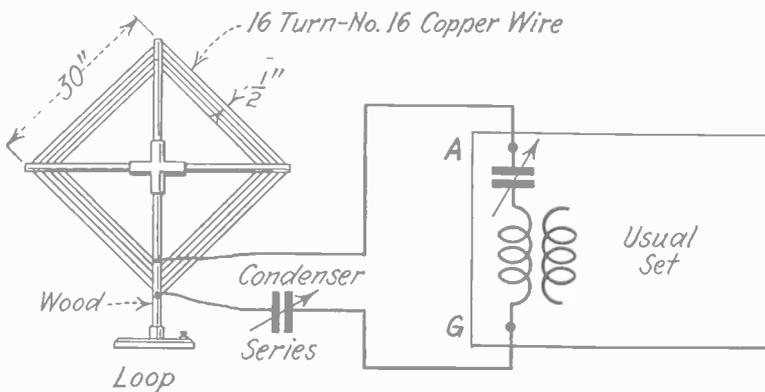


FIG. 7

HOW TO CORRECT a loop in series (Fig. 7) and in parallel (Fig. 8).

one side of the loop is grounded as shown by Fig. 8, the directional effect is ordinarily lost, but when the grounding is done on the grid side, increased signal volume results from phantom input action as was shown by Fig. 4. A loop is not needed to cut out local stations if the set itself is sufficiently selective, but where directions permit, even a fairly poor set as regards tuning selectivity, will permit working through locals with the aid of loop pointing.

Other Methods

Some sensitive sets will work without aerial or ground connection because the coils included in the set pick up sufficient energy for operation. Other sets will operate without either the ground or the aerial connection, using the ground wire on the terminal labelled for use of aerial. Often two-circuit sets will do this, as operating energy is transferred from the grounded primary winding to the tuned grid input circuit.

Where an aerial is out of the question as an outside installation, the indoor methods can be tried, and often the results will be very satisfactory. Distance is obtainable by the indoor methods.

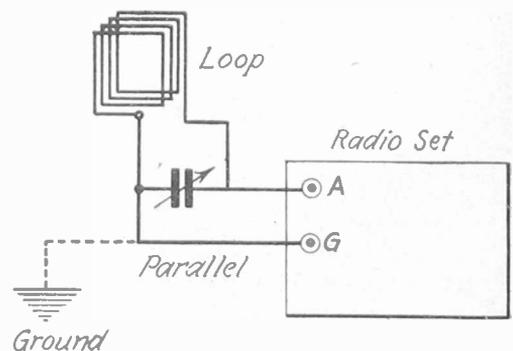


FIG. 8

Radio Antenna Makes a House Safe

By *N. N. Bernstein*

Technical Editor

THE best possible means of protection from static electricity when it comes in an extra heavy charge is an outdoor radio antenna, properly grounded by a switch or furnished with an approved lightning arrester. In reality, the aerial is a lightning rod and, properly equipped, affords protection instead of being a source of anxiety.

Static, or electricity in the air, is formed by the action of the elements. This electricity collects in the air, but not necessarily in clouds or vapor that can be seen. It endeavors to dispose of itself to the ground or earth through anything that is a conductor, such as trees, wire fences, piping in buildings, lightning rods, and radio aerials.

It is a fact that electricity will take the course of least resistance. A high resistance lead to the ground, such as a tree or unequipped building, will not readily carry the charge, therefore enough electricity must accumulate to force itself through the high resistance of the earth. If a tree were properly equipped with conductors running from every limb to the ground, the electricity would not have a chance to accumulate, therefore a heavy static discharge would be impossible.

In the city the same rule applies. It is a remarkable fact that there is hardly any record of lightning having ever struck a building in a very congested district, due probably to the large amount of metal that goes into the construction of the buildings and which acts as a ground lead for all the static in the vicinity.

Radio antennae function in exactly the same way. For instance, take a house in New York City. You may see from one to fifteen aerials strung in all directions over the roof. These wires pass the electricity in the air directly to the ground, either through the

receiving set or through the lightning arrester. This action is kept up all the time. During precipitation, that is when rain, hail or snow is falling, loud crackling noises are sometimes heard when the radio set is in operation. These noises are due to the static discharges collected by the antenna and passed to the ground through your set.

Thus it is easily seen that you have the best protection in the world when you have a radio antenna strung up in your house. **BUT** some aerials are put up regardless of fire department regulations and city ordinances.

A few of the simple rules that are often disregarded are:

- (1) Antenna wires must not cross above or below high voltage feed wires, and must never be fastened to any pole carrying any kind of service wires.
- (2) On roofs, aerial wires must be more than six feet above the surface, and the lead-in wires should be run at least one foot away from the side of the building and never touch it.
- (3) Radio antennae should never cross streets.
- (4) Every antenna should be equipped either with a ground switch of the proper capacity, or with an approved lightning arrester, properly placed.

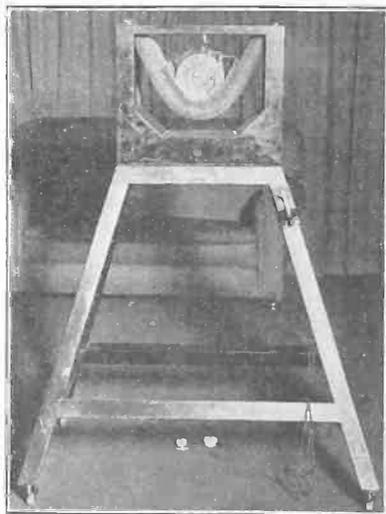
Common sense will tell you that it is dangerous to place wires near high voltage lines. In a high wind, the antenna is likely to break loose and swing against the feed wires, causing a short circuit. Wires should be kept at least six feet above the roofs.

Another important consideration is to take down a discarded antenna. It is sheer negligence even to leave it so that the wire may dangle.

Oddities Recorded by the Lens



(Kadel & Herbert)
EASTER WEEK was made the more enjoyable at the home of Martin Foster, 12-year-old Cincinnati schoolboy, by reason of a crystal set which he rigged up in a toy rabbit.



(Kadel & Herbert)
UNUSUAL to the American eye is a microphone of this sort, the very one used at Station 2LO, London. You may have heard of 2LO as the station tuned in nightly by the crystal-set owners of the United States (maybe). The microphone is mounted on a soft, shock-absorbing hammock, which prevents extraneous noises.



(Foto Topics)

ALTHOUGH it is hard to develop a novelty in the line of a "smallest crystal set," Harry Friedenberg has succeeded in proving to the satisfaction of his friends that he can make a workable one, using his favorite pipe. You will notice from the photo that circumstances compel him to use the brier instead of the hard rubber for insulation, although this is contrary to the best principles of radio. Harry was able to tune in the local stations and could tell about tuning in DX ones. The cat-whisker is mounted in front of the bowl, with a binding post cap for insulating purposes. Both the aerial connection and ground return are on the same side of the pipe. The set consists of nothing more than what you see in the picture.

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MAY 3, 1924

The Catch In Opposition to Kill Copyright Bill

WHEN Victor Herbert, John Philip Sousa, Irving Berlin, Harry von Tilzer, Charles K. Harris, Gene Buck, William Jerome and Raymond Hubbell appeared recently before the Senate Patents Committee against the Dill bill, which would permit the broadcasting of copyrighted compositions without payment to the composers or publishers, they declared that radio had cut into royalties to a disastrous degree during the past year and that sales of sheet music had dropped off greatly. They failed, however, to add that composers had been grumbling for years over the drop in their royalties and that the music publishing business had been on the ragged edge for four or five years. Many music publishing concerns have gone out of business, and the remaining ones declare that there is no money in music publishing. And broadcasting was not a factor even three years ago. Give more facts, gentlemen—all the facts!

Boy Signals Arctic With \$60 Set



(Radio World)

"HAY-WIRE OUTFIT" is what Everett Sutton (above) calls the set with which he signalled the MacMillan arctic expedition. He wound the coupler on pancake flour cartons and uses his mother's washline as a counterpoise—except on Mondays.

By P. M. Fogg

AT midnight, February 15, the MacMillan Arctic exploring expedition, frozen in the ice at Refuge Harbor, North Greenland, picked up and answered a CQ signal, broadcast by Everett Sutton, fifteen-year-old school boy of Port Angeles, State of Washington, and thus, for the time being, re-established communication with the world after an interruption of many weeks.

"Hay-Wire Outfit"

Sutton, whose five-watt set he declares is only a "hay-wire outfit," had frequently heard the Bowdoin, MacMillan's vessel, but he had no idea that with his equipment he could reach across the 3,000 miles intervening between his home and the location of the exploring party. Shortly after broadcasting his CQ,

he was surprised to hear the Bowdoin calling him, and to find that he could work the vessel with ease. In fact, Donald Mix, the operator, reported that the signals came in like blows of a trip-hammer, and every one in the cabin could hear them. Mix also stated that he had been able to detect the signals from Amundsen's ship, the Maude, as she broadcast to Spitzbergen from the opposite coast of Greenland, but that she failed to reply to his.

He Got 3,000 Words

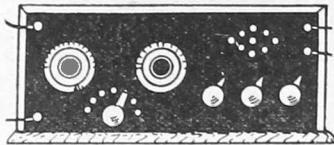
Continuous communication with the Bowdoin was maintained until five o'clock on the morning of February 16, and during that time Sutton received messages totalling 3,000 words, for relaying to the press and to private individuals, including Captain MacMillan's family, who had not heard from him since Christmas. Congratulations afterwards poured in upon the boy from many sources.

He disclaims any especial credit, however, and modestly describes his \$60 set as "not worth looking at." Nevertheless on this particular occasion it performed with a precision which many radio fans all over America would gladly have witnessed in their costly outfits. Winnipeg, at a distance of 1,300 miles, was as far east as he had operated successfully prior to this.

Did It Himself

Sutton assembled the sending and receiving sets himself, the parts having been purchased, except for the variocoupler, which he wrapped on pancake flour cartons. The receiving set consists of a detector and one step of amplification, and for a counterpoise he uses his mother's clothes line, except on Mondays, when he disconnects it. One week after he had worked the Bowdoin, he had her again. But this time it was only for a short period.

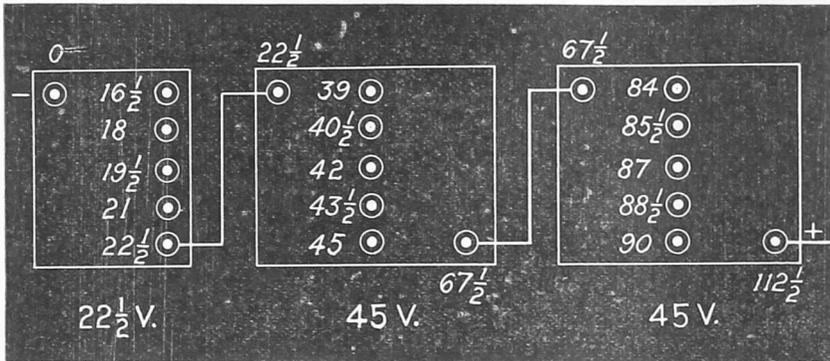
The boy was reared in an atmosphere of telegraphy. His father and his mother are both experts, and his aunt was the first woman in the United States to obtain a radio license. However, Everett evinced no particular desire to acquire skill in this art until his interest in radio was stirred. Then he procured a key from his father and without instructions soon mastered the Morse and the international codes. He too is now an expert in handling both.



The Radio Primer

Information and Instruction for the Beginner

How to Connect B Batteries



CONNECTION of B batteries in series is shown in Fig. 1 (above). The minus posts after the one on the first battery (at left) are converted into plus. The voltage range is indicated by the numerals at the posts.

By Herman Bernard

IF you would use more than one B battery you can connect them together so as to obtain the sum total of the maximum voltages of each of the batteries and at the same time derive the advantage of optional intermediate voltages.

The 22½-volt B battery is used to supply the plate current to the detector tube of any circuit using either one and one-half volt dry-cell A batteries or six-volt storage A batteries.

One terminal of the B battery is marked minus and usually is the pole which is all by itself on one side of the battery.

You have a selection of five different voltages on this one B battery, as shown in the accompanying diagram (Fig. 1). These optional voltages are 16½, 18, 19½, 21 and 22½ volts.

The reason for the battery affording different voltages is that different tubes function best at varying plate voltages. In fact, even the same make of tube, such as the WD12 and UV199, do not all function best at 22½ volts plate voltage. It is seldom that a tube functions at its best when 16½ volts are used. Some tubes, like the UV200, are very critical as to plate voltage and although functioning excellently as a detector at, say, 21 volts, may not work at all at 22½.

The voltages beyond 22½ are used to supply the plate current to the amplifying tubes which step up the signal strength to operate the loud speaker. Also the voltages beyond 22½ are used in the detector when a tube primarily designed for amplifying work is put in the detector circuit in an emergency or when experimenting. Sometimes an amplifying tube, like UV201A, proves highly efficient as a detector.

The desirability of having a large range of optional voltages therefore is apparent.

Besides the 22½-volt B batteries, which all tube sets must have, there are usually two extra B batteries for the amplifying tubes, and these batteries are commonly 45½ volts each. The battery is rated by its maxi-

mum voltage. So, although such battery is referred to as a 45-volt battery, it, too, affords an option as to voltages, as follows: 16½, 18, 19½, 21, 22½ and 45.

The figures shown in the center battery of the diagram do not indicate the actual figures which appear on the battery itself, because the 22½ of the first battery (at left) is connected to the minus post of the center battery. This is known as connecting the batteries in series and makes the voltages cumulative. Therefore the voltage in the first battery is added to the voltage of any given post in the second battery. Thus the 22½-volt post of the first battery is added to the 16½ on the second battery, giving 39 volts in all for the first effective post of the second battery.

The same procedure is followed in connecting the third battery, which alone has a maximum voltage of 45. The maximum voltage obtainable from the three batteries is the sum total of the maximum voltage of each battery, or 22½ plus 45 plus 45; total, 112½ volts.

Although each battery has a minus post and several plus posts, when batteries are connected in series only one of the terminals is minus and all the others are plus. It will be noted that where the connection is made between the maximum voltage of one battery to what would ordinarily be the minus post in the next battery, this theoretical minus is now actually a plus and of the same voltage as the maximum voltage of the preceding battery or batteries.

In connecting the B batteries to the amplifying tubes it is sometimes advisable to have a higher voltage delivered to the plate of the third tube (second audio-frequency) than to the second tube (first amplifier).

If this proves desirable, the lower and the higher voltages can both be tapped from the series-connected B batteries.

Likewise the current for the plate of the detector tube can be tapped from the same series-connected batteries.

Although the function of the A battery is to heat the filament in the tube so that the filament can throw off electrons, and the

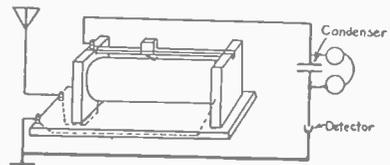
Simple Crystal Set

PERHAPS the most simple and inexpensive radio receiver possible is the old tuning coil crystal set, which when used with a fairly long antenna (about 100 feet) gives good results on local stations. The parts needed are:

- 100 feet antenna wire.
- 50 feet lead-in wire.
- 25 feet ground wire.
- 2 antenna insulators and 1 lead-in insulator.
- Ground clamp.
- 1 single-slide tuning coil.
- 1 good crystal detector.
- 1 good pair ear-phones.
- 1 .002 fixed condenser.

For the benefit of those beginners in radio who do not understand the diagrams as yet, the wiring is explained in detail.

The end of the lead-in wire that comes



TUNING COIL CRYSTAL SET shown in schematic diagram. The aerial is designated at left, top; the ground at left, bottom.

from the antenna is fastened to one binding post on the tuning coil, the ground wire going to the other post. A second wire is connected to the ground binding post to one post on the crystal detector. A wire from the other post on the detector is fastened both to one side of the fixed condenser and one of the telephone cord tips. The other tip and the other side of the fixed condenser are connected to the binding post on the slider rod of the tuning coil and the circuit is complete. The only adjustment in tuning in stations is made by sliding the knob on the rod back and forth until the loudest signal is obtained. The tuning coil can be bought cheaply.

Beginners' Dictionary

MICROFARAD—One-millionth of a farad. The commonly used unit of capacity.

RECTIFIER—An apparatus for changing alternating current to direct current as in a storage battery charger.

290 Stations in Russia

THERE are some 290 radio stations in Russia, Moscow being the center with three very powerful broadcasting and telegraphic sets. One is Shabalovk, (RAJ) called Mossoviet; with a power of 150 kw.; the central radiophone station, called Comintern, and the old station of Kodinsk (RAI) now called October.

great precaution is to prevent delivering the high B battery voltage into the filament which takes a low voltage, it is all right to connect the A minus with the B minus. Thus employing a common minus lead does not make a filament circuit.

Although connecting the A minus to the B minus does not injure the filament, if the B plus also were connected (to the plus of the filament) the tube would burn out and become useless, because the filament is very delicate, and excessive voltage would incinerate it instantaneously. When the filament is thus destroyed, a bright blue or white flame is visible within the tube for a fraction of a second.

Snodgrass Leads in Popularity

WOS Pianist Takes First Place Away from Roxy, of WEA, as Radio World's Test for the Most Popular Entertainer Goes Merrily On—Leader Has 383, a Margin of 61—Old-Time Fiddlers, of WOS, Third—Dody Reimer, of WLAG, Jumps from Twenty-second to Seventh Place.

HARRY M. SNODGRASS, of WOS, entertainer, known as "King of the Ivories," has snatched the lead from Roxy, of WEA, by 61 votes in RADIO WORLD's "election" to determine the most popular broadcast entertainer. Snodgrass has 383 votes, Roxy 322.

The Old-Time Fiddlers, of WOS, are going strong in third place, being 16 votes ahead of KDKA's Little Symphony Orchestra. Wendell Hall, the red-headed music maker, now on tour, jumped from ninth to sixth place, and is making a strong fight.

Perhaps the most remarkable increase is credited to Miss Dody Reimer, of WLAG, who made a meteoric rise from twenty-second position to seventh. A new performer, Harry Richman, of WHN, has been entered on the lists.

It is up to RADIO WORLD readers all over the country to show appreciation in this way of the delightful entertainment broadcasters give, and this can be done effectively by balloting on your favorite. It's only a minute's work to clip the coupon printed on one of RADIO WORLD's program pages, and mail it to Broadcasting Manager, RADIO WORLD, 1493 Broadway, New York City.

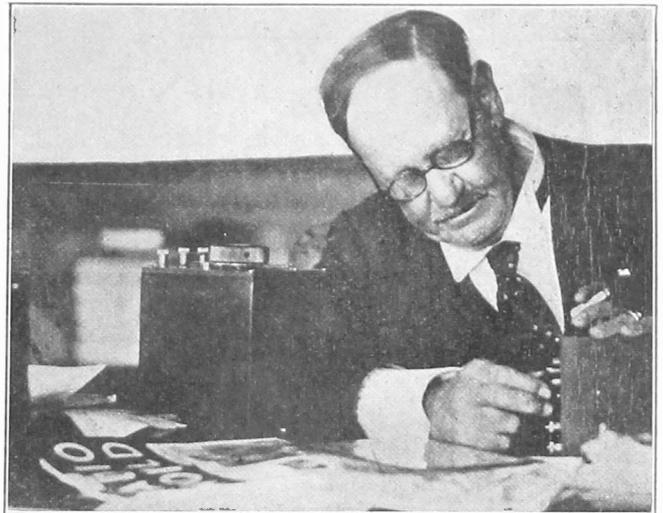
Already three tally sheets have been published. The accompanying one is the fourth. The fifth will be completed soon and published immediately thereafter.

Come on folks, show these people who are striving to make you happy that you like them, and do it NOW!

THE TALLY:

H. M. Snodgrass	WOS	Jefferson City, Mo....	383
Roxy	WEAF	New York.....	322
Old Time Fiddlers	WOS	Jefferson City, Mo....	218
Little Symphony Orch.	KDKA	Pittsburgh, Pa.	202
Thornton Fischer	WEAF	New York.....	200
Wendell Hall	KYW	Chicago.....	189
Dody Reimer	WLAG	Minneapolis, Minn.	188
Vincent Lopez	WEAF	New York.....	177
Jerry Sullivan	WDAP	Chicago.....	162
Cafe Boulevard Orch..	WJZ	New York.....	160
The Harmony Girls	WDAP	Chicago.....	152
Jack Nelson	WDAP	Chicago.....	144
McDowell Sisters	WFAA	Dallas, Texas.....	144
Henry Field	WOAIV	Omaha, Neb.....	140
Night Hawks Frolic	WDAF	Kansas City, Mo.....	133
Jack Chapman	WDAP	Chicago.....	121
E. H. Smith	WGY	Schenectady, N. Y.....	117
Howard Lannin	WDAR	Philadelphia.....	115
Alabama Club Orch.	WHN	New York.....	112
The Hired Hand	WBAP	Fort Worth, Texas.....	100
Little Orchestra	WGY	Schenectady, N. Y.....	98
Ernie Rogers	WSB	Atlanta, Ga.....	83
Bob Miller	WMC	Memphis, Tenn.....	83
Desert Orchestra	KZN	Salt Lake City, Utah..	77
The Hawaiians	WFAA	Dallas, Texas.....	71
Coon Sander's Orch.	WDAF	Kansas City, Mo.....	70
Mary Vogt	WOO	Philadelphia.....	52
Prison Band	WOS	Jefferson City, Mo....	52
The Hotel Astor Band	WJZ	New York.....	39
Dr. Cadman	WEAF	New York.....	28
A. E. Sonn	WOR	Newark, N. J.....	25
Eveready Battery Orch.	WEAF	New York.....	25
Uncle John	KHJ	Los Angeles, Calif....	24
Happiness Boys	WEAF	New York.....	23
KGO Players	KGO	Oakland, Calif.....	14
Sweeney Radio Orch.	WHB	Kansas City, Mo.....	14
Dance Orchestra	WCAM	Villanova, Pa.....	10
Harry Richman	WHN	New York.....	6

Millionaire's Hobby



SON of Hetty Green and heir not only to the fortune she left but to many of her great talents, Col. Green is one of the most enthusiastic radio hobbyists in New England. He is shown making a set from a diagram of RADIO WORLD, which is in front of him. He looks at a diagram, closes the book and goes ahead. His own station is WMAF, South Dartmouth, Mass.

New Broadcasters

LIST OF CLASS "A" BROADCASTING STATIONS

Station		Frequency Kcys.	Wave Length Meters	Power Watts
KFPO	Clifford M. Esler, Denison, Texas.....	1300	231	10
KFPR	Los Angeles Co., Forestry Dept., Los Angeles, Calif.....	1300	231	500
KFPS	Carter A. Ross Motor Service Co., Casper, Wyo.....	1240	242	10
KFPV	Helntz & Kohlmoos, Inc., San Francisco, Calif.....	1270	236	50
KFPW	St. Johns M. E. Church, S. Carterville, Mo.....	1120	268	20
WABB	Harrisburg Sporting Goods Co., Harrisburg, Pa.....	1130	266	10
WCBT	Clark University, Collegiate Dept., Worcester, Mass.....	1260	238	250
WCBU	Arnold Wireless Supply Co., Arnold, Pa.	1180	254	50
WCBV	Tallahoma Radio Club, Tallahoma, Tenn.	1190	252	10
WEAR	The Evening News Publishing Co., Baltimore, Md.....	1150	261	50
WIAY	Woodward & Lothrop, Washington, D. C.....	1100	273	100
NEW CLASS "B" STATIONS				
WHO	Bankers Life Company, Des Moines, Iowa	570	526	500
WLS	Sears, Roebuck & Company.....	870	345	500
TRANSFERRED CLASS "C" TO CLASS "A"				
KFRE	Reuben H. Hern, San Luis Obispo, Calif.	1240	242	50
KFDH	University of Arizona, Tucson, Ariz.....	1120	268	50
WIAS	Home Electric Co., Burlington, Iowa..	1060	283	100

An Opportunity

RADIO dealers, attention!
Cash in on the fact that every family that owns a radio set can "sit in" on all the baseball games everywhere and on the Democratic National Convention in New York City, and the Republican National Convention in Cleveland.

Tell your customers through newspapers, circulars, and word of mouth, that they can participate in all these important events, as well as the regular broadcasting program, by merely owning a radio set.

Here is great, honest and effective propaganda that you should keep on broadcasting day in and day out during the coming spring and summer season.

The Radio Woman

*Her Activities In
Science and Art*

Women Inspect Bulbs at U. S. Laboratory

By S. R. Winters

WASHINGTON.

THE Radio Communication Section of the Bureau of Standards, United States Department of Commerce, maintains a laboratory for testing vacuum tubes, in which women do an important part of the inspection work. The behavior of different types of "Aladdin lamps" is observed by women and the performance in actual service determined.

How long is the life of various types of vacuum tubes? What is the power rating of power electron tubes? What is the effect of regeneration in radio receiving units? How can you avoid radiation from regenerative circuits? These are among the questions asked and problems attacked in the Radio Laboratory of the Bureau of Standards.

C. B. Jolliffe, a member of the staff of the Radio Laboratory, said:

"It was found that the amplifications due to regeneration decreases with the increase of signal strength and that the effect of regeneration is not strictly equivalent to a negative resistance for different values of current in the circuit."

This study also contemplates an analysis of different ways proposed for preventing radiation from regenerative receiving circuits. This form of interference is annoying, to say the least, and has brought derision upon this type of radio receiver.

Her First Play Wins First Prize of \$500

By The Hostess

FIRST PRIZE in the Radio Drama Competition conducted by WGY, the Schenectady Broadcasting Station of the General Electric Company, has been awarded to Miss Agnes Miller, of 150 East Seventy-second Street, New York City, for her comedy drama of business life, entitled "A Million Casks of Pronto."

The object of the competition was to develop a type of play especially adapted to radio presentation; a type of play that will tell its story through an appeal to the ear and imagination just as the screen play is directed exclusively to the eye. Miss Miller's play was selected from nearly three hundred manuscripts as the best original drama submitted and she will receive a cash prize of \$500.

Miss Miller is a native of New York. She was graduated from Barnard College and later received her master's degree in comparative literature from Columbia University. For eighteen months, during the war, she served with the United States Naval Reserve on foreign language censorship. Some of her experiences in this work furnished the ground work for her successful radio play.

Miss Miller is a writer of juvenile fiction and has published three books in a series known as "The Lin-



(Bureau of Standards)

VACUUM TESTS LABORATORY of the Bureau of Standards, where women play an important part in the inspectional work (above).



(General Electric)

AGNES MILLER, who won first prize, \$500, with the first play she ever wrote. The prize was awarded in a contest conducted by WGY, which will broadcast the play, "A Million Casks of Pronto."

ger-Nots." The books are "Golden Quest," "Valley Feud" and "Mystery House." She has also contributed many stories to Young People's Magazine.

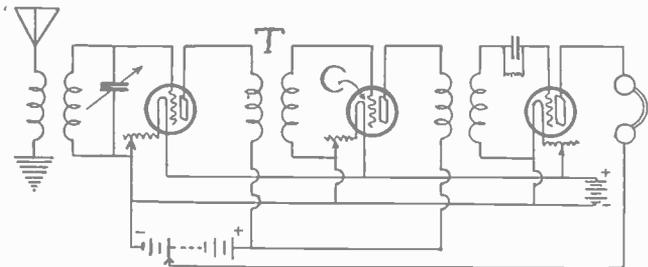
"This is the first play I have written," said Miss Miller. "I have never taken any courses in dramatic writing, but my profession is writing. Until now I have been writing books for young girls such as the 'Linger-Not' series.

"The play is the result of the experience I gained in commercial life when I served, during the war, with the United States Naval Reserve in a foreign language censorship unit in Broad Street. I was then able to observe the humorous side of 'big business.'"

The successful play will be presented by the WGY Players at a date to be announced later.

Additional prizes will be offered for several other manuscripts which the judges have deemed worthy of production on the air. Announcement of these prizes will be made later.

Here's What the Super-Heterodyne Is



TWO-STAGE RF AMPLIFIER, with detector. The secondary voltage of the transformer T is impressed across the condenser C (Fig. 1).

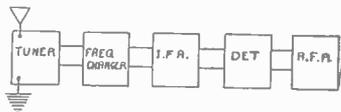
By Walt S. Thompson, Jr.

THE origin of the Super-Heterodyne was in France when Major E. H. Armstrong, then with the Signal Corps of the United States Army, was trying to develop a sensitive receiver which would work efficiently on low wave lengths.

It was soon found that the ordinary type of radio frequency amplifier was very inefficient on the wave lengths with which they were working, that is, between 130 and 400 meters.

The reason for this inefficiency is due, in part, to the fact that the electrodes of the available vacuum tubes act as the plates of a small condenser across which the signal voltage is impressed. Referring to Fig. 1, which shows a two stage radio frequency amplifier with a detector, it is evident that the secondary voltage of the radio frequency transformer T is impressed across the condenser C, the plates of which are the grid and the filament of the second tube. As the impedance of this condenser may be as low as 2,000 ohms at a wave length of 200 meters, it is evident that the voltage across it will be very small as compared to that which exists when the wave length being received is 10,000 meters and the impedance 100,000 ohms. Thus it can be seen that the capacitance between the grid and the filament acts as a short circuit across the secondary terminals of a radio frequency transformer when very low wave lengths are being received.

The remedy for this condition has already been suggested. Let us change the frequency of the incoming wave so that its wave length will be 10,000 meters instead of 200 meters. This is the principle upon which the super-heterodyne was developed and it

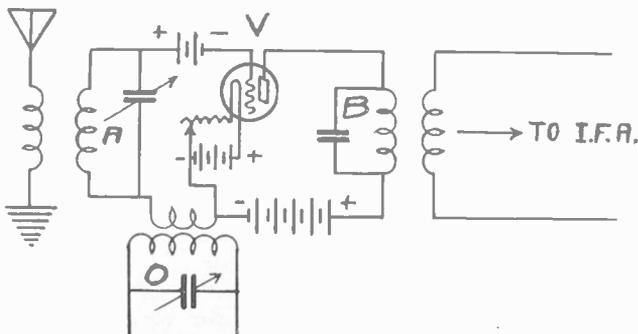


PRINCIPLE on which the super-heterodyne was developed. The tuner is adjusted to the incoming wave. The output goes to the frequency changer (Fig. 2).

is illustrated by Fig. 2. The tuner is adjusted to the wave length of the incoming wave and its output goes to the frequency changer as indicated.

In the frequency or wave length changer the wave length is changed from that which is being received, say 200 meters, up to a higher wave length such as 10,000 meters, after which the signal is amplified at this new wave length by the intermediate frequency amplifier and is then detected and again amplified by the audio frequency amplifier.

As the next logical step, let us inquire into the operation of the frequency changer. Fig. 3 will be used to illustrate the principle of this part of the Super-Heterodyne. Fig. 3 shows a vacuum tube, V, connected as a detector and having a tuned grid circuit A and a tuned plate circuit B and having the circuit O coupled to its grid

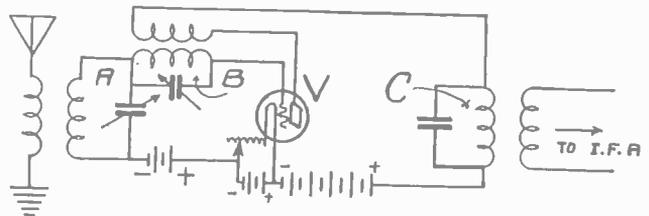


THIS TUBE is used as detector, a combination of two frequencies being impressed across the grid filament of the tube V (Fig. 3)

circuit. Let us assume that the circuit A is tuned to an incoming wave at 200 meters or 1,500 kilocycles per second and that the circuit O is connected to an oscillator having a frequency of 1,470 kilocycles. We then have a combination of two frequencies impressed across the grid-filament of the tube V. It can be shown experimentally as well as mathematically that in the plate circuit of the tube V there will be found a current having a frequency equal to the difference of the two frequencies found in the grid circuit, that is, 1,500-1,470 or 30 kilocycles. Circuit B is permanently tuned to this frequency and the secondary of the transformer, of which circuit B is the primary, is connected to the intermediate frequency amplifier where the signals are amplified at this frequency which corresponds to a wave length of 10,000 meters.

In tuning the Super-Heterodyne, the operator tunes the circuit A to the frequency of the desired signal and then tunes Circuit O until its frequency differs from that of the signal by 30 kilocycles. As the circuit B remains unchanged, it can be seen that until the above condition has been established no energy will get into the intermediate frequency amplifier. In Fig. 3 and in those which follow, the antenna and the coupler may be replaced by a loop.

As the oscillator to which the circuit O is usually connected is another vacuum tube, it is evident that a frequency changer of this type requires two vacuum tubes. As this seems wasteful of tubes, many efforts have been made to design a frequency changer making use of only one tube. As it is a well known fact that a detector tube will oscillate as first attempted as is illustrated in Fig. 4. The vacuum tube V was connected as an oscillator by inductively coupling the plate circuit to the grid circuit, the frequency of the oscillatory current being adjusted by tuning the circuit B. The idea here is to tune the circuit A to the incoming signal wave, say 1,500 kilocycles and the circuit B to 1,470 kilocycles giving the required difference frequency of 30 kilocycles



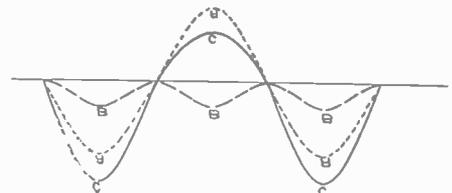
IN SEARCHING for a frequency changer, this plan was hit upon at first. But it presented difficulties (Fig. 4).

to which the circuit C and the intermediate frequency amplifier are tuned. On paper this seems to be a very fine development, but due to the fact that circuits A and B are tuned to so nearly the same frequency, they react one upon the other and spoil the operation of the frequency changer.

This difficulty was overcome by a most ingenious scheme. It is well known that the oscillatory current flowing in the vacuum tube circuits is very seldom a pure sine wave and that there is present in these circuits a wave which has a frequency twice that to which the circuits are tuned. This condition is illustrated by Fig. 5 which is a graphical representation of this oscillatory current and its components. Curve A represents a pure wave which is called the fundamental, the frequency of which is that to which the vacuum tube circuits are tuned. Curve B represents the second harmonic which has a frequency double that of the fundamental. These two waves when added give the true oscillatory current wave C, which is found in the circuit B of Fig. 4.

Now again assuming that circuit A in Fig. 4 to be tuned to

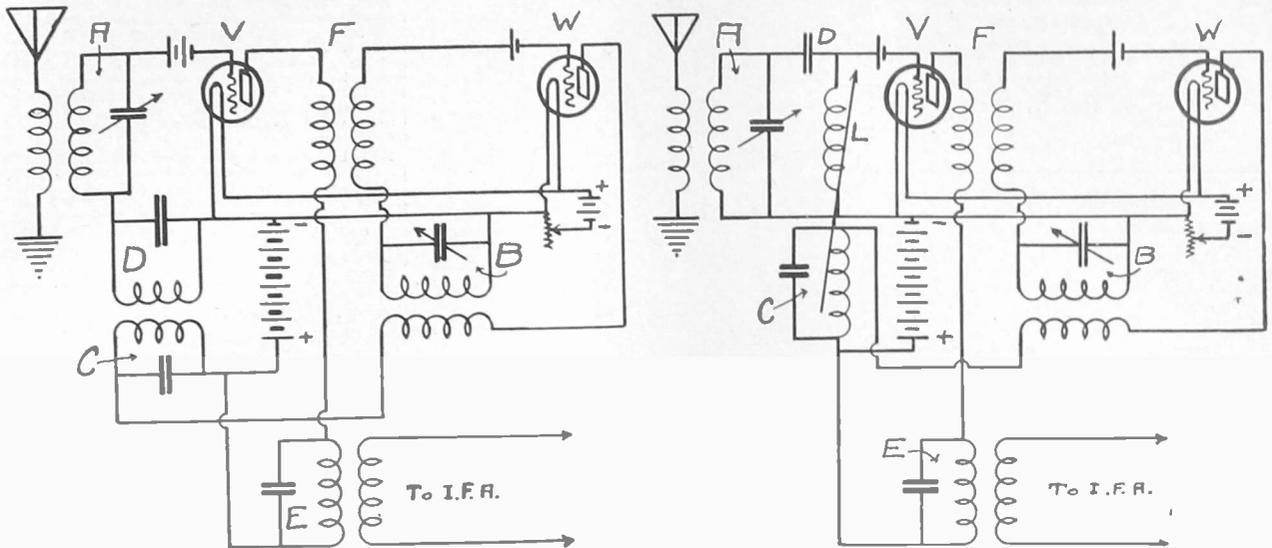
GRAPHIC representation of the current as it oscillates, revealing its component parts, accounting for impurity by contrast between waves. B is the second harmonic (Fig. 5).



1,500 kilocycles, let us tune circuit B to 735 kilocycles knowing that the second harmonic (curve B Fig. 5) will have the desired frequency of 1,470 kilocycles and that there will result the required frequency of 30 kilocycles for Circuit C and the intermediate frequency amplifier. As the circuits A and B are now tuned to far different frequencies, they do not interfere with each

(Concluded on next page)

Set Makes Its Own Wave Length



A STAGE of RF, placed before the oscillator, serves a double purpose. The second purpose is its utility in the first stage of the intermediate frequency amplifier shown in Fig. 6 (at left). Oscillation resulted. This trouble was remedied as shown in Fig. 7 (at right), showing the inductance coupling.

(Concluded from preceding page)

other and we have the desired result, that is, a one tube frequency changer.

As the oscillating tube V, Fig. 4, is coupled to the antenna circuit, such a set will radiate sustained waves and will cause considerable interference. This is true of the majority of Super-Heterodynes the writer has seen described and is sufficient to condemn them for anyone who has the slightest regard for his neighbors or for the future of radio. Radiation by regenerative and other types of receivers which are prone to oscillate is, in the writer's opinion, the most prevalent cause of interference today and will, in time, force broadcasting stations to shut down if it is not eliminated. This can be done if everybody refrains from tuning with a whistle or beat note or by adding one stage of non-regenerative radio frequency amplification before the oscillating tube.

The addition of one stage of radio frequency amplification before the oscillating frequency changer was the next step in the development of the Super-Heterodyne. As this would add an additional tube to the set, this additional tube is used for two purposes, that is, in a stage of radio frequency amplification and in

the first stage of the intermediate frequency amplifier as illustrated by Fig. 6.

The tube V acts as the combined radio frequency amplifier and intermediate frequency amplifier and the tube W is the frequency changer tube in this figure. Keeping in mind that the circuit A is tuned to the incoming wave, Circuit B to the necessary oscillator frequency and circuits C, D and E to the intermediate frequency, the path of the waves through circuits A, F, C, D and E is easy to follow.

Due to this reflexing of two frequencies in one tube, this tube caused considerable trouble by oscillating. The remedy for this is illustrated by Fig. 7. There the tuned circuit C is coupled to the inductance L, which with the condenser D has been substituted for the tuned circuit D in Fig. 6. This arrangement makes the action of this first tube very stable and adds greatly to the ease with which the Super-Heterodyne can be tuned.

The writer cannot emphasize too strongly the necessity for using some method for preventing sets from sending signals into the air. The future of broadcasting depends upon the owners of radio sets. If you want broadcasting to continue do not let your tubes oscillate or use some method such as defined herewith.

CONY Sought as Letters of City's Station

New York Will Begin Municipal Broadcasting Next Month, Whalen Announces

CONY.

Those are the call letters Grover A. Whalen wants for the power broadcasting station the City of New York will begin operating in May. Decision by the Federal Government is awaited.

CONY—City of New York. Simple, isn't it?

The idea came to Mr. Whalen, who is Commissioner of Plant and Structures in Mayor Hylan's administration. As soon as the thought struck him he discarded the idea of running a prize contest to get the most appropriate call letters. What need of a contest when perfection already was achieved?

CONY is a sort of reflex circuit as call letters go. Its double duty is to signify City of New York and Coney, the name of the famous summer resort island that is almost as famous as New York City itself.

Mr. Whalen said that the broadcasting equipment which the city purchased from the Westinghouse Company would be delivered probably this week from Rio de Janeiro, Brazil.

"There is no truth in the report that the municipal broadcasting station is going to broadcast the meetings of the Board of Estimate or the Board of Aldermen," Mr. Whalen said. "What we are going to broadcast is general information on city activities, showing what the different departments are doing. That part of the broadcasting will be educational.

"But the right of way will be given to the Police and Fire Departments always in cases of emergency. If the Police Department in case of a great disaster should requisition it, the regular broadcasting program would be stopped and the plant would be used by the police through a distant control station.

Mr. Whalen said that the concerts on the Mall in Central Park would be broadcast by means of loud speakers to many of the other parks.

"We will also broadcast the voices of opera singers of the first magnitude," he continued. "The very best talent would come to the city to broadcast when their services could not be obtained at any price by other broadcasters."

"There Will Be Another Rainbo in the Sky"

CHICAGO.

THE Rainbo Gardens here will shortly open its own broadcasting station. Their new angle is setting aside a regular hour, from 3 to 4 o'clock each afternoon, for sending out culinary recipes to exploit a brand of baking powder.

From 8 to 9 at night, popular songs will be sent out, and from 10 until 1 A.M. the cabaret show will be broadcast. The old second-floor room, formerly used for rehearsals, will be turned into a cafe of the kind requiring evening dress after 6 o'clock.

Jerry Sullivan, associated with Feist, will act as program manager and announcer.

BIGGEST AND BEST LIST OF PROGRAMS!

Explanation of Abbreviations

G. M. T.—Greenwich Meridian Time
 E. S. T.—Eastern Standard Time
 C. S. T.—Central Standard Time
 M. T.—Mountain Time
 P. T.—Pacific Time
 m.—meters
 k.—kilometers

Wednesday, April 30

WDAF, Kansas City, Mo., 411m (730k), C. S. T.— 6 P. M., School of the Air, piano tuning in number on the Duo Art marketgram weather forecast, time signal and road report address Weekly health talk given under the auspices of the Health Conservation Association, the Tell Me a Story Lady, music Fritz Hanlein's Trioan Ensemble Hotel Muehlebach 8 P. M. program arranged and presented by the student department of the Kansas City Music Club 11 45 P. M. Nighthawk Frolic, the Merry Old Chief and the Coon Sanders Orchestra Plantation Grill Hotel Muehlebach

WOR, Newark, N. J., 465m (740k), E. S. T.— 8 P. M. Sigmund Spaeth Ph. D. and Henry Souvaine pianist in the first of a weekly series of novel and diverting musical programs 8 50 P. M. Recital by Lilyan Mae Challenger contralto 9 P. M. Leviathan Orchestra in a return engagement 9 20 P. M. Boy Mayor of New York City George Bronx vs Boy Mayor of Newark, N. J., in "What I Expect to Do as Mayor of the City of New York and City of Newark Respectively." 10 15 P. M. Manhattan Serenaders of New York augmented by the Arcadian Orchestra

WLW, Cincinnati, Ohio, 369m (970k), E. S. T.— 10 40 A. M. Weather forecast and business reports 3 P. M. market reports 4 P. M. program for the "Shut Ins by the Wurlitzer Concert Company 8 1 M. Woodward High School Orchestra 8 30 P. M. program by the David Davis Vocal School of Cincinnati 9 20 P. M. Ho-Down Tunes by Jake Routs's Pumpkin Vine Orchestra

KHJ, Los Angeles, 395m (760k), P. T.— 12 30 P. M. program presenting Blanche Nichols, mezzo soprano 2 30 P. M. program presented through the courtesy of Barker Bros. 6 30 P. M. children's program presenting Evelyn Sheehy pianist 15 years old pupil of Anna Lisenbard, Dick Winslow juvenile reporter, George W. Hood reader 8 P. M. program through the courtesy of Mrs. J. F. Faber presenting Judge Bledsoe speaker, Carl Buratti cornetist; Robert Odell president of the Board of Education, Burkman Brothers Hawaiian Quartet. 9 P. M., Dr. Mars Baumgardt, lecturer

WOC, Davenport, Iowa, 484m (620k), C. S. T.— 10 55 A. M. time signals 11 A. M. weather and river forecast 11 05 A. M. market quotations and agrigrams 12 noon chimes concert 2 P. M., closing stocks and markets 3 30 P. M., Educational program musical numbers to be announced. 6 30 P. M. Sandman's visit. 6 50 P. M. sport news and weather forecast 7 P. M. educational talk 8 P. M. organ recital.

KDKA, Pittsburgh, Pa., 326m (920k), E. S. T.— 2 30 P. M. scores inning by inning of baseball games played today 5 30 P. M. dinner concert by the Pittsburgh Athletic Association Orchestra Gregorio Scalzo director 6 P. M. baseball scores, continued 6 30 P. M., "The Gingerbread Man Will Play a Prank" 6 45 P. M. feature 7 05 P. M., one act play presented by the Dramatic League of Pittsburgh 7 30 P. M. feature 7 40 P. M., national stockman and farmer market reports. 8 P. M. concert arranged by the K of C 10 P. M., Arlington time signals; weather forecast.

KYW, Chicago, 536m (560k), C. S. T.— 7 P. M. dinner concert broadcast from the Congress Hotel 8 P. M. musical program 10 P. M. to 2 30 A. M., this is a Chicago Evening American Westinghouse feature broadcast from the Hearst Building; program will be announced by radiohphone.

WBZ Springfield, Mass., 337m (890k), E. S. T.— 5 P. M. dinner concert by the WBZ String Orchestra, Miss Alice A. Mikus, harpist 6 P. M. "General Service Staff Special: General Staff of the Organized Reserves" 6 30 P. M. bedtime story for the kiddies, Hotel Kimball studio Springfield 6 40 P. M. program of chamber music by the WRZ String Orchestra Miss Alice A. Mikus harpist and Lenox Blige low, baritone; Gertrude Clifford soprano, Mrs. Eleanor Turner JaZazzera accompanist, Hotel Kimball Studio, Springfield 7 30 P. M. program of music transmitted from Home Beautiful Exposition Mechanics Bldg Boston 8 P. M. musical program transmitted from the Studio of the Home Music Company, Boston 9 55 P. M. Arlington time signals. 10 40 P. M. program of dance music by Leo Reisman and his orchestra

WEAF, New York, 492m (610k), E. S. T.— 11 P. M., musical program to be announced; health talk by the New York Health Speakers Service Bureau; market and weather reports. 12 noon, chapel services direct from the Columbia University Chapel, with address by Chaplain Raymond Knox and musical program. 4 P. M., Muriel Muth, popular songs with Gertrude Bernstein, pianist; Hazel Wedel, pianist; Teresa



HELEN M. HANN, one of the announcers of WEAF New York broadcasting station of the American Telephone and Telegraph Company, has captured the admiration of many by her winning voice. Miss Hann enjoys her work almost as much as her audience.

Uhlinger entertainer concert by the Classical Trio. 7 P. M. Synagogue services by the United Synagogue of America 7 30 P. M. United Cigar Stores daily sport talk by Thornton Fisher, talk by American Agriculturist the tenth of a series of lectures on practical American politics by Schuyler C. Wallace supervisor of government of Columbia University 8 20 P. M. concert by the Bridgeport Oratorio Society Percy Grainger director direct from Carnegie Hall New York City 9 30 P. M. Congratulatory dinner to the newly created Cardinal Patrick J. Hayes by the Catholic Club of the City of New York direct from the Waldorf Astoria New York City. 10 30 P. M. Wendell Hall popular song maker with his ukulele entertaining for National Carbon Co.

WOO Philadelphia, 509m (590k), E. S. T.— 7 30 P. M. sports results and police reports; dinner music by the Havana Casino Orchestra broadcast direct from the main dining room of the Hotel Sylvania 8 45 P. M. grand organ recital Mary E. Vogt 8 45 P. M. address "Independence Robert E. Golden director

WGI, Medford, Mass., 360m (830k), E. S. T.— 12 40 P. M. New England weather forecast furnished by the U. S. Weather Bureau 12 45 P. M. closing report on farmers produce market report 6 30 P. M. closing stock market reports, live stock markets reports; world market survey, U. S. Department of Foreign and Domestic Commerce; Boston police reports Boston police headquarters 6 45 P. M. code practice 7 30 P. M., evening program

WRC, Washington D. C., 469m (640k), E. S. T.— 3 P. M. fashion developments of the moment prepared by Women's Wear 3 10 P. M. song recital to be announced 3 25 P. M. report of the National Conference Board 3 30 P. M. housekeeper's half hour by Aunt Margaret 3 45 P. M. piano recital by Eleanor Glynn 3 50 P. M. current topics by the editor of The Outlook 4 P. M. song recital to be announced 5 15 P. M. instruction in international code 6 P. M., stories for children by Peggy Albion

WDAR, Philadelphia, 395m (760k), E. S. T.— 2 P. M. Arcadio Concert Orchestra, Mrs. Louis Love will talk on "The Care of Children 4 30 P. M. artist recital Rebecca Reichlin pianist 5 45 P. M. baseball and other sports results 7 30 P. M. Dream Daddy with the boys and girls 8 P. M. W. P. High School boys' week address Alex Colville Jr. W. P. High School address Henry M. Neely, baseball talk by Eddie Rommel George Otorn from the U. of P. Linn & Dance Orchestra from the Arcadia Cafe; special features during the intermissions of the orchestra

WHAS Louisville, Ky., 400m (752k), C. S. T.— 4 55 P. M. baseball scores 5 P. M. official central standard time announced 7 30 to 9 P. M. Agricultural Tabloid talk prepared by the faculty of the State Agricultural College at Lexington Kentucky; concert by the Louisville Music Company Hawaiian Studio Frank Plada director, steel guitar and ukulele; Mrs. Frank Plada steel guitar and ukulele; Emil Bomberger, straight guitar; Gene Kingman, piano soloist; soprano solos Mrs. Lucille Long Brown accompanied by Miss Ellen Lawrence Gardner; piano logues, Miss Ellen Lawrence Gardner, of New

Albany, Ind.; late important news bulletins, official central standard time announced at 9 o'clock
WIP, Philadelphia, 500m (590k), E. S. T.— 1 P. M., luncheon music by the Tea Room Orchestra 1 30 P. M., official weather forecast 3 P. M., artist recital 6 P. M., official weather forecast and final baseball scores 6 05 P. M., dinner music by the Weymann Five Orchestra 6 45 P. M., U. S. Department of Agriculture live stock and produce market reports 7 P. M., Uncle Wip's bedtime stories and roll call for the children.

KFI, Los Angeles, Cal., 469m (640k), P. T.— 4 45 P. M. Evening Herald news bulletins 5 15 P. M. Examiner news bulletins 6 45 P. M. Nick Harris detective stories and concert 8 P. M. Evening Herald concert 9 P. M. Examiner concert 10 P. M. Hollywoodland Community Orchestra 11 P. M. Ambassador Max Fisher Co. Coconut Grove Orchestra

KPO, San Francisco, 423m (710k), P. T.— 4 30 P. M., children's hour stories by "Big Brother" of KPO 7 P. M. Rudy Seiger's Fairmont Hotel Orchestra 8 P. M. E. Max Bradford's Versatile Band, during the intermissions Mr. Elzinga will speak on "Your Boy and Mine"; Jack Delaney, pianist, will play popular music.

CKAC, Montreal, 425m (705k), E. S. T.— 4 45 P. M. Mt Royal Hotel Concert Orchestra. 4 P. M. weather, stocks news 4 30 P. M. Mt Royal Hotel dance program

KGW, Portland, Ore., 492m (610k), P. T.— 11:15 A. M. window shopping 11 30 A. M. weather forecast 12 30 P. M., concert by Darby's Orchestra of Cotillon Hall 3 30 P. M. children's program 7 30 P. M. baseball scores weather forecast and market reports 8 P. M. concert by Columbia Theater All Artist Orchestra 9 P. M., Alexander Hamilton Institute business talk by James Albert 10 P. M. dance music by George Olsen's Metropolitan Orchestra of the Hotel Portland

WFAA, Dallas, Texas, 476m. (630k), C. S. T.— 12 30 P. M. musical program by the Red Head Girl of the Dallas Journal.

WHN, New York, 360m. (830k), E. S. T.— 7:30 P. M. Mal Hallett's Roseland Dance Orchestra. 8 P. M. London Shoe Orchestra and Entertainers. 8 30 P. M. Union of Orthodox Jewish Congregations 8 50 P. M. H. Murray O'Neil baritone soloist singing popular and classical ballads 9 P. M. Dan Gregory and his Dancing Carnival Orchestra 9 30 P. M. M. Witmark Black and White program 10 05 P. M., Fletcher Henderson's Alabam Club Orchestra

WJZ, New York, 455m. (660k), E. S. T.— 7:30 P. M. dance program by Irving Selzer and his Cafe Boulevard Orchestra 7 45 P. M., "The Progress of the World," a Review of Reviews talk. 8 P. M. dance program by Irving Selzer and his Cafe Boulevard Orchestra 8 30 P. M., city official series 8 45 P. M., at home with Andrew White and his guest, H. C. Wagner 9:05 P. M., annual quiet of the Talking Machine and Radio Men's Association, direct from the grand ballroom of the Hotel Pennsylvania; Paul Whiteinan, Garber Davis, Piron Orchestra, Brooke Johns, Brox Sisters Vincent Lopez, Ben Selvin, Emil Coleman Paul Specht, Eddie Cantor

KSD, St. Louis, Mo., 546m. (550k), C. S. T.— 6 30 P. M., program of Abergh's Concert Ensemble broadcast direct from Hotel Statler 9 P. M., studio recital by Mrs. H. W. Geller soprano; Miss Virginia Slack reader 11 P. M., broadcasting direct from Hotel Statler dance music played by Rodemich's Orchestra

KFAE, Pullman, Wash., 330m. (910k), P. T.— 8 P. M., "The Outlawry of War" Prof. C. H. Woody; "Finding New Facts for Agriculture," Dean E. C. Johnson; "Two Bouquets of Clover," Lincoln R. Lounsbury; instrumental music, vocal solos piano

WKAQ, San Juan, P. R., 360m. (830k), E. S. T.— Broadcasts every Wednesday, 7 to 9 P. M., announcements in Spanish and English.

PWX, Havana, Cuba, 400m. (750k), E. S. T.— Broadcasts Wednesdays at 8 30 P. M.; programs announced

WRAZ, Newark, N. J., 233m (1290k), E. S. T.— Broadcasts every evening from 12 midnight until 1 A. M.; program announced

KPNF, Shenandoah, Iowa, 266m. (1130k), C. S. T.— Broadcasts Wednesdays, 7 30 to 9 30 P. M.; program announced

Thursday, May 1

WWJ, Detroit, 517m (580k), C. S. T.— 8 A. M. setting up exercises by R. J. Horton physical director of the Detroit Y. M. C. A. 9 30 A. M., "Tonight's Dinner" and a special talk by the woman's editor 9 45 A. M. public health service bulletins and talks on subjects of general interest. 10 25 A. M. official weather forecast 11 55 A. M., Arlington time relayed by the Western Union. 12 noon Edward Barnes baritone; LeRoy De Turk tenor 3 P. M., the Detroit News Orchestra. 3 30 P. M. official weather forecast. 3 35 P. M., market reports 5 P. M. baseball scores 8:30 P. M. the Detroit News Orchestra; Miss Victoria Davie contralto, Miss Irene Benson, soprano. 7 P. M. dance music by Jean Goldkette's Orchestra broadcast from the Graystone Ballroom.

WDAF, Kansas City, Mo., 411m (730 k), E. S. T.— 6 P. M., School of the Air; piano tuning in number on the Duo Art; marketgram, weather forecast; time signal and road report; address, speaker from the William Jewell College Liberty.

Mo.; reading, Miss Cecile Burton, from the works of local and Missouri writers; the Tell-Me-a-Story Lady; music, Fritz Hanlein's Trianon Ensemble, Hotel Muehlebach 11:45 P. M., Night-bawk Frolic; the "Merry Old Chief" and the Coon-Sanders Orchestra, Plantation Grill, Hotel Muehlebach.

WBAP, Fort Worth, Texas, 476m (620k), C. S. T. 7:30 to 8:30 P. M., concert by Owen Crockett's Yeoman Orchestra. 9:30 to 10:45 P. M., Concert by the Old Time Fiddlers of Lewisville, Texas.

WOR, Newark, N. J., 405m (740k), E. S. T. 3 P. M., Guy Hunter, the blind entertainer. 3:10 P. M., one act from Samuel Shipman's play, "Cheaper to Marry." 3:30 P. M., recital by Helen Rennyson Wilson, soprano. 6:15 P. M., Albert E. Sonn, in "Radio for the Layman." 6:30 P. M., "Music While You Dine."

WAAM, Newark, N. J., 263m (1140k), E. S. T. 9 P. M., Ann Rose, Spanish soprano, singing "La Paloma," "Carmena Waltz," "Marina," "Aloha Oe"; Michel Borochofsky, pianist. 9:15 P. M., Rev. Dr. Arthur W. Brooks, scientific astrologist. 9:30 P. M., E. M. Shoemaker, radio doctor. 9:45 P. M., Times Square Entertainers. 10 P. M., Matawan Frolicers' Musicrevue. 10:15 P. M., Charles J. Sanders' Sterling Dance Orchestra. 10:45 P. M., Harry Golub, tenor, and Jack Palmer, pianist.

WLW, Cincinnati, Ohio, 369m (970k), E. S. T. 10:30 A. M., weather forecast and business reports. 3 P. M., market reports. 4 P. M., piano solos by Miss Adelaide Apfel; talk by a representative of the League of Women Voters. 10 P. M., Times-Star Radio Club of the World. 10:10 P. M., special program by the Cincinnati Conservatory of Music.

WGY, Schenectady, N. Y., 380m (790k), E. S. T. 11:55 A. M., time signals. 11:30 A. M., stock market report. 11:40 A. M., produce market report. 11:45 A. M., weather report. 1 P. M., music and fashion talk. 5 P. M., produce and stock market quotations; news bulletins; baseball results. 5:30 P. M., dinner music by Romano's Orchestra, New Kemore Hotel, Albany, N. Y. 7:40 P. M., baseball results. 7:45 P. M., radio drama, "The Walls of Jericho," by Alfred Sutro, presented by WGY Players.

KHJ, Los Angeles, 395m (760k), P. T. 12:30 P. M., news items, weather report and music. 2:30 P. M., program presented through the courtesy of Barker Bros. 6:30 P. M., music memory contest conducted by Fitzgerald Music Co.; Prof. Walter Sylvester Hertzog telling stories of American history; the Hollywood School for Girls Glee Club; weekly visit of Dickie Brandon, screen juvenile; bedtime story by Uncle John. 8 P. M., program presented through the courtesy of the Fitzgerald Music Co. 9 P. M., Albert Bryant, tenor; Susan Frances White, reader.

WOC, Davenport, Iowa, 484m (620k), C. S. T. 10:55 A. M., time signals. 11 A. M., weather and river forecasts. 11:30 A. M., market quotations and agriforecasts. 12 noon, chimes concert. 2 P. M., closing stocks and markets, including weekly report of wool market. 3:30 P. M., education program. 5:45 P. M., chimes concert. 6:30 P. M., Sandman's visit. 6:50 P. M., sport news and weather forecast. 9 P. M., orchestra program.

KDKA, Pittsburgh, Pa., 326m (920k), E. S. T. 5:30 P. M., dinner concert by the KDKA Little Symphony Orchestra, Victor Saudek, conductor. 6 P. M., baseball scores. 6:30 P. M., Mother Goose will have her May party. 6:45 P. M., feature. 7:15 P. M., program arranged by the National Stockman and Farmer, including the market reports. 8 P. M., concert arranged by Chauncey Parsons through the courtesy of the Rosenbaum Company. 10 P. M., Arlington time signals; weather forecast; baseball scores. 11 P. M., special concert.

KYW, Chicago, 536m (560k), C. S. T. 7 P. M., dinner concert broadcast from the Congress Hotel, Chicago. 7:35 P. M., sport talk furnished by Leo Fisher of the Chicago Evening American staff. 7:45 P. M., talk on "Finance and Markets" by Mr. T. Hoyne, who writes for the Chicago Evening American under the name of Argus. 8 P. M., "Twenty Minutes of Good Reading," by Rev. C. J. Pearn, S. J., head of Department of English, Loyola University, Chicago. 8:20 P. M., Edison Symphony Orchestra Concert at Orchestra Hall.

WBZ, Springfield, Mass., 337m (890k), E. S. T. 5 P. M., dinner concert by the Leo Reisman Ensemble. 6:30 P. M., bedtime story for the kiddies. 7 P. M., program from the General Conference of the Methodist Episcopal Church, broadcast from the Springfield Auditorium. 8:30 P. M., program as arranged by Charles La Fiere, pianist, assisted by Mardis Groon, baritone, Vincenzo Spolizio, tenor, transmitted from Hotel Brunswick Studio, Boston. 9:55 P. M., Arlington time signals.

WEAF, New York, 492m (610k), E. S. T. 11 A. M., Thursday morning talks for women; "The Place of Salads in the Daily Menu" by Sarah Field Spint; consolidated market and weather reports. 4:00 P. M., program by the Boys' Choir of Calvary Episcopal Church of New York City, with talk by Dr. Livingston Farrand, and Micky Bennett under the auspices of the American Child Health Association. 5 P. M., children's stories and songs by Anne Loyte, the Airship Fairy, and Marie Horton Hasel, the Bird Lady. 10 to 12 P. M., mid-week services under the auspices of the Greater New York Federation of Churches; United Cigar Stores daily sport talk by Thornton Fisher; Amphion Male Quartette; talk by the Bank of America; "The Chiclet Orchestra"; Adelaide Soper, contralto; Joseph Wilberscheid, violinist; Harriet Sammet, pianist;



(Kadel & Herbert)

HUDSON MAXIM, inventor of the Maxim silencer, appears before the microphones at Station WRC, Washington, in an address to the American public on why they should vote for 2.75% beer and light wines.

Vincent Lopez and His Orchestra direct from the Grill of the Hotel Pennsylvania.

WGI, Medford, Mass., 360m (830k), E. S. T. 12:40 P. M., New England weather forecast furnished by the U. S. Weather Bureau. 12:45 P. M., closing report on farmers produce market report. 6:30 P. M., closing stock market reports; live stock markets reports; agriforecasts furnished by the U. S. Department of Agriculture; Boston police reports, Boston police headquarters. 7:30 P. M., evening program.

WRC, Washington, D. C., 469m (640k), E. S. T. 5:15 P. M., instruction in international code. 6 P. M., children's hour by Peggy Albion. 7:45 P. M., "The Question Box," by arrangement with the Pathfinder Publishing Co. 8 P. M., dance program by the Better 'Ole Orchestra. 9 P. M., a talk on motoring under the auspices of the American Automobile Association. 9:15 P. M., song recital to be announced. 9:30 P. M., Negro imitations by Arthur B. Pierce. 9:45 P. M., song recital to be announced. 9:55 P. M., time signals and weather reports. 10 P. M., operalogue by Peggy Albion, assisted by members of the Washington Opera Company.

WOO, Philadelphia, 509m (590k), E. S. T. 11 A. M., grand organ. 11:30 A. M., United States weather forecast. 12 noon, luncheon music by the Tea Room Orchestra. 12:55 P. M., United States Naval Observatory time signals. 4:45 P. M., grand organ and trumpets. 5 P. M., sports results and police reports. 10:55 P. M., United States Naval Observatory time signals. 11:02 P. M., United States weather forecast.

WDAR, Philadelphia, 395m (760k), E. S. T. 11:45 A. M., daily almanac. 12:02 P. M., organ recital from the Stanley Theatre; features from the studio; Arcadia Concert Orchestra, Feri Sarkozi, director. 2 P. M., Arcadia Concert Orchestra; artist recital from the studio; Mrs. Anna B. Scott in talk, "The Market Basket." 4:30 P. M., concert by the pupils of Herman Widmaier. 5:45 P. M., baseball results and other sports. 7:30 P. M., Dream Daddy with the boys and girls.

WHAS, Louisville, Ky., 400m (750k), C. S. T. 4:50 P. M., local livestock, produce and grain market reports. 4:55 P. M., baseball scores. 5 P. M., official central standard time announced. 7:30 to 9 P. M., concert by Fritz Reinhart and his orchestra; Fritz Reinhart, piano and director; Robert Lawrence, trombone; Walter Lips, saxophone; Leonard Calvin, drums; Raymond Lawrence, saxophone; Edward Gray, saxophone; Bert La Mar, trumpet; four-minute Radio Forum Boy Scout talk; four-minute digest of International Sunday School lesson, by Dr. R. B. Grider; late important news bulletins; official central standard time announced at 9 o'clock.

WNAC, Boston, 278m (1080k), E. S. T. 10:30 A. M., WNAC women's club talks. 1 P. M., Shepard Colonial Orchestra and Soloists. 6 P. M., children's half hour. 6:30 P. M., WNAC Dinner Dance, Checker Inn Orchestra. 8 P. M., Concert under auspices Malden Chamber of Commerce.

WFAA, Dallas, Texas, 476m (630k), C. S. T. 12:30 P. M., address, Dr. A. D. Laugenour, president Dallas Astronomical Society. 6:45 P. M., Boy Scout program, H. W. Wester, Scout executive. 8:30 P. M., male quartet of singers with varied entertainment from Greenville, Texas. 11 P. M., Gibson Mandolin and Guitar Club.

WHN, New York, 360m (830k), E. S. T. 9:30 P. M., the Ormonde Sisters of Ed. Hutchinson's Revue at the Monte Carlo. 9:40 P. M., Lou Gold's Wigwam Club Orchestra. 10 P. M., program by All Nation's Association, Henry Tutor, Mason. 11:05 P. M., Edith Wilson and Fletcher Henderson of the Club Alabam. 11:30 P. M., Harry Hock

Entertainers, singing "On the Blue Lagoon," "A Smile Will Go a Long Way" and "You're in Love With Everyone." 11:45 P. M., Ross Fowler, baritone, singing "Somebody Stole My Gal." "Floating Down the Mississippi" and "Abie's Wild Irish Rose."

WJZ, New York, 455m (660k), E. S. T. 5:30 P. M., State and Federal agricultural reports, farm and home reports, closing quotations of the New York Stock Exchange, foreign exchange quotations, Evening Post news. 7 P. M., Jack Rabbit Stories. 7:15 P. M., The Magazine of Wall Street. 7:30 P. M., J. Vincent Moore, tenor. 7:45 P. M., Mr. Stokowski, director of Philadelphia Symphony Orchestra. 8 P. M., New York University lecture direct from N. Y. U. 8:30 P. M., Wanamaker organ concert. 9:15 P. M., Edwin Franko Goldman, talk. 9:30 P. M., Marion Christian, soprano; Helen Mohr, soprano. 10 P. M., Wanda Norman, pianist. 10:30 P. M., Hotel Majestic Orchestra, dance program.

WJY, New York, 405m (740k), E. S. T. 7:30 P. M., Philip Steele, baritone. 7:45 P. M., "Golf," by Innis Brown. 8 P. M., Philip Steele, baritone. 8:30 P. M., concert. 9:30 P. M., May Singhi Breen, banjoist, and Peg Wanamaker, pianist. 10 P. M., Douglas C. Harlow, "Movie Cartoons." 10:15 P. M., Leon Gilbert Simon, baritone, accompanied by Miss Simon.

WJAX, Cleveland, O., 399m (760k), E. S. T. 8 P. M., one hour of music furnished by the Cleveland Hotel Orchestra; soprano solos by Estelle Chapin Thomson; numbers by the Bryan Brothers, a versatile pair.

WIP, Philadelphia, 509m (590k), E. S. T. 1 P. M., luncheon music by the Tea Room Orchestra. 1:30 P. M., official weather forecast. 3 P. M., artist students from the Horatio Connell Vocal Studios. 6 P. M., official weather forecast and final baseball scores. 6:05 P. M., dinner music by Harold Leonard's Red Jackets from Club Madrid. 6:45 P. M., U. S. Department of Agriculture livestock and produce market reports. 7 P. M., Uncle Wip's bedtime stories and roll call for the children. 8:30 P. M., talk by James Francis Cooke, editor of the "Etude," on the Philadelphia Music Pageant; songs by Mrs. James Francis Cooke, soprano. 8:20 P. M., international broadcast of a program under the auspices of the International Esperantists, announcements to be made in Esperanto. 9:30 P. M., religious services under auspices of Philadelphia Branch, United Synagog. 10:05 P. M., talk by Lieut. William Perry, P. N. G., 11th Infantry. 10:30 P. M., recital by Karl Bonowitz on the Germantown Theatre organ. 11:15 P. M., Ted Weems and his Cafe L'Aiglon Orchestra.

KFI, Los Angeles, Cal., 469m (640k), P. T. 4:45 P. M., Evening Herald news bulletins. 5:15 P. M., Examiner news bulletins. 6:45 P. M., Y. M. C. A. concert; sales lecture. 8 P. M., Ambassador Hotel concert. 9 P. M., Examiner concert. 10 P. M., concert arranged by Birkel Music Co.

KPO, San Francisco, 423m (710k), P. T. 2:30 P. M., musical matinee. 4:30 P. M., Rudy Seiger's Fairmont Hotel Orchestra. 5:30 P. M., children's hour stories by "Big Brother" of KPO. 7 P. M., Rudy Seiger's Fairmont Hotel Orchestra. 8 P. M., organ recital by Theodore J. Irwin. 9 P. M., program for the National Musical Federation. 10 P. M., E. Max Bradford's Versatile Band.

CKAC, Montreal, 425m (705k), E. S. T. 4 P. M., weather, stocks, news, music. 7 P. M., kiddies' stories in French and English. 7:30 P. M., Rex Battle and his Mt. Royal Hotel Concert Orchestra; solo by Benjamin Scherzer, violinist, and Rex Battle, pianist. 8:30 P. M., studio entertainment. 10:30 P. M., Joseph C. Smith and his Mount Royal Hotel Dance Orchestra; specialties by Teddy Brown, xylophone and saxophone.

KGW, Portland, Ore., 492m (610k), E. S. T. 11:15 A. M., window shopping. 11:30 A. M., weather forecast. 12:30 P. M., concert provided by Seiberling Lucas Music House. 3:30 P. M., woman's story program. 7:30 P. M., baseball scores, weather forecast and market reports. 8 P. M., accordion solos by Johnny Sylvester. 8:15 P. M., studio program of dance music by George Olsen's Metropolitan Orchestra of Hotel Portland. 10 P. M., dance music by George Olsen's Metropolitan Orchestra of the Hotel Portland; intermission solos by Naomi Miller, soprano.

WNAC, Boston, 278m (1080k), E. S. T. 10:30 A. M., WNAC women's club talks. 1 P. M., Chamber of Commerce luncheon, broadcast from Copley Plaza Hotel. 4 P. M., Shepard Colonial Orchestra. Incidental music, broadcast from Loew's State Theatre. Selections on the Mehlin Welte reproducing piano. 6:30 P. M., WNAC Dinner Dance, broadcast from Hotel Westminister. 8 P. M., Brighton Women's Catholic Institute Banjo Club.

Friday, May 2

WWJ, Detroit, 517m (580k), C. S. T. 8 A. M., Setting-up exercises by R. J. Horton, physical director of the Detroit Y. M. C. A. 9:30 A. M., "Tonight's Dinner" and a special talk by the woman's editor. 9:45 A. M., Public Health Service bulletins and talks on subjects of general interest. 10:25 A. M., official weather forecast. 11:55 A. M., Arlington time relayed by the Western Union. 12 noon, dance music by Jean Goldkette's Orchestra, broadcast from the Graystone Ballroom. 3 P. M., the Detroit News Orchestra. 3:30 P. M., official weather forecast. 3:35 P. M., market reports. 5 P. M., baseball scores. 7 P. M., the Detroit News Orchestra; Miss Genie La Plantte, soprano; Archibald Cooper, baritone.

(Continued on page 22)

Meanwhile Home-work Waits

Set Called M

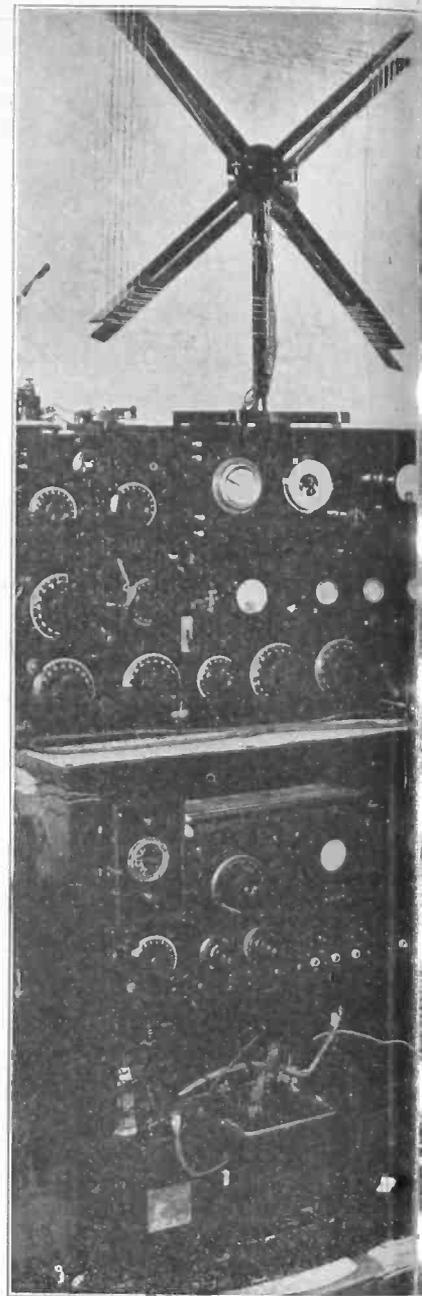


(Kadel & Herbert)

A FANCY motor delivery wagon equipped with a radio receiving set, plenty of headphones and loud speaker, is making a tour of the country. Photo shows children in New York City having a glorious time listening in. Twenty sets of earphones are used. The novelty added a touch of radio to the sidewalks of New York and afforded a gleeful afternoon for a small army of youngsters and some adult lookers-on and listeners-in.

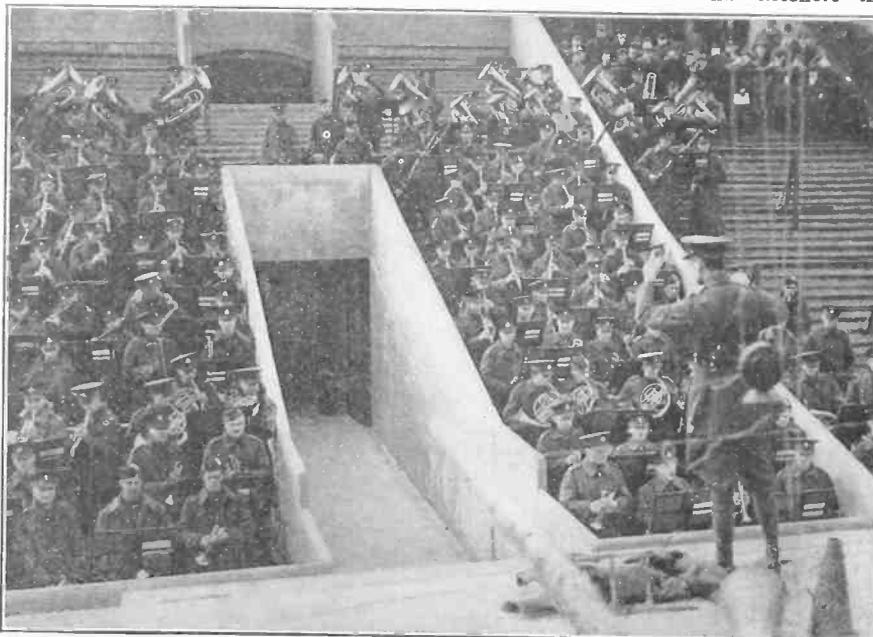


Father Hayden, Chaplain at Atlanta Penitentiary, adjusts the prisoners' set. (Keystone)



(Foto Topics, Keystone)

POSSessor of a set termed "the m Bennett (above), of New York City, ge stations each night. He has five aer



A REHEARSAL was held at Wembley, England, before the microphone to see that it was in good condition for the speech King George delivered. (Wide World)



(Associated Newsreel)

MAYOR ROLPH, of San Francisco, tun route to the Far East, his wife

Most Complete

New Station is on the Air



(International Newsreel)

broadcasting sta-

tion was added to the list of more than 570 now operating in the United States when WES, Chicago, went on the air. The photo shows J. A. Goodrich, one of the operators at the new station, doing double duty as broadcast listener and testing expert.



A MECHANIC climbs the aerial tower of CKCH, Ottawa.

complete." A. L. from 30 to 50 DX and a loop.



onboard ship en stant in.



(Atlantic Foto)

HERE IS Irene Delroy, whose voice has charmed thousands of WHN listeners.

Programs

Friday, May 2 (continued from page 19)

WDAF, Kansas City, Mo., 411m (730k), C. S. T.—6 P. M., School of the Air; piano tuning-in number on the Duo-Art; marketgram; weather forecast; time signal and road report; address, speaker from the Kansas City Children's Bureau; the Tell-Me-a-Story Lady; music, Fritz Ilanlein's Trianon Ensemble, Hotel Muehlebach. 8 P. M., program by the WDAF ninestrels and Jack Riley's Plantation Serenaders. 11:45 P. M., Nighthawk Frolic; the "Merry Old Chief" and the Coon-Sanders Orchestra, Plantation Grill, Hotel Muehlebach.

WBAP, Fort Worth, Texas, 476m (620k), C. S. T.—7:30 to 8:30 P. M., concert by the Texas Christian University, under arrangement of Prof. H. D. Guelick, head of the school of music. 9:30 to 10:45 P. M., concert by Fred Wagner and his Hawaiian steel guitar players.

WOR, Newark, N. J., 405m (740k), E. S. T.—6:15 P. M., Agnes Leonard in songs for the children. 6:30 P. M., "Man in the Moon" stories for the children. 7 P. M., recital by William J. Clancy, tenor.

WLW, Cincinnati, Ohio, 309m (970k), E. S. T.—10:30 A. M., weather forecast and business reports. 1:30 P. M., market reports. 11 P. M., popular program by Doherty's Melody Boys.

WGY, Schenectady, N. Y., 380m (790k), E. S. T.—11:55 A. M., time signals. 11:30 A. M., stock market report. 11:40 A. M., produce market report. 11:45 A. M., weather forecast. 1 P. M., music and one act play, "The Test," by Jay Lee Murphy. 5 P. M., produce and stock market quotations; news bulletins. 5:30 P. M., children's program. 7:35 P. M., health talk, N. Y. State Department of Health. 7:40 P. M., baseball reports. 7:45 P. M., musical program.

KHJ, Los Angeles, 395m (760k), P. T.—12:30 P. M., program presented through the courtesy of Barker Bros. 6:30 P. M., music memory contest conducted by the Fitzgerald Music Co.; Prof. Walter Sylvester Hertzog; program through the courtesy of Barker Bros; weekly visit of Richard Headrick, screen juvenile; bedtime story by Uncle John. 8 P. M., program presented through the courtesy of Barker Bros.

WOC, Davenport, Iowa, 484m (620k), C. S. T.—5:45 P. M., cliques concert. 6:30 P. M., Sandman's visit. 6:50 P. M., sport news and weather forecast. 7 P. M., educational lecture. 7:20 P. M., Sunday School lesson. 8 P. M., musical program.

KDKA, Pittsburgh, Pa., 326m (920k), E. S. T.—5:30 P. M., organ recital by Paul Fleegeer, from the Cameo Motion Picture Theatre, Pittsburgh, Pa. 6 P. M., baseball scores; concert continued. 6:30 P. M., "The Queen of Hearts, She Baked Some Tarts." 6:45 P. M., news bulletins. 7:05 P. M., Radio Boy Scout meeting. 7:40 P. M., National Stockman and Farmer market reports. 8 P. M., special feature. 10 P. M., Arlington time signals; weather forecast; baseball scores.

KYW, Chicago, 536m (560k), C. S. T.—6:45 P. M., children's bedtime story. 7 P. M., dinner concert broadcast from the Congress Hotel, Chicago. 8:20 P. M., program furnished by the American Farm Bureau Federation. 10 P. M. to 2:30 A. M.—Midnight Revue.

WBZ, Springfield, Mass., 337m (890k), E. S. T.—5 P. M., dinner concert by the WBZ Orchestra. 6 P. M., "The Pouch," a dramatized story. 6:30 P. M., bedtime story for the kiddies. 9:30 P. M., program as arranged by Aaron Richmond, consisting of cello solos, soprano solos and piano solos, transmitted from the Boston Studio. 10 P. M., program of chamber music by the WBZ Orchestra; results of games played by the American, National and Eastern Leagues will be announced at 5, 6 and 9 P. M.

WEAF, New York, 492m (610k), E. S. T.—11 A. M., talk under the auspices of Country Life; musical program; consolidated market and weather reports. 4 P. M., special club program of interest to women, with talks and music. 5 P. M., George Olsen and His Orchestra. 7:20 to 11 P. M., talk by Louis Wiley, editor of New York Times on Boys' Week; United Cigar Stores daily sport talk by Thornton Fisher; talk on Crisco; "The Happiness Boys," Billy Jones and Ernest Hare; Felian Garzia, pianist; battery instruction talk by George C. Furness, head of Radio Division of National Carbon Co.; B. Fischer and Company's "Astor Coffee" Dance Orchestra; Wendell Hall, song maker with his ukulele entertaining for National Carbon Company; Mozart String Quartette.

WGI, Medford, Mass., 360m (830k), E. S. T.—12:45 P. M., closing report on farmers' produce market report. 6:30 P. M., closing stock market reports; code practice; Boston police reports; Boston police headquarters. 7:30 P. M., evening program. 7:40 P. M., late Ampico releases. 7:50 P. M., Red Cross health talk by Henry Copley Green of the Metropolitan Chapter of the American Red Cross entitled "What to Eat." 8 P. M., vocal and instrumental concert arranged by Miss Mable Murray of Winthrop, Mass. 9 P. M., popular song hits by the Orpheum Music Company.

WRC, Washington, D. C., 469m (640k), E. S. T.—3 P. M., fashion developments of the moment prepared by "Women's Wear." 3:10 P. M.,

song recital by Arthur McCormick, baritone. 3:20 P. M., "Beauty and Personality," by Elsie Pierce. 3:25 P. M., current topics by the editor of "The Review of Reviews." 3:35 P. M., piano recital by Ethel Grant. 3:50 P. M., the Magazine of Wall Street. 4 P. M., song recital to be announced. 5:15 P. M., re-transmission of time signals and weather forecasts. 6 P. M., stories and songs for children by Peggy Albion and Mary Frances Glenn.

WOO, Philadelphia, 509m (590k), E. S. T.—7:30 P. M., sports results and police reports; dinner music by the Hotel Adelphia Concert Orchestra. 8:30 P. M., Special program from the Fox Theatre Studio. 9:10 P. M., Temple Male Quartette. 9:30 P. M., grand organ recital, Mary E. Vogt. 10 P. M., dance program by Earl Gresh and his Orchestra from the Hotel Adelphia. 10:55 P. M., United States Naval Observatory time signal. 11:02 P. M., United States weather forecast.

WDAR, Philadelphia, 395m (760k), E. S. T.—11:45 A. M., daily almanac. 12:02 P. M., organ recital from the Stanley Theatre; features from the studio; Arcadia Cafe Concert Orchestra. 2 P. M., Arcadia Cafe Concert Orchestra; playlet, the Philadelphia School of Elocution and Oratory. 4:30 P. M., program of dance music. 5:45 P. M., baseball and other sports results. 7:30 P. M., Dream Daddy with the boys and girls. 7:50 P. M., Dream Daddy's own music man. 8 P. M., book review by Arnold Abbott. 8:10 P. M., poet's and author's corner; artist recital; playlet by the Walter Greenough WDAR Players. 10:10 P. M., Howard Lanin's Dance Orchestra.

WHAS, Louisville, Ky., 400m (750k), C. S. T.—4 to 5 P. M., selections by the Walnut Theatre Orchestra, Walter Davison, conductor; police bulletins; weather forecast for Kentucky, Indiana and Tennessee; "Just Among Home Folks," a daily column appearing in the Courier-Journal; selections by the Alamo Theatre Orchestra, Harry S. Currie, conductor; late important news bulletins. 4:50 P. M., local livestock, produce and grain market reports. 4:55 P. M., baseball scores. 5 P. M., official central standard time announced. 7:30 to 9 P. M., concert under the auspices of the New Albany (Ind.), Boys' Observance Committee; Fred J. Williams, chairman; late important news bulletins; official central standard time announced at 9 o'clock.

WIP, Philadelphia, 509m (590k), E. S. T.—1 P. M., luncheon music. 1:30 and 6 P. M., official weather forecast. 3 P. M., artists from the Ada Turner Kurtz Vocal Studios. 4 P. M., radio lesson in Mah Jong broadcast from Cafe L'Aliglon. 6:05 P. M., Jordan-Lewis Dance Orchestra from American Studio of Dancing. 6:45 P. M., U. S. Department of Agriculture market reports. 7 P. M., Uncle Wib's bedtime stories and roll call for the children.

KFI, Los Angeles, Cal., 469m (640k), P. T.—4:45 P. M., Evening Herald news bulletins. 5:15 P. M., Examiner news bulletins. 6:45 P. M., concert. 8 P. M., Evening Herald concert. 9 P. M., Examiner concert. 10 P. M., vocal and instrumental concert. 11 P. M., Ambassador-Max Fisher Coconut Grove Orchestra.

KPO, San Francisco, 423m (710k), P. T.—12 noon, time signals from the Naval Observatory; reading of the Scriptures. 1 P. M., Rudy Seiger's Fairmont Hotel Orchestra. 2:30 P. M., organ recital by Theodore J. Irwin. 4:30 P. M., Rudy Seiger's Fairmont Hotel Orchestra.

CKAC, Montreal, 425m (705k), E. S. T.—1:45 P. M., Mt. Royal Hotel Concert Orchestra. 4 P. M., weather, stocks, news. 4:30 P. M., Mount Royal Hotel Dance Orchestra.

KGW, Portland, Ore., 492m (610k), P. T.—11:15 A. M., market basket. 11:30 A. M., weather forecast. 12:30 P. M., program by Peck Holton's Orchestra of the Wintergarden. 3:30 P. M., lecture by Esther B. Cooley, clothing expert of extension service, Oregon Agricultural College. 7:30 P. M., baseball scores, weather forecast and market reports. 8 P. M., lecture provided by Portland School of Social Work. 10:30 P. M., Hoot Owls.

WFAX, Dallas, Texas, 476m (630k), C. S. T.—12:30 P. M., address, Dr. Robert Stewart Hyer, president emeritus of Southern Methodist University, on Sunday school lesson. 6:45 P. M., Frank Reedy on "Alaskan Railway Development." 8:30-9:30 P. M., musical recital by J. Wesley Hubbell, baritone, and the memoers of the Hubbell Club.

WHN, New York, 360m (830k), E. S. T.—11 P. M., Louie Cohen's Orchestra. 11:30 P. M., Billy Berkes singing "There's Yes, Yes in Your Eyes" and "My Fair Lady." 11:40, Alex Cantor singing "Twilight Rose" and "Watchin' the Moon Rise." 11:45 P. M., Bob Schaefer and Dave Ring singing.

WJZ, New York, 455m (660k), E. S. T.—5:30 P. M., State and Federal agricultural reports, farm and home reports, closing quotations of the New York Stock Exchange, foreign exchange quotations, Evening Post news. 7 P. M., Thornton Burgess, Bedtime Stories. 7:30 P. M., weekly French lesson. 8 P. M., Time's "Pop Question Game." 8:15 P. M., the Crescent Trio. 8:45 P. M., talk and songs by Capt. Clarence Cisin. 9 P. M., the Crescent Trio. 9:15 P. M., Gen. John Ross Delafeld, "Preparedness Our Best Guarantee Against War"; 16th Infantry Band. 10 P. M., Eleanor Ziff, soprano. 10:30 P. M., dance program by Paul Specht's Hotel Almanac Orchestra.

WJY, New York, 405m (740k), E. S. T.—7:30 P. M., Red and Gray Melody Boys concert. 8

P. M., Looseleaf Current Topics. 8:15 P. M., Frank Shevitz, "Income Taxes." 9:30 P. M., blow-by-blow description of the boxing bout between Vicente and Pal Moran, direct from the ringside at Madison Square Garden.

KSD, St. Louis, Mo., 546m (550k), C. S. T.—8 P. M., program to be announced.

KFAE, Pullman, Wash., 330m (910k), P. T.—8:30 P. M., Vagabond's Orchestra, eighteen Bailey, Spokane, leader; "Farm Crops," C. L. Vincent; "Is the Pacifist Right?" Rev. Clay Palmer; cornet solos, William P. Hanson, Michigan, N. D.; "Transferring Bees," B. A. Slocum; instrumental selections.

WKAQ, San Juan, P. R., 360m (830k), E. S. T.—Broadcasts every Friday, 7 to 9 P. M. Program announced.

WNAC, Boston, 278m (1080k), E. S. T.—10:30 A. M., WNAC women's club talks. 1 P. M., Shepard Colonial Orchestra. 3:30 P. M., Young Peoples Fellowship Conference. 6 P. M., children's hall hour. 6:30 P. M., WNAC Dinner Dance, Shepard Colonial Orchestra. 8:15 P. M., New England Conservatory Orchestra, broadcast from Jordan Hall.

Saturday, May 3

WFAA, Dallas, Texas, 476m (630k), C. S. T.—12:30 P. M., address by Hugo Swann, manager Better Business Bureau. 3:30 P. M., special musical program. 8:30 P. M., Ball-Richey-Smith faculty recital from North Texas State Teachers' College, Denton, Texas. 11 P. M., Adolphus Hotel Orchestra playing dance music in the junior ballroom of the hotel.

WHN, New York, 360m (830k), E. S. T.—12 noon, "Listen In," with Jack Shack here and there, on an hour's program of varied and popular entertainment. 2:15 P. M., musical program. 2:45 P. M., Tom Banks' Colonial Inn Orchestra. 3:45 P. M., Edith Wilson, of the Creole Revue, at the Club Alabam. 4 P. M., musical program. 4:30 P. M., Tom Butler, boy soprano, singing popular songs. 4:45 P. M., Melo Club Orchestra, Dave Reish, leader, with Beulah Wolf, ragtime singer.

WJZ, New York, 445m (660k), E. S. T.—4 P. M., concert by the Hotel Belmont Stringed Ensemble, Harry Lerner, leader, direct from the Tea Room of the Hotel Belmont. 5 P. M., Landau and his Harbor Inn Serenaders. 5:30 P. M., State and Federal agricultural reports, farm and home reports, closing quotations of the New York Stock Exchange, foreign exchange quotations, Evening Post news. 7 P. M., Uncle Wiggleby Stories. 7:10 P. M., Mary Ellis and Rudolf Friml. "Songs." 7:30 P. M., piano ensemble, Marion Moodie and Dorothy Madden. 8 P. M., New York University Symphony Orchestra. 9 P. M., Mrs. William Jay Wright, soprano. 10 P. M., Hanna Van Vollenhoven, pianist.

KSD, St. Louis, 546m (590k), C. S. T.—8 P. M., Missouri Theatre Orchestra concert and specialties broadcast direct from the theatre.

WJAX, Cleveland, O., 390 m (760k), E. S. T.—12 midnight, Orpheus Saxophone Sextette and Orchestra; vocal duets, June Ackroyd Farley and Ruth Spensler; Carl Rupp and Hollenden Hotel String Quintette, with Fred Kempsey, tenor; Hawaiian Orchestra, instrumental; Hawaiian Orchestra, with vocal selections by Miss Jean Kibby and Howard Justice; vocal duets, Misses Ethel Rhody and Bobby Fitzpatrick; banjo solos, Eddie Connor, accompanied by Frank Wiesenberger; vocal duets, Miss Jean Kibby and Mr. Howard Justice; instrumental solos, Eddie Peabody, of Allen Theatre; Hughie Thow's Orchestra, of Gilbert's Academy, Lakewood; George Warmack's Syncopators, of the Far East Restaurant; Austin J. Wylie's Orchestra, of the Golden Pheasant Restaurant; Howard Moran Rainbow Orchestra, of Rainbow Gardens. There will be instrumental solos between numbers by members of the various orchestras.

KFNN, Shenandoah, Iowa, 266m (1160k), C. S. T.—Broadcasts Saturdays, 7:30 to 9 P. M. Program announced.

WWJ, Detroit, 517m (580k), C. S. T.—8 A. M., setting-up exercises by R. J. Horton, physical director of the Detroit Y. M. C. A. 9:30 A. M., "To-night's Dinner" and a special talk by the Woman's editor. 9:45 A. M., Public Health Service bulletins and talks on subjects of general interest. 10:25 A. M., official weather forecast. 11:55 A. M., Arlington time relayed by the Western Union. 12 noon, Edward Barnes, baritone; LeRoy De Turk, tenor. 3 P. M., the Detroit News Orchestra. 3:30 P. M., official weather forecast. 3:35 P. M., market reports. 5 P. M., baseball scores. 7 P. M., the Detroit News Orchestra.

WDAF, Kansas City, Mo., 411m (730k), C. S. T.—6 P. M. (School of the Air); piano tuning-in number on the Duo-Art. Marketgram, weather forecast, time signal and road report. Address, Edgar A. Linton, writer-lecturer of Kansas City. The Tell-Me-a-Story Lady. Music: Fritz Ilanlein's Trianon Ensemble, Hotel Muehlebach. 11:45 P. M., Nighthawk Frolic, the "Merry Old Chief" and the Coon-Sanders Orchestra; Plantation Grill; Hotel Muehlebach.

WBAP, Fort Worth, Texas, 476m (620k), C. S. T.—7 to 7:30 P. M., review of the interdenominational Sunday school lesson and radio Bible class by Mrs. W. F. Barnum.

WOR, Newark, N. J., 705m (740k), E. S. T.—8 P. M., Gene Ingraham's Bell Record Orchestra. 9 P. M., "Impressions of Radio on a Newspaper Man," by Donald H. Short. 9:15 P. M., "Mental

Telapathy and Its Investigations," by Gardner Murphy, Ph. D., of Columbia University. 9:30 P. M., joint program by Lucy Jahn, soprano; Beth Tregaskis, contralto; Edmund A. Jahn, bass-baritone. 10:15 P. M., Ben Friedman Entertainers.

WLW, Cincinnati, Ohio, 309m. (970k), E. S. T.—10:30 A. M., weather forecast and business reports. 1:30 P. M., market reports, 3 P. M., stock quotations. 4 P. M., special program. T. C. O'Donnell, editor of Writers' Digest, lecture on "Journalism."

WGY, Schenectady, N. Y., 380m. (790k), E. S. T.—10:55 A. M., U. S. Naval Observatory time signals. 11:30 A. M., stock market report. 11:40 A. M., produce market report. 9:30 P. M., dance music by Romano's Orchestra, New Kenmore Hotel, Albany, N. Y.

KHJ, Los Angeles, 395m. (760k), P. T.—12:30 P. M., special program for Music Week arranged through the courtesy of R. E. Wales, presenting Gladys Blackwell Pickering, soprano, and Raymond Harmon, tenor. 2:30 P. M., matinee musicale. 6:30 P. M., children's program. Music Memory Contest, conducted by Fitzgerald Music Co. Prof. Walter Sylvester Hertzog, telling stories of American history. Kathryn Sawyer, 4 years old, reader. Caryl Boardman, pianist, 12 years old, pupil of Clara Gordon Seefeld. John T. Brown, harmonica. Bedtime story by Uncle John. 8 P. M., program arranged through the courtesy of the Paul G. Hoffman Co.

WOC, Davenport, Iowa, 484m. (620k), C. S. T.—10:55 A. M., time signals. 11 A. M., weather and river forecast. 11:05 A. M., market quotations. 12 noon, chimes concert. 12:30 P. M., closing stocks and markets. 3:30 P. M., educational program. 5:45 P. M., chimes concert. 6:30 P. M., Sandman's Visit. 6:50 P. M., sports news and weather forecast. 9 P. M., orchestra program.

KDKA, Pittsburgh, Pa., 326m. (920), E. S. T.—5:30 P. M., dinner concert by the Westinghouse Band. 6 P. M., baseball scores; concert continued. 6:30 P. M., "The Knave of Hearts, He Stole Some Tarts." 6:45 P. M., "Last Minute Helps to Teachers of Adult and Secondary Classes." 7 P. M., baseball scores. 8 P. M., concert by the Westinghouse Band, T. J. Vastine, conducting.

KYW, Chicago, 536m. (560k), C. S. T.—6 P. M., news, financial and final markets. 6:18 P. M., talk. Speaker will be announced by radiophone. 6:45 P. M., children's bedtime story. 7 to 7:30 P. M., dinner concert broadcast from the Congress Hotel, Chicago. 8 to 8:58 P. M., musical program.

WBZ, Springfield, Mass., 337m. (890k), E. S. T.—11:55 A. M., Arlington time signals; weather reports; Boston market report. 5 P. M., dinner concert by the Leo Keisman Ensemble. 6:30 P. M., bedtime story for the kiddies. 6:40 P. M., concert by the Hotel Kimball Trio. 7:30 P. M., program of music transmitted from Ilione Beautiful Exposition, Mechanics Building, Boston. 9:55 P. M., Arlington time signals. Results of games played by the American, National and Eastern Leagues will be announced at 5, 6 and 9 P. M.

WEAF, New York, 492m. (610k), E. S. T.—4 P. M., dance program by the Mount Royal Orchestra; Mary Hupple, contralto. 7:30 P. M., 12 midnight, Gordon Male Quartet; Ada Gordon, pianist; Mary Van Doren, soprano; George Pecoraro, Hawaiian guitar; Charles Catanese, ukulele; Evelyn Simons, mezzo soprano; Mrs. George P. Robbins, violinist; Salvatore Solte, basso; Vincent Lopez and his orchestra direct from the grill of the Hotel Pennsylvania.

WGI, Medford, Mass., 360m. (830k), E. S. T.—6:30 P. M., code practice. New England weather forecast, furnished by the U. S. Weather Bureau. New England crop notes, furnished by V. A. Saunders, statistician. 7:30 P. M., 1. Talk on current events, by David M. Cheney. 2. Popular song hits, by C. P. Reine. 8 P. M., 14th of a series of talks on New England business industry, by Arthur R. Curnick, of the New England Business Magazine. Minstrel show given by the St. John's Church.

WRC, Washington, D. C., 469m. (640k), E. S. T.—5:15 P. M., instruction in international code. 6 P. M., Children's Hour, by Peggy Albion. 7:45 P. M., Bible talk, under the auspices of the Men's Organized Bible Class of D. C. 8 P. M., violin recital by Mildred Falhore. 8:15 P. M., song recital by Dorothy Mansfield, of the Washington Opera Company. 8:30 P. M., song recital by Edouard Albion, baritone and director of the Washington Opera Company. 8:45 P. M., piano recital, to be announced. 9 P. M., song recital by Edouard Albion, baritone and director of the Washington Opera Company. 9:15 P. M., concert of instrumental music. 9:55 P. M., time signals and weather forecasts. 10 P. M., concert of Hawaiian music.

WOO, Philadelphia, 609m. (590k), E. S. T.—12 noon, luncheon music by the Tea Room Orchestra. 12:55 P. M., United States Naval Observatory time signal. 4:45 P. M., grand organ and trumpets. 5 P. M., sports results and police reports. 10:55 P. M., United States Naval Observatory time signal. 11:02 P. M., United States weather forecast.

W DAR, Philadelphia, 395m. (760k), E. S. T.—11:45 A. M., daily almanac. 12:02 P. M., organ recital from the Stanley Theatre; features from the studio; Arcadia Cafe Concert Orchestra. 2:30 P. M., Arcadia Concert Orchestra; artist recital from the studio. 4:30 P. M., The Cotton Pickers, under the direction of Wilbur De Paris, from

the Palais De Amour. 5:45 P. M., baseball and other sports results. 7:30 P. M., Dream Daddy with the boys and girls.

WHAS, Louisville, Ky., 400m. (750k), C. S. T.—4 to 5 P. M., selections by the Alamo Theatre Orchestra, Harry S. Currie, conductor. Police bulletins. Weather forecast for Kentucky, Indiana and Tennessee. Selections by the Walnut Theatre Orchestra, Walter Davison, conductor. Late important bulletins. 4:50 P. M., local live stock, produce and grain market reports. 4:55 P. M., baseball scores. 5 P. M., official central standard time announced. 7:30 to 9 P. M., one-hour concert by the Alpha Mu Musical Fraternity of Hanover College (Ind.), G. H. Lemmon, director. Reading, Mrs. Cordia Greer Petrie. Baritone solos, Bryan Holloway, accompanied by Miss Christine Brenzinger. Late important news bulletins. Official central standard time announced at 9 o'clock.

WIP, Philadelphia, 509m. (590k), E. S. T.—1:30 and 6 P. M., official weather forecast. 3 P. M., program by the Metropolitan Quartet, of Chester Pa. 6:05 P. M., Harold Leonard's Red Jackets. 7 P. M., Uncle Wip's bedtime stories and roll call for the children. 8:15 P. M., Bethlehem Steel Male Chorus of eighty voices, Bethlehem, Pa. 10:15 P. M., Harold Leonard's Red Jackets from Club Madrid.

KFI, Los Angeles, Cal., 469m. (64k), P. T.—4:45 P. M., Evening Herald news bulletins. 5:15 P. M., Examiner news bulletins. 6:45 P. M., vocal concert. 8 P. M., Gardiner Hart, baritone, arranging program. 9 P. M., Examiner concert. 10 P. M., popular concert. 11 P. M., Ambassador-Max Fisher Coconut Grove Orchestra.

KPO, San Francisco, 423m. (719k), P. T.—12 noon, time signals from the Naval Observatory. Reading of the Scripture. 1 P. M., Rudy Seiger's Fairmount Hotel Orchestra. 2:30 P. M., Mill Valley Junior Musical Club, under the direction of Mary Melrose Gardner. 3:30 P. M., E. Max Gradfield's Versatile Band, playing in the Palace Rose Room Bowl, tea dansant. 8 P. M. to 12 midnight, dance music by Art Weidner's popular artists. During the intermissions the KPO Trio will sing popular songs.

CKAC, Montreal, 425m. (705k), E. S. T.—7 P. M., kiddies' stories in French and English. 7:30 P. M., Rex Battle and his Mt. Royal Hotel Concert Orchestra; Herbert Spencer, organist; Nap. Dansereau, cellist. 8:30 P. M., concert direct from the Fontenac Breweries, by Fontenac artists and band. 10:30 P. M., Joseph C. Smith and his Mount Royal Hotel Dance Orchestra.

KGW, Portland, Ore., 492m. (610k), P. T.—11:30 A. M., weather forecast. 3 P. M., special musical program. 3:30 P. M., children's program; story by Aunt Nell. 10 P. M., baseball scores, weather forecast and dance music by George Olsen's Metropolitan Orchestra.

WNAC, Boston, 278m. (1080k), E. S. T.—10:30 A. M., WNAC women's club talks. 1 P. M., Brookline Society Synopsators. 4 P. M., Tea Dance, broadcast from Copley Plaza Hotel. 6:30 P. M., WNAC Dinner Dance, by Lyonhurst Dance Orchestra. 8:15 P. M., Dance music, State Ballroom Orchestra, broadcast from State Ballroom. 9:15 P. M., Dance Music, Hotel Westminster Orchestra. 10:15 P. M., Dance Music, Copley Plaza Orchestra.

Sunday, May 4

KYW, Chicago, 536m. (560k), C. S. T.—11 A. M., Central Church service broadcast from Orchestra Hall, Chicago. Musical program under the direction of Daniel Protheroe. 2:30 P. M., Studio Chapel service given under the direction of the Chicago Church Federation. Speaker will be announced by radiophone. 7 P. M., preliminary service of Chicago Sunday Evening Club. 8 P. M., regular meeting of the Chicago Sunday Evening Club broadcast from Orchestra Hall, Chicago.

WBAP, Fort Worth, Texas, 476m. (670k), C. S. T.—11 A. M., complete services of the First Methodist Church, Rev. J. W. Bergin, pastor. 4 P. M., organ concert from the Rialto Theatre, Miss Margaret Agnew White, organist. 5 P. M., concert sponsored by Mrs. Will S. Horn, violinist; J. F. Garmon, violinist, and Jociel Garrison, pianist. 11 P. M., midnight concert.

WGI, Medford, Mass., 360m. (830k), E. S. T.—4 P. M., twilight program: 1, "Adventure Hour," conducted by the Youth's Companion; 2, address by Rev. F. A. Wiggins; Albert E. Adams, pianist. 8:30 P. M., evening program: 1, talk, under the auspices of the Greater Boston Federation of Churches; 2, musicale.

WIP, Philadelphia, 509m. (590k), E. S. T.—2:50 P. M., services from Germantown Theatre. 7:30 P. M., evening service from Holy Trinity.

KFI, Los Angeles, Cal., 469m. (640k), P. T.—10 A. M., L. A. Church Federation service. 4 P. M., Federated Church Musicians' Vesper service. 6:45 P. M., Dr. Henry Foote-Perrin and pupils in concert. 8 P. M., Ambassador Hotel concert. 9 P. M., Examiner concert. 10 P. M., Dutch Mill Orchestra.

KPO, San Francisco, 423m. (719k), P. T.—11 A. M., undenominational and non-sectarian church service. The speaker will be Rev. A. W. Farlander, pastor Emanuel Evangelical Church of San Francisco. The soloist will be Mr. Syl Burkenroad, bass. 8:30 P. M., concert by Rudy Seiger's Fairmount Hotel Orchestra.

CKAC, Montreal, 425m. (705k), E. S. T.—4:30 P. M., special concert.

WF AA, Dallas, Texas, 476m. (630k), C. S. T.—6 P. M., Radio Bible Class, Dr. William M. Anderson, pastor First Presbyterian Church, teacher; Bible study and Gospel song. 9 P. M., address, Dr. Harry Lee Virden, archdeacon diocese of Dallas, the Protestant Episcopal Church. 9:30 P. M., Jack A. Davis and his orchestra in popular music recital.

KGO, Oakland, Cal., 312m. (960k), P. T.—3:30 P. M., concert by KGO Little Symphony Orchestra and soloists.

WHAA, Joplin, Mo., 283m. (1060k), C. S. T.—9 A. M., Radio Chapel services.

WGY, Schenectady, N. Y., 380m. (790k), E. S. T.—10 A. M., Service of Union Presbyterian Church, Schenectady, N. Y., sermon by the Rev. T. Roseberry Good. 2:30 P. M., WGY Symphony Orchestra, Leo Kliwen, conductor, assisted by Leonard W. Grant, baritone, and Ralph Steele, tenor. 6:30 P. M., Service of Union Presbyterian Church, Schenectady, N. Y.

WEAF, New York, 492m. (610k), E. S. T.—10 A. M., Annual Communion Breakfast of the Holy Name Society of the Police Dept. of Brooklyn and Queens direct from the 106th Regiment Armory, Brooklyn. Music by the Boys Band from St. Vincent's Home; vocal selections. 2:45 P. M., "Sunday Hymn Sing" under the auspices of the Greater New York Federation of Churches. 3:30 P. M., Interdenominational Services under the auspices of the Greater New York Federation of Churches, William B. Millar, General Secretary, will preside. Address by the Rev. Leon H. Couch, Pastor of the 2nd Church, Disciples of Christ, Bronx; Music by Federation Radio Choir; Federation Mixed Quartette. 7:20 P. M., special musical program direct from the Capitol Theatre, New York City. 9:15 P. M., organ recital by Henry F. Seibert, organist of Holy Trinity Church, from Skinner Organ Company's Studio.

Monday, May 5

WBAP, Fort Worth, Texas, 476m. (620k)—C. S. T.—7:30 P. M., concert by G. W. Mallory's Quartet, of Roswell, Texas. 9:30 P. M., concert by the fifty-piece Moslah Temple Shrine Band.

KFI, Los Angeles, Cal., 469m. (640k), P. T.—4:45 P. M., Evening Herald news bulletins. 5:15 (Continued on page 31)

Who Is America's Most Popular Radio Entertainer?

Everybody is interested in this query: Who is America's most popular radio entertainer? You have your favorite. Who is she or he? Let us know your choice, whether a comedian, an opera singer, a jazz band, or a story-teller. RADIO WORLD wants to be able to tell the world the name of the entertainer who stands highest in the regard of listeners-in.

Use the accompanying blank and mail to Broadcasting Manager, RADIO WORLD. Cut off. Fill out. Mail today.

BROADCASTING MANAGER, RADIO WORLD, 1493 Broadway, New York City.

Dear Sir:

My favorite entertainer is..... Station.....
 Name.....
 Street Address.....
 City and State.....

A complete list of broadcasting stations was published in the April 5 issue of RADIO WORLD. Another list, corrected to the new date of publication, will be printed in an early issue.

The Radio University

A Question and Answer Department conducted by RADIO WORLD for its Subscribers by its Staff of Experts.

Address Letters to Radio University Department
RADIO WORLD, 1493 Broadway, New York City

I HAVE constructed the Superdyne according to RADIO WORLD for Dec. 15-22-29, and it works great, the only difficulty being that I find it hard to control the oscillation. The rotor stands over one inch from the stator and lies almost parallel to it. What can I do to overcome this excessive oscillation?—Ed Freeman, New Harmony, Ind.

You should have the rotor a bit closer to the stator. Try lowering it to about three-quarters of an inch from the top winding on the stator. This should result in less oscillation and should enable you to decrease the coupling.

By using a crystal in the grid circuit, as shown by the accompanying diagram, I am able to get distance stations that the tube alone will not bring in. You will see that I use three variable condensers. The 43-plate one is in the aerial lead, while the others are 23-plate. I am eight miles from WWJ, Detroit News, and get their concerts on the loud speaker with only one stage of A. F. I am using WD 11 tubes. I am sending this hook-up so you can let your readers see it and I can get some ideas for possible improvement.—Walter R. Snyder, 422 Cadieux, Grosse Pointe, Mich.

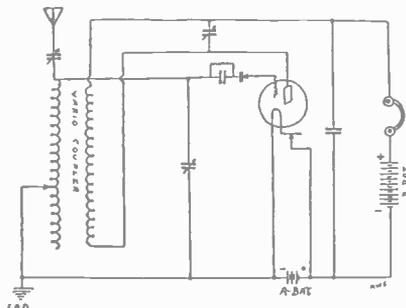


DIAGRAM sent in by Walter R. Snyder, showing how he used a crystal in the grid lead of his tube to improve reception (Fig. 5).

You deserve to be complimented on your ingenuity. However, you should be just as considerate as you are ingenious, and add a stage of RF in such a way that not only will it make your set a still better distance getter, but take it out of the radiating class. See article by Walt E. Thompson in RADIO WORLD, issue of April 12.

1. What is the address of the company that makes the U. S. Tool Condensers specified for the Superdyne? 2. Would there be any advantage gained by putting a variable grid condenser in the detector circuit of the Superdyne? 3. In what direction should the 4-turn primary of the Superdyne be wound in relation to the secondary? 4. When is the capacity of a variable condenser increased—when the rotor plates are turned in or out? 5. Is a .00018 mfd. fixed condenser larger in capacity than one of .00025 mfd?—Robert Reynolds, 2276 Creston Ave., New York.

1. U. S. Tool Condensers are advertised in RADIO WORLD, so would suggest your looking in the advertising columns. 2. Yes, but be sure to use one of first-class make. One of three small plates will do. 3. The primary is wound in the same direction as the secondary. 4. The capacity of a condenser is increased when the plates are turned in. 5. The condenser of .00025 mfd. is larger.

Enclosed find diagram of a set I intend building. What is your opinion of it as to selectivity? What kind of wire should be used on a small variocoupler primary and secondary windings? What kind of tube is best for reflex circuits? Is the DeForest bulb good for this purpose?—Frank J. Keisnowski, 1406 Kellam Ave., Los Angeles, Cal.

This circuit has a fairly good ability to tune sharp. Use size 22 or 24 wire on the variocoupler for both windings. UV201A is recommended for the reflex circuit. The DeForest tube can be used with good results also.

In RADIO WORLD for March 8, the article by Richard Carlisle calls for two condensers, one of .00001 mfd. and the other for .000025. How

can these be constructed, or where can they be obtained?—John O. Lee, Lewistown, Ill.

These condensers can be made in the same manner as those used in the neutrodyne circuit, or regular neutrodyne condensers can be purchased at any radio supply house.

I intend building the Superdyne receiver and would like to have the following information. What distance is the lowest turn of the tickler coil from the top turn of the secondary coil? Would an Amplex grid-denser be of value in place of the grid condenser and would a grid leak help?—Mel. Mordaunt, 1038 Balboa St., San Francisco, Cal.

The bottom turn of the tickler is approximately on the same level as the top turn of the secondary coil. You might try the grid-denser with a grid leak in place of the one specified and compare results.

Wishing to build the Golden Rule receiver by W. S. Thompson, I find that I need a little more information. In RADIO WORLD for March 22 what are the capacities of C6, grid, and C2? Also what are R1 and R2? Are UV199 tubes used throughout?—F. L. Philpot, Box 361, Neodesha, Kan.

C6 is a small capacity condenser of the neutrodyne type, as used in neutrodyne circuits. The grid condenser is .00025 mfd. C2 is a variable vernier condenser .0005 capacity. R1 is a 15 ohm vernier rheostat while R2 is a plain 15 ohm rheostat. UV199 tubes are used throughout.

Please publish a diagram of an impedance-coupled radio-frequency amplifier. I have a variocoupler and two variometers from an old regenerative set. Can these be used in the circuit I ask for?—L. M. Smythe, 680 Warwick Street, Brooklyn, N. Y.

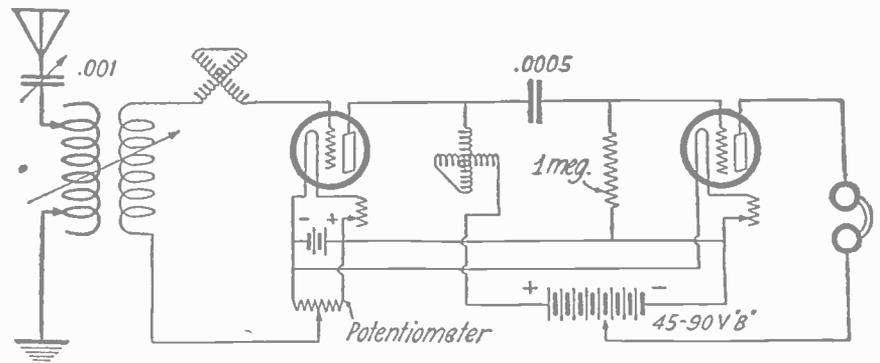


FIG. 6 is diagram asked for by L. M. Smythe, showing how two variometers and one variocoupler are used in the tuned radio-frequency circuit.

Fig. 6 shows a two circuit receiver with one stage of tuned impedance radio-frequency amplification. A variometer is employed as the impedance in this case, since you have the same on hand. Very good results should be obtained from this set, which is very easy to handle.

Referring to RADIO WORLD issue of March 22, the article on Interference, by S. M. Kintner, he says in part that interference is caused by nearby amateur stations operating a spark set,

but the article does not give a remedy to combat the evil. Would a device shown on page 14 of the same issue as above do the work?—H. A. Hood, 2814 Jackson St., Houston, Texas.

You are quite right. Mr. Kintner explains the interference, but does not tell how to overcome the difficulty. Mr. Caldwell's article on page 14 of that issue describes a very good device for eliminating interference.

In RADIO WORLD for March 22 you give a description of the Golden Rule receiver by W. E. Thompson. It says it was designed for UV199 tubes. Would it work as well if I used UV201A tubes, and would the wiring remain the same?—Geo. M. Gordon, 294 Pool Street, Biddeford, Me. UV201A tubes will function as well, the only change necessary being to substitute a six-volt storage battery for the dry cells in the filament lighting circuit. The other wiring remains the same.

Can I construct a crystal circuit using one variometer? Will a variable condenser be necessary for tuning?—B. R. Proust, Bowie, Md.

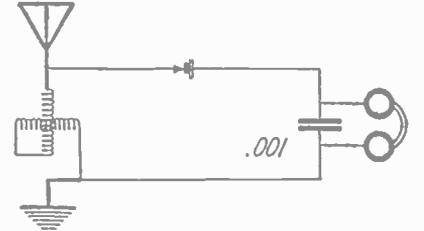


FIG. 7 is a very simple and efficient crystal receiver utilizing a variometer. This circuit tunes sharp and is more sensitive than a tuning coil set due to the fact that there is no unused wire in the whole circuit. A fairly long antenna, about 100 feet, gives excellent results. The tuning is accomplished by varying the position of the rotor. No taps are needed.

An excellent crystal set can be made with one variometer, ear-phones and phone condenser. The circuit is shown in Fig. 7. The .001 condenser across the phones is not absolutely necessary, although it keeps out small stray noises and improves the tone.

Where can I get blue prints and full information for building the receiver mentioned on page 5 of RADIO WORLD for March 29?—J. F. Foster, Swansboro, N. C. Write to the Electrical Research Laboratories, 2515 Michigan Avenue, Chicago, Ill.

Join RADIO WORLD'S University Club

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

RADIO WORLD, 1493 Broadway, New York City:

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

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*This instrument sets a new and higher
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 economy of operation.*



*Volume
 Control*

- R3 (New Model), with Volume Control - - - - \$35.00
- R2 (New Model), with Volume Control - - - - \$50.00
- M1 requiring no battery for its operation - - - - \$35.00

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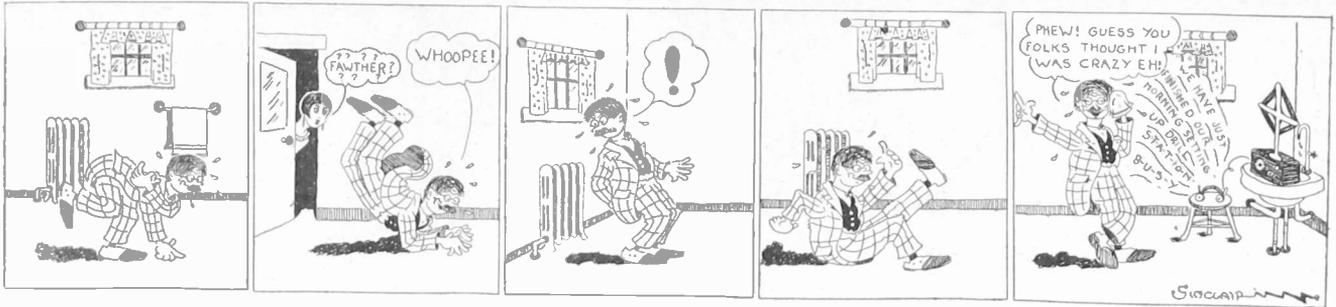
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The Reproducer Supreme

MR. D. X. HOUND

Radio's World's Own Artist Creates An
Enjoyable Character

By HAL SINCLAIR



The Radio Trade

Joralemon New Chief of Crosley Sales

THE appointment of A. M. Joralemon as general sales manager of The Crosley Radio Corporation, Cincinnati, brings another executive to the organization which has grown in the past three years under the guidance of Powel Crosley, Jr., its president.

The new executive was with the National Carbon Company, serving in a managerial capacity, for fourteen years. His most recent endeavors were as sales manager of the radio division of that company. Mr. Joralemon succeeds W. W. Boes, who has been appointed district manager for the State of Ohio.



A. M. JORALEMON

Handy Card Index Log Put on Market

S. T. ASTON & SON, 114 Worth St., New York City, have placed on the market a novel radio-log in the form of a card-index. The set consists of 10 good quality index cards printed with dial settings and data, a set of index dividers and a handsome cabinet. The cabinets can be had in mahogany finish or golden oak to match the user's set.

Neutrodyne owners will find this set particularly adapted to their needs, but it can be used with any set. Special cards can be had to order for the use of many dials.

Imitator Guilty; Fined \$100

AS the result of charges preferred by the Dubilier Condenser and Radio Corporation, Harold Hymans, doing business under the firm name of the Micadine Company, pleaded guilty to having imitated the Dubilier Micadon fixed condenser. Hymans was prosecuted criminally under the commercial fraud statutes of the State of New York. A sentence of thirty days in jail or \$100 fine was imposed by the court.

This is the first conviction in an effort to purge the radio industry and trade of fraudulent manufacturers and dealers.

New Corporations

Richardson Radio, New York City, 250 shares common stock, no par value; D. W. Richardson, I. O. Blake and L. O. Blake, Jr. (Attorney, S. V. Ryan, Albany.)

Walters Radio Research Laboratories, New York City, \$5,000; Y. Geffner, E. Ellison, T. S. Dvorkin. (Attorney, C. E. Benoit, 297 Fourth Ave.)

Mars Radio Shop, New York City, \$10,000; A. and A. Holland, Y. Levine. (Attorney, S. Goodeman, 63 Park Row.)

Ehrlich Electric Service, Troy, N. Y., \$15,000; C. S. and M. Erlich, H. C. August. (Attorneys, Stern & Hirschfeld, Albany.)

H. C. Roberts Electrical Supply Co., Syracuse, N. Y., \$500,000; G. E. Carpenter, C. Stark, H. M. Gansman. (Attorney, J. J. Jackson, Pittsburgh.)

Ili-Lo Radio Horn Co., New York City, 100 shares common stock, no par value; W. R. Wood, H. Respass. (Attorney, W. R. Respass, 27 Warren Street.)

Ace Radio Horn Corp., New York City, \$5,000; J. E. Benjamin, L. Knobel, E. M. Haas. (Attorneys, Cohen, Haas & Schimmel, 302 Broadway.)

H. L. Radio Laboratory, Queens, N. Y., \$10,000; H. Siegel, L. E. Rothfield. (Attorney, E. Blatt, 1265 Broadway.)

Besco Electrical Mfg. Corp., New York City, make radio sets, \$6,000; E. R. Kalka, L. D. Baily, N. Dashesky. (Attorney, D. W. Kahn, 120 Broadway.)

General American Radio Manufacturing Corp., New York City, 5,000 shares preferred stock, \$100 each; 10,000 common, no par value; I. Port, E. S. Friberg. (Attorney, A. M. Grill, 34 Wall St.)

Concourse Radio Corp., New York City, \$50,000; E. H. Bailey, A. H. Denzel, L. A. Olson. (Attorneys, Rumsey, Sheppard & Ingalls, 27 Cedar St.)

M. Miller Radio Supplies Corp., New York City, \$10,000; N. Horowitz, B. Goldberg, D. Berkowitz. (Attorneys, Freudenberg & Matuck, 522 5th Ave.)

Names Changed

F. E. M. Radio & Electric Corp., Queens, to F. E. M. Electric Co.

North American Radio and Supply Corp., Del., to North American Radio Corp.

Delaware Charters

Radio Engineering & Development Cop., Dover, \$100,000. (Capital Trust Co. of Delaware.)

Readers Ask for Literature

George Horning, 2213 State St., Erie, Pa.
W. A. Ramsey (dealer), Clarksville, Ga.
E. E. Ledbetter, Carrollton, Texas.
Roy Lee Taylor, 818 Electra St., Electra, Texas.

Coming Events

MAY 2.—Convention of Chamber of Commerce of the United States, at Cleveland, at which adoption of metric units of weights and measures will be discussed.

SEPTEMBER 22 to 28.—First Annual International Radio Show, Madison Square Garden, New York City.

"Big Summer" Is Prediction for Radio Fan

PLANS and programs just completed by the larger broadcasting stations in the United States, as well as by the leading manufacturers of radio apparatus, will make the summer of 1924 the greatest radio summer since broadcasting was begun.

This is the prediction made by E. B. Mallory, Chairman of the Radio Section of the Associated Manufacturers of Electrical Supplies, which includes in its membership leading factors in the radio industry.

"In the first place," said Mr. Mallory, "the Democratic National Convention in New York in June and the Republican National Convention in Cleveland during the same month, will place the radio fan right in the thick of the pre-election campaign. For the first time in the history of the United States, virtually millions of people will 'attend' the national conventions.

Tradiograms

THE WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY has moved its executive offices from 165 Broadway, New York City, to the new home of the Westinghouse Company at 150 Broadway. The new building is known as The Westinghouse, and all departments of the company will conduct business from there starting to-morrow. The Westinghouse Electric International Company and the Westinghouse Lamp Company moved in, also. The Westinghouse interests will utilize the upper twelve stories of the 23-story structure, the total space amounting to approximately 100,000 square feet.

Business Opportunities Radio and Electrical

Rates 40c a line; minimum 3 lines.

ELECTRICIAN—An opportunity rarely found awaits mechanics who can merchandise and finance an electrical and radio shop. Baker, 21, opposite Hotel Blackstone, Manhattan Beach, N. Y.

RADIO DEPARTMENT for rent, largest army and navy store in Newark; best location; wonderful opportunity for live wire. Box XX, RADIO WORLD.

RADIO ESTABLISHED BUSINESS, receipts \$1,000 to \$1,500 weekly; great thoroughfare; stock and fixtures cost \$8,000; sacrifice \$6,500; investigation invited. Crowe, Times Building, N. Y. C.

"LET US MANUFACTURE IT."

MANUFACTURER IN THE SOUTH WITH LARGE FACTORY AND VERY CHEAP LABOR IS INTERESTED IN QUANTITY PRODUCTION; ARTICLES MADE FROM STAMPED METAL ALSO WOOD; WE DO ASSEMBLING AND WHITE ENAMELING; WOULD BE INTERESTED IN MAKING SMALL RADIO PARTS. BOX 66 RADIO WORLD.

PARTNER with \$5,000 cash and sales ability to assist in expansion and marketing of a popular priced line of radio sets, with practically unlimited money-making possibilities. If you are serious, clean-cut and can qualify, give previous business experience or no attention will be paid to your reply. Box TT, RADIO WORLD.

WHN Licensed to Broadcast Ads

THE license granted by the American Telephone and Telegraph Company to Station WHN, New York, includes the right to charge tolls for broadcasting.

Heretofore the sale of broadcasting privileges was made only by the A. T. & T., from its WEAf station, and considerable opposition to such commercialization of the air was made.

The news of the settlement of the patent infringement suit against WHN was published in RADIO WORLD, issue of April 19. At that time all possible secrecy was maintained as to the terms of the license, but now the facts come out.

It is said that WHN is now negotiating for considerable broadcast advertising, having already signed up the Keystone Ice Cream Company for two sessions a week, ten minutes each, at \$75, or \$3.75 per minute. A shoe store is advertising the fact that it has bought time at WHN.

H. G. Cisin Now With Radio Receptor

RADIO RECEPTOR COMPANY has appointed H. G. Cisin as sales and advertising manager. Mr. Cisin was formerly in charge of Dictograph Products' radio sales promotion, advertising and publicity. His initiative and constructive merchandising ability brought outstanding success. Mr. Cisin was also engineering editor of "Electrical Record" for several years.

Mr. Cisin is a Cornell graduate, holding the degree of mechanical engineer and certificate of electrical engineer. In addition to being the author of "The Radio Telephone Handbook," he has written other books, including "Practical Electrical Engineering," "Modern Marine Engineering," etc. He has taught electrical engineering at Cornell University, Johns Hopkins University, U. S. Navy Electrical School and also Stevens Institute of Technology. While at Stevens he worked under Professor Hazeltine, inventor of the neutrodyne. During the war, Mr. Cisin served in the Navy as Ensign.

Paul Green Joins Jefferson Forces

PAUL GREEN, formerly advertising manager for the Cole Manufacturing Company, of Chicago, has taken over the duties of advertising manager for the Jefferson Electric Manufacturing Company, 426-430 South Green Street, Chicago, manufacturers of a complete line of radio transformers, as well as other transformers and ignition coils.

A plan has been laid out whereby the facilities of the Jefferson Research Laboratories will be virtually thrown open to the radio public.

Detailed information on this opportunity to the public will be disclosed later, the company announced.

The Superdyne Circuit To be Discussed

IN an early issue of RADIO WORLD there will be published an article on Refinements of the Superdyne, treating particularly of the tuning and selectivity of the circuit. All possible points where trouble may occur to interfere with the proper working of the set will be discussed in detail by N. N. Bernstein, Technical Editor. Also construction diagrams will be published for convenient reference.

Radio Manufacturers!

READ THIS interesting letter from a manufacturer who has doubled his business every 90 days for the past year.

SLEEPER RADIO CORPORATION

88 Park Place
New York City

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

April 22, 1924.

It is now a full year that we have been using RADIO WORLD to tell the story of the Monotrol to your readers. We have found RADIO WORLD to be in the truest sense a national publication and the amazing thing to us has been not so much the splendid response that we got to the first announcement that David Grimes had come with us as our Chief Engineer and that we were producing a loop set using the Grimes Inverse Duplex Circuit, as was the great flood of replies that still continues to come to our advertising.

In the last week at a season of the year when so many people wrongly assume that interest in radio is dormant, we have had fifty-two inquiries from dealers wanting to handle the Monotrol and something over a hundred requests for information from individuals.

We strongly recommend RADIO WORLD to any advertiser having a story of national appeal.

Yours very truly,

(Signed) GORDON C. SLEEPER,
President.

New List of Broadcast Stations

AN official list of broadcasting stations, brought up to the moment of going to press, will be published in an early issue of RADIO WORLD.

All new stations, with wave length in meters and kilocycles, will appear. Also the names and addresses of the station owners will be given.

The 570-odd stations in the United States will be on the list—every single one of them. So will all the stations in Canada, Mexico and Cuba.

WATCH FOR THE LIST!

Keep the Copy of Radio World for Ready Reference!

New Binding Post

"CAN'T-LOSE-EM" is a very good for the binding post put out by the Cortlandt Panel Engraving Co., 81 Cortlandt Street, New York City. The taps are counter-sunk and cannot come off to roll under the bureau while the fan is anxious to hook up his set. The binding post is Bakelite, handsomely engraved; the taps are nickel-plated with lugs attached. This concern also cuts, drills and engraves panels.

Court Throws Out Broadcasting Suit

CINCINNATI.

A VICTORY for broadcasting stations using musical numbers on which a copyright has been granted was won in the United States District Court here when Judge Hickenlooper dismissed a petition filed to halt the broadcasting of such numbers without paying the holder of the copyright.

Nine Senators

Against the Tax

WASHINGTON.

THE fate of the proposed 10 per cent tax on radio sets and parts is in doubt.

The following senators are said to be opposed to taxing radio sets, parts or accessories:

- Oscar W. Underwood, Alabama, D.
- W. J. Harris, Georgia, D.
- Wm. B. McKinley, Illinois, R.
- Arthur Capper, Kansas, R.
- Woodbridge N. Ferris, Mich., R.
- Pat Harrison, Mississippi, D.
- Ralph B. Howell, Nebraska, R.
- Walter E. Edge, New Jersey, R.
- C. C. Dill, Washington, D.
- Magnus Johnson, of Minnesota, Farmer Labor Party.
- Ellison B. Smith, South Carolina, D.

Shack Engineers Happy Over Their Product

THE engineers of the Radio Shack, 55 Vesey Street, New York City, after extensive research and experiment have arrived at what they consider probably the best neutrodyne set at the price. Careful study of the weaknesses of the individual parts that go to make up some neutrodyne have enabled the Radio Shack experts to assemble an outfit of specialized units that work together with the highest efficiency. Not only does the assembled set work to the entire satisfaction of the user, but the appearance is also very pleasing. The mahogany panel and dials, fronted with the gold plated jacks and gold engraving give the outfit that high class finish that only comes with expensive makes. All apparatus used in the set is licensed under the Hazeltine Neutrodyne patent.

Amateurs:—

Get One of These

WESTERN ELECTRIC MICROPHONES



Talk thru your own set. Two types—one with breast-plate, shoulder-straps, cord and plug; other, larger size for mounting or suspending.



\$1.50

Shipped prepaid anywhere in U. S. Send no Stamps or Checks—Money Orders Only.

ROVA

Dept. B, 167 West 18th St., N. Y. C.

Hula-Hula Island Hears Chicago on 2 Tubes

THREE letters and a radio bulletin have just been received by KYW, the Westinghouse station at Chicago, from Samoa, a British possession in the South Sea Islands—some 6,000 miles from Chicago.

"Mr. E. E. Dunwoodie, radio officer of Western Samoa heard you quite distinctly," wrote Quincy F. Roberts, American Vice-Consul, "He used a single circuit receiver, with one stage of audio frequency amplification. On Sunday, February 14, he heard you signing off at 1:04 A. M.

"The music modulation was splendid," wrote W. Ralph Ragsdale, of Savaii, British Samoa. "We heard the singing, the pipe organ music and the piano. The signal strength was nearly the same as that received from Pacific Coast stations."

A Set in Dressing-Room

LIONEL ATWILL, star of "The Outsider," at the Ambassador Theater, New York City, is having a radio installed

in his dressing room. Mr. Atwill has no particular interest in the violin solos or bedtime stories, but is a great prizefight fan. Theatrical engagements have always kept Mr. Atwill away from the big July bouts; this year he hopes to enjoy a vicarious thrill through his radio at the Ambassador.

GUARANTEED

8-Tube Super-Heterodyne
Assembled in beautiful Mahogany Cabinet. List price \$225.00. **\$98.00** Net

5-Tube Neutrodyne
Completely assembled in attractive Mahogany Cabinet. List price \$125.00. **\$69.00** Net

M. H. Kleinfeld & Co.
Dept. P
161 West 64th Street, New York City

The "Goode" Two-o-One



Le Ton d'argent

Guaranteed



BY MAIL ONLY
\$2.39
Postpaid

QUARTER AMPERE AMPLIFIER-DETECTOR RADIO TUBE

GUARANTEED SATISFACTORY

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

ONE—"Goode" Detector-Amplifier..... **\$2.39**
THREE—"Goode" Detector-Amplifiers..... **\$6.42**
(All postage prepaid)

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

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

The Goode Tube Corporation
Incorporated
EVANSVILLE INDIANA

\$25 for \$10

Famous Bel-Canto Loud Speaker PRICE

DELIVERED FREE TO YOUR DOOR

\$10

Money Back Any Time Within Ten Days If Dissatisfied

SENT FREE RADIO LOGGING CHART—GET ONE BEL-CANTO MFG. CO.

BENSEL-BONIS CO., Inc.

417-421 East 34th Street New York City
Tel. Vanderbilt 8959

AN EXPERT SAYS: RESISTANCE COUPLED AMPLIFICATION



G. Y. Allen, of the Westinghouse Electric and Manufacturing Co., writes in the MAY RADIO BROADCAST:

"True, great improvements have been made, but the fact remains that fundamentally the transformer cannot ever give distortionless amplification. For those who demand quality at all cost, the resistance coupled amplifier is unquestionably the most desirable.

"Cost is no longer a drawback! Daven specialized resistance coupled amplifier parts have cut the price to less than \$3.00 per stage!"



Special inexpensive resistors from 5,000 ohms up. Our RESISTO-COUPLER, to hold resistor, leak and condenser \$1.50
Ask your dealer—or let us help you out.

DAVEN RADIO COMPANY
"Resistor Specialists"
10-12 CAMPBELL STREET, NEWARK, N. J.

ARROW BATTERY SLASHES Prices TO CONSUMERS ONLY

Prices Smashed! Quality Not Sacrificed

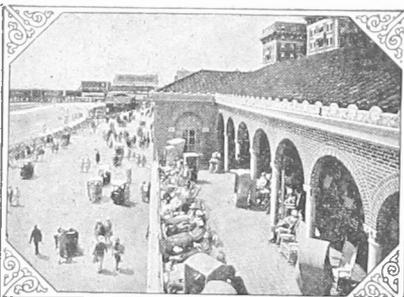
Here is real battery quality, guaranteed to you, at prices that will astound the entire battery-buying public. Order direct from factory. Put the Dealer's Profit in your own pocket. You actually save much more than half, and so that you can be convinced of true quality and performance, we give a **Written Two-Year Guarantee**.

Here is your protection! Noneed to take a chance. Our batteries right—and the price is the lowest ever made. Convince yourself. Read the prices!

- Special 2-Volt Radio Storage Battery, \$3.75
- Special 4-Volt Radio Storage Battery, 6.00
- 6-Volt, 60 Amp. Radio Storage Battery, 7.00
- 6-Volt, 80 Amp. Radio Storage Battery, 8.00
- 6-Volt, 100 Amp. Radio Storage Battery, 9.50
- 6-Volt, 120 Amp. Radio Storage Battery, 11.50
- 6-Volt, 140 Amp. Radio Storage Battery, 13.00

We ask for no deposit. Simply send name and address and style wanted. Battery will be shipped the day we receive your order Express C. O. D., subject to your examination on arrival. Our guarantee accompanies each battery. We allow 5% discount for cash in full with order. You cannot lose! Act quick. Send your order today—NOW.

Arrow Battery Co.
1421 South Wabash Ave.
Dept. 8 Chicago, Ill.



CHALFONTE-HADDON HALL ATLANTIC CITY

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

For more than fifty years, these two delightful hotels have been the natural choice of cultivated, interesting people—bent on happy, health-giving days by the sea.

American Plan Only. Always Open. Illustrated folder and rates on request.

LEEDS and LIPPINCOTT COMPANY



VAN'S RADIO RECORD BOOK

Everything right before you at a Glance when you have this copyrighted RADIO RECORD BOOK. Space opposite each Broadcasting Station for Dials Settings (any set). Keep a record of all stations you have heard, and go right back to them when wanted. No set complete without one. Money Back if you are not SATISFIED. Thousands of Listeners-in are using VAN'S RADIO RECORD BOOK everywhere. Send stamp for "sample page."

VACUUM TUBE CHART HOW TO SELECT AND USE THEM

Different RADIO TUBES illustrated. Tells you what TUBES to get the BEST out of your receiving set. Power and current required and consumed by the different tubes from Laboratory Tests. What TUBES work best with a DRY CELL or STORAGE batteries, or on both. If you SEE this book, you will want one.

Price 50 Cents

At Your Dealer or Sent Prepaid on Receipt of Price.

VAN PUBLISHING CO.
112 Nassau Street, New York

Fans who are considerate of the comfort and pleasure of their neighbors and other radio fans in the vicinity should get RADIO WORLD for Dec. 8, Feb. 9, and Feb. 23, and see how they can conquer the squeals in their receivers that are causing so much trouble. 15c. per copy, the three issues for 45c., or start your year's subscription with and one of them. RADIO WORLD, 1493 Broadway, New York City.

Russell Thaw Not Worried



(International Newsreel)
RUSSELL THAW

able to manage his own estate, Russell Thaw, son of Evelyn Nesbit Thaw and Harry, tuned in, just to show he wasn't worrying. His mother expressed fear that Harry Thaw, if freed from the insane asylum, would menace her and their son.



378 DX STATIONS

DX fans, if you have not logged 300 stations in past six months you need a Kennedy Three Circuit Tuner. The Kennedy Tuner logged 378 stations from September 15th to March 15th, including 210, London; SWA Cardiff, Wales; CFCM Calgary, Alberta, Canada; KGW Portland, Oregon; KFI and KHJ Los Angeles, California; KPO San Francisco, California; KGO and KLX Oakland, California.

KENNEDY TUNER TAKES THE PLACE OF

3 Honeycomb Cells at \$1.40	\$4.20
1 Honeycomb Coil Mounting	5.00
1 23-Plate Vernier Condenser	5.00
		\$14.20

Kennedy Tuner, including
Globe Trotter Diagram **\$5.00**

T. J. KENNEDY
RADIO GLOBE TROTTER
470 W. 159TH STREET NEW YORK, N. Y.
GUARANTEE: If not satisfied after 30 days will cheerfully return your money.

MAHOGANITE Dials that match the set

ATLANTIC CITY.
A JURY in Philadelphia having decided, after deliberating eleven hours, that Harry K. Thaw was of sound mind and

"KILLS REFLEX TROUBLES"

"LINCOLN" DETECTOR

Creating tremendous sensation. Enclosed, fixed, adjustable. New. Brings in distant stations loud and clear. You need it. Ask your dealer or write—today. Price only \$2.00. Absolutely guaranteed for one year.

Jobbers, Dealers: Wire or write. Mention this ad.

LINCOLN MFG. COMPANY
Dept. S-4 Los Angeles, Calif.

10c Brings You
Our New
48-Page Radio Catalog.
Includes thousands of
unequaled Radio Bargains

Send a dime for your copy, today!

CHICAGO SALVAGE STOCK STORE
527 South State Street
CHICAGO

Like all other distinctive products, Mahoganite has its imitators. But, these imitations are on the surface only. Mahoganite is not a surface finish. The electrical values of Mahoganite extend through the material.

The only way to assure yourself of genuine Mahoganite Panels, or Dials which match the panels is to make sure that the RADION Trademark is on every one that you buy.

21 Stock Sizes

Mahoganite and Black

6 x 7	7 x 14	8 x 26
6 x 10 1/2	7 x 18	9 x 14
6 x 14	7 x 21	10 x 12
6 x 21	7 x 24	12 x 14
7 x 9	7 x 26	12 x 21
7 x 10	7 x 30	14 x 18
7 x 12	7 x 48	20 x 24

RADION

The Supreme Insulation
PANELS

Dials, Sockets, Knobs, Insulators



Look for this stamp on every genuine RADION panel, because of substitutes and imitations.

INTRODUCING THE

ULTRA-SYNCHRODYNE

YEARS IN ADVANCE

THE PINNACLE OF RADIO. Years in advance of the present age. This wonderful receiving set is beyond comparison. It's the last word in radio reception. Not only is it synchronized, but it is ultraized. When others fail, this baby begins. Twenty-seven broadcasting stations logged in three hours. Los Angeles heard clearly on loud speaker 3,000 miles away. Mounted in a beautiful Mahogany or Walnut Cabinet. Quality material—high class workmanship. A set fit for King George, but made for you. No middle man profits added. Direct from manufacturer to user, at wholesale prices. This set comes to you complete, everything needed is furnished, or you can purchase it in parts, or piece by piece, our written guarantee enclosed. Satisfaction or money refunded. In only one way can you compare this new wonder with others—See it!

Hear it! Write for complete details.

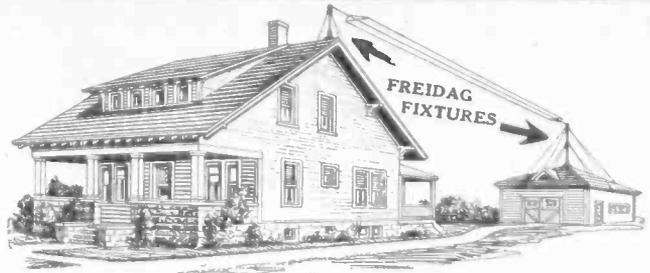
THE STANLEY RADIO SUPPLY COMPANY
2947 LORAIN AVENUE CLEVELAND, OHIO

American Hard Rubber Co.
11 Mercer St. New York

The Right Aerial

for Your House

MEANS SAFETY AND PROTECTION
FOR YOU AND YOUR NEIGHBORS



FREIDAG AERIAL MAST PIPE FIXTURES

MAKE A

SURE—SAFE—SIGHTLY AERIAL



No. 60—Price \$3.50
Per Set

Lighter Fixture
No. 70—Price \$1.00
Per Set

DESIGNED to take the place of unsightly, poorly erected wood poles and towers used in the erecting of aerials. Will allow the erection of any height or length aerial. Uses $\frac{1}{2}$ and 1 inch standard pipe. Equipped with Guy Wires. If your dealer cannot supply them, write us, giving his name.

DEALERS—JOBBER: The fan has learned the importance of a perfect aerial. Sell them Perfect Aerial Fittings. Write today for discounts and descriptive booklet.

DIRECT SALES COMPANY
431 SO. DEARBORN STREET CHICAGO, ILL.

The Bestone V-60 Super-Toned Receiver



*Incorporates
All the Essential Qualities
for Ideal Radio Reception*

Tone	Distance	Volume
Economy	Sensitivity	Selectivity
Ruggedness	Two Controls	Simple Tuning
No Regeneration	No Distortion	No Reradiation
No Howls or Squeals	No Body Capacity	Only Four Tubes

Parts May Be Had by the Experimenter

Write for Particulars

HENRY HYMAN & COMPANY, Inc.

476 BROADWAY
NEW YORK

Manufacturers

212 W. AUSTIN AVE.
CHICAGO

"The 'Bestone' Receiver under tests conducted by the Radio Editor has proven superior in tonal quality to any set, commercial or home-made, tested under similar conditions. It was noteworthy that volume was not sacrificed for clarity as is commonly the case."

New York Telegram-Mail.

"It is easy to tune and it certainly does work—has the selectivity which is essential where the ether is congested as it is here."

New York Herald-Tribune.

"The 'BESTONE' Circuit combines the essentials of the ideal radio Receiver in an economical, practical combination. The outstanding features are its quietness of operation without distortion, its extreme sensitivity, simplicity of operation, faithful reproduction and distance-getting qualities."

New York World.

Programs

Monday, May 5 (continued from page 23)

P. M., Examiner news bulletins. 6:45 P. M., Nick Harris detective stories and concert. 8 P. M., Evening Herald concert. 9 P. M., Examiner concert. 10 P. M., Hollywood Community Orchestra. 11 P. M., Ambassador-Max Fisher's Coconut Grove Orchestra.

KPO, San Francisco, 423m. (710k), P. T.—2:30 P. M., John Favre, cellist, accompanied by Sarah I. McFarland; banjo solos, Peter J. Butti; soprano solo, Augusta Hayden. 4:30 P. M., Rudy Seiger's Fairmont Hotel Orchestra. 5:30 P. M., children's hour stories by "Big Brother" of KPO. 7 P. M., Rudy Seiger's Fairmont Hotel Orchestra. 9 P. M., program under the management of Pearl H. Whitcomb. 10 P. M., E. Max Bradford's Versatile Band.

CKAC, Montreal, 425m. (705k), E. S. T.—1:45 P. M., Mt. Royal Hotel classic concert. 4 P. M., weather, stocks, news. 4:30 P. M., Mt. Royal Hotel Dance Orchestra.

WFAA, Dallas, Texas, 476m. (630k), C. S. T.—12:30 P. M., address, Dr. J. B. Cranfill, business

NEUTRODYNE

FADA, complete\$69.45

BUILT FOR YOU FREE

FADA Sealed Kit, 5-tube.....\$54.75

PERFECTION RADIO CORP.

119 W. 23rd Street 59 Cortlandt Street
118 Nassau Street 78 Cortlandt Street
NEW YORK CITY



RITTER COLLAPSIBLE

\$6.50
List

Cut Out That Static

Leading Radio Engineers are unanimous in saying that only 2% of summer static can pass through a Ritter Collapsible. Whether it's a Superheterodyne Reflex, or ordinary radio frequency circuit, you can improve its reception with a Ritter Collapsible. And they bring it distance.

Ask your dealer or write us direct.

RITTER RADIO CO.,
232 Canal St. N. Y.

DID YOU GET A COPY OF THE ANNIVERSARY NUMBER OF RADIO WORLD DATED APRIL 5? Larger than usual, and full of many special features. Mailed on receipt of 15c in stamps, or begin your subscription with that number.—RADIO WORLD, 1493 Broadway, New York City.

man, on "Things That Are Real." 8:30 P. M., B. M. Taylor, leading the Gospel-in-Song Quartet, male singers.

KGO, Oakland, Cal., 312m. (960k), P. T.—1:30 P. M., New York Stock Exchange and U. S. Weather Bureau reports. 3 P. M., short musical program; address on the subject "The Health of the Child." 4 P. M., St. Francis Hotel Dance Orchestra, San Francisco, Henry Halstead, leader. 6:45 P. M., final reading, stock exchange and weather reports and news items. 8 P. M., educational program, with musical numbers; courses in agriculture, Spanish, music, economics and literature.

WHAZ, Troy, N. Y., 380m. (790k), E. S. T.—9 P. M., National Music Week feature; concert by Troy Conservatory of Music faculty and pupils. 9:30 P. M., educational talk by member of faculty of Rensselaer Polytechnic Institute. 10 P. M., garden talk by John Jeannin, Jr., former extension lecturer, New York State Department.

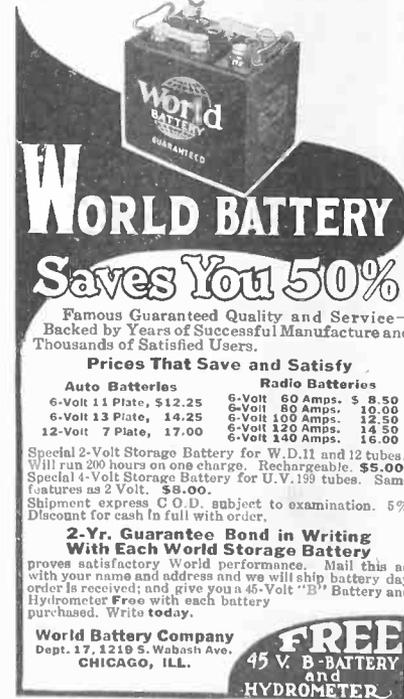
(Continued on page 34)

SUPER RADIOS

With Super Performance

When you buy a radio receiver you want one that will be permanent—that you can easily operate—that will give a clear, life-like and vivid tone. From every standpoint the new Slagle receiver will surpass your expectations. You can hear all the best musicians and fun makers in the country for less because you buy direct. Write today for FREE catalogue and price list.

SLAGLE RADIO COMPANY
531 Masterson Ave. Fort Wayne, Ind.



WORLD BATTERY
Saves You 50%

Famous Guaranteed Quality and Service—Backed by Years of Successful Manufacture and Thousands of Satisfied Users.

Prices That Save and Satisfy

Auto Batteries		Radio Batteries	
6-Volt 11 Plate, \$12.25	6-Volt 60 Amps. \$ 8.50	6-Volt 80 Amps. 10.00	6-Volt 100 Amps. 12.50
6-Volt 13 Plate, 14.25	6-Volt 120 Amps. 14.50	6-Volt 140 Amps. 16.00	
12-Volt 7 Plate, 17.00			

Special 2-Volt Storage Battery for W. D. 11 and 12 tubes. Will run 200 hours on one charge. Rechargeable. \$5.00.
Special 4-Volt Storage Battery for U. V. 199 tubes. Same features as 2 Volt. \$8.00.
Shipment express C. O. D. subject to examination. 5% Discount for cash in full with order.

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

proves satisfactory World performance. Mail this ad with your name and address and we will ship battery day order is received; and give you a 45-Volt "B" Battery and Hydrometer Free with each battery purchased. Write today.

World Battery Company
Dept. 17, 1219 S. Wabash Ave.
CHICAGO, ILL.

FREE
45 V. B. BATTERY and HYDROMETER

SAVE 25%

WHOLESALE TO THE PUBLIC

ALLOW US TO QUOTE ON ANY PARTS OR STANDARD SETS

Mail Order Department

BROOKLYN RADIO SERVICE CO.

577 Myrtle Avenue
BROOKLYN, N. Y.

Telephones:
Prospect 8168-2952

Send 5c. in Stamps for Catalogue

SLEEPER MONOTROL

Reg. U. S. Pat. Off.

Licensed under the Grimes Inverse Duplex Inventions. No aerial—no ground. Just dial to turn.

Perfect selectivity—no interference. The Monotrol will bring in more stations with better reception than any other set you have ever heard.

Booklet "W" on request.

SLEEPER RADIO CORPORATION
88 Park Place New York

RADIO WORLD'S QUICK-ACTION CLASSIFIED ADS

5 CENTS A WORD. 10 WORDS MINIMUM

VACUUM TUBES—For sale 2 WEJ Tubes guaranteed new and perfect. \$4.50 each or \$8.50 for both. Address W. J. Bramblett, 61 Maple St., Charleston, S. C.

FOR SALE—Slightly used Grebe "Rorn" 201A Tube and coils. A real bargain. Write Paul H. Clauss, Lehighton, Penna.

FOR SALE—Knocked-down, three circuit receiver. Cheap. Write for particulars. Wallace Hulbregtse, Oostburg, Wisconsin.

PATENTS PROCURED—Send sketch or model today for examination, prompt report and advice. No charge for preliminary advice. Write for free Booklet and blank form on which to disclose your idea. Highest references. Promptness assured. Clarence A. O'Brien, Registered Patent Lawyer, 201-C, Security Bank Building. Directly across the street from Patent Office, Washington, D. C.

MAIL US YOUR DISCARDED JEWELRY—Gold Crowns and Bridges, Watches, Diamonds, Silver, Platinum and Old False Teeth. Money promptly mailed. Goods returned if offer refused. UNITED STATES SMELTING WORKS, (The Old Reliable), Dept. 55A, Chicago, Ill.

MAGNAVOX R3 or M1—Latest nationally advertised reproducers. List, \$35. Introductory, \$25. The factory sealed carton is your guarantee. RADIO CENTRAL, Dept. W., Abilene, Kans.

PATENTS—SEND DRAWING OR MODEL FOR EXAMINATION AND OPINION. Booklet free. Write to E. Coleman, Patent Lawyer, 644 G St., Washington, D. C.

FREE RADIO MAP—With each order for Loose Leaf Binder containing Blue Prints and Design Data on all standard circuits. Sent prepaid for only fifty cents. E. Jay Foley, 587 Fifth Avenue, Astoria, Ore.

FOR SALE—Radiola Sr. and Amplifier. Brand new. Complete with tubes and headset. \$65.00. Earl Wright, Cole Camp, Mo.

START A PICTURE SHOW. Full Equipments, Machines, Screens, and everything complete, \$100.00 and up. Send for literature. WESTERN MOTION PICTURE CO., Danville, Ill.

DEFOREST'S WIRELESS IN THE HOME—Mailed for 15c postpaid. The Columbia Print, 1493 Broadway, New York City.

THE POPULAR NEUTRODYNE, the five-tube tuned radio-frequency set that even the inexperienced can operate. See RADIO WORLD dated March 8, 15, 22, and get all the details. The three copies for 45c, or free if you send \$6.00 for yearly subscription. RADIO WORLD, 1493 Broadway, New York City.

Repeats Paul Revere's Ride; Broadcasts Warning

PAUL REVERE, impersonated by a State Guard trooper in Colonial costume, repeated the famous midnight ride of 149 years ago, when the countryside turned out to celebrate Patriot's Day. But radio and air-planes assisted in spreading the alarm of the advance of the British.

"Revere" mounted his horse in front of the old Paul Revere house in the North End, and rode through Charlestown to Medford, where he shouted his warning through the microphone of Station WGI at Medford Hillside, and then galloped on over the old route to Arlington and Lexington.

Lexington Minute Men, dressed like their ancestors and carrying their powderhorns and flintlocks, met "Paul" at the Buckman Tavern, which was the headquarters of Captain Parker's men, on April 19, 1775.

Ideas Worth While

BROADCAST announcers should give their call letters before and after each rendition by singer, speaker or orchestra.

MANUFACTURERS should furnish templates for all their panel-mounted parts.

"**C**OMPLETE" in reference to a set should be used only when aerial, all batteries and tubes are furnished for the price stated. "Semi-complete" should be used to describe set including panel and

cabinet, but excluding aerial, tubes and batteries.

[Readers who have worth-while ideas for improving and standardizing the radio field should address Idea Editor, RADIO WORLD, 1493 Broadway, New York City.]

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WHAT IS AN INVENTION?
How to obtain a patent and other valuable information is supplied in our FREE Booklet. Write for a copy today.
MANUFACTURERS PATENT CO., Inc.
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The Ultimate Radio Receiver THE FLEX-O-DYNE CO.

1674 Broadway (At 52nd St.)
New York, N. Y.

Circle 4589

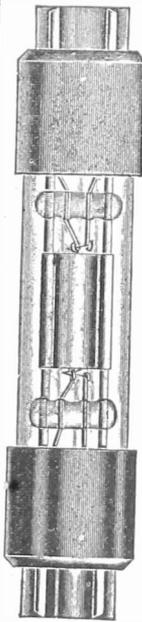
"GET HASTINGS, NEB." We Will Mail Free the Hook-up of "Killoch Kilo Koupler"

Most Wonderful Coil

A CIRCUIT WELL WORTH WHILE!
Build a two-tube set, one stage of R.F., using neutrodyne principle, and detector. Full details in Radio World, issue April 12. Send 15 cents.

David Killoch Company

57 Murray Street New York



(Actual Size)

The long-life tube!

Since their inception, radio vacuum tubes have been fragile. To knock or drop one incurred the expense of a new tube. But now there are

Myers Tubes

Practically Unbreakable

—so protected by their unique design that they have been dropped on the floor without injury. But their sturdiness is only one feature. They are the most perfect detectors and amplifiers obtainable. Smaller capacity and no bunched leads mean less interference—more clarity and greater amplification. Actual tests, all over the world, have proved their supremacy. Two types—**Dry Battery** and **Universal** (for storage battery). At your dealer's—or send price and be supplied postpaid. Write for free circuit diagrams.

\$5 Each. Complete with clips, ready to mount on your set; no sockets or other equipment necessary.

F. B. Myers Co. Ltd.
Radio Vacuum Tubes

240 CRAIG STREET W.
MONTREAL, CANADA

AT LAST! THE MOST PERFECT ONE-TUBE REFLEX

ever built

CLARITY—VOLUME
DISTANCE

Inductance or Capacity
Tuning or Both

NO Howling, Hissing, Squealing, Distortion, Rheostat, Potentiometer, Storage Battery (optional), Taps, Switches, or dead-end-losses.

Uses standard parts. A few cents changes your old reflex into this new one. Complete hook-up and all information.

PRICE ONE DOLLAR

Checks and stamps not accepted.
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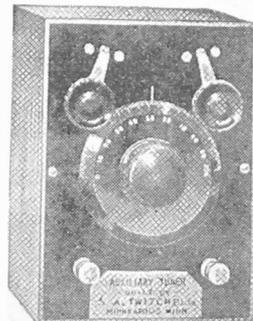
California

TWITCHELL AUXILIARY TUNER

Patents Pending. Name Registered.

CUTS OUT ALL INTERFERENCE

A TWITCHELL AUXILIARY TUNER connected to any make of tube receiving set will positively cut out any local broadcasting or code stations so you may tune in all long distance stations any time regardless of local conditions.



THE TWITCHELL AUXILIARY TUNER never decreases but in many cases increases volume from distant stations.

TWITCHELL TUNERS, however near large broadcasting stations, enable their owners to easily and completely cut out the local station and bring in distant stations at any time on a loud speaker.

This instrument will also enable you to bring in programs sent out on longer waves than you can tune in without it, thus bringing all the broadcasting stations within the wave length range of the many sets of limited range now in use.

Complete instrument, walnut cabinet..... \$15.00
All parts, unassembled, and diagram..... 9.00
Diagram of Twitchell Tuner..... .50

A New and Wonderfully Efficient Coil for the Reinartz circuit for those who want the best. Price \$4.00, or with blueprint for either one or three tubes, \$4.50.

This circuit brings in both coasts loud and clear and is the most successful Reinartz modification yet produced.

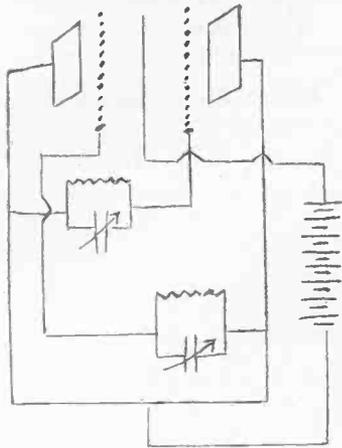
All goods prepaid. These instruments are easy to build, easy to operate. Everything clearly shown.

1830 WESTERN AVENUE

S. A. TWITCHELL

MINNEAPOLIS, MINN.

5-Electrode Tube Developed



MOUNTING of five-electrode tube.

GERMANY has quietly gone to work and built a five electrode tube. It consists of a filament, two grids, and two plates. They are on the same plan as that thought of (but never put into practice) by a Russian, Danilewsky, in 1920. The filament is

made somewhat in the form of a ring, the plates are fastened to glass frames on both upper and lower ends; and on this frame of glass is coiled the grid, so that the latter actually surrounds the plate. The distance between the grid and the plate is about 2 mm. The filament is also fixed to a small glass loop or frame, the distance between it and the grid being some 2 mm.

The tubes are used for the generation of very small waves (only two or three meters), the mounting commonly used being shown in the diagram.

TIPS TO THE NOVICE

on Purchase of a Set as given in the Radio World Decalogue, page 22, April 19th issue.

1. Quality of reproduction
2. Volume
3. Range (sensitivity)
4. Ease of tuning
5. Ease of construction
6. Non-radiating
7. Sharpness of tuning (selectivity)
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9. Small upkeep expense
10. Low cost



These 10 Points are just what you can expect from the GLOBE UNITUNE.

Described fully on page 25, April 19th Radio World.

Descriptive circular on request.

Globe Radio Equipment Co.
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\$15 Set Gets 2,000 Miles

The Essex Radio Special, the receiving set with a conscience, gets you more distant stations clearer and sweeter than sets costing ten times its price.

- \$15** SET COMPLETE WITH CABINET, WITHOUT TUBE OR BATTERIES
- \$20** SET COMPLETE WITH CABINET TUBE AND BATTERIES

Essex Radio Service

617 West 125th St. New York
Detailed information on request.

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No. 1001
6 1/2 Ohm Rheostat . \$1.10
25 Ohm Rheostat . \$1.10
40 Ohm Rheostat . \$1.10
Patd. 870,842

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200 Ohm Potentiometer . \$1.50
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Multi Terminal Receiver Plug
1 in 5 instantaneous connection for as many as six pairs of standard receiver plugs . \$2.00
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25 Ohm Mili-crometer Rheostat . \$1.50
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Crosley 51, 2-tube Regenerative	\$16.40
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Order direct or write for full description. Cut prices on Standard Radio Supplies. Send stamp for list.

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A C H LONG DISTANCE ONE-TUBE SET

\$17.50 Mail Orders Only

Price includes Case and Parts, all mounted ready to wire. No Solder. For Dry Cell Tube.

Including

- 2 A. C. H. Sharp Tuners \$5.00
- 2 A. C. H. 4-Phone Connectors . 25

NOTE—\$2.00 must be sent with C. O. D. Orders.

YES—Use the Wonderful A C H Sharp Tuners.

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100 Cards, Mahogany Finish or Oak Cabinet, and Index Dividers, Complete, \$3.00. A Useful Accessory to Any Set. Give Name of Your Set or Sketch of Dial Arrangement. Sent Postpaid on Receipt of Cash or Money Order.

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THE DE LUXE

HAZELTINE NEUTRODYNE

For Beauty and Distance

ALL PARTS MATCHED ALL PARTS LICENSED

Complete Assembly Kit to Build Your Own Genuine Hazeltine Neutrodyne

- 1 DRILLED Radion Mahogany Panel, engraved in gold.
- 5 Four-inch Radion Mahogany Dials, gold engraved.
- 1 Gold Plated Jacks.
- 1 Genuine Hazeltine Neutroformers mounted on the famous Comco Bakelite End Condensers. Positively the only Neutrodyne Kit including these famous Comco Condensers.
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- 1 5-Ohm and 1 10-Ohm Rheostat with Gold Plated Knobs to Match Panel.
- 2 Genuine Killark Shielded Audio Transformers.
- 1 Baseboard, 10 Foot Tinned Wire-bar.
- 1 80000 Freshman Grid Condenser.
- 1 Tubular Glass Grid Leak.
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Base also special panel and base blue print.

All packed in attractive box, \$34.49. Written Money-Back Guarantee.

All orders acknowledged by return mail. Shipments O. O. D. in 24 to 48 hours. We answer EVERY LETTER we get, same day we get it.

\$34.49

C. O. D. SEND NO MONEY.

Labels include: ALL PARTS MATCHED IN GOLD, GENUINE RADION MAHOGANITE DIALS, GENUINE RADION MAHOGANITE PANEL, GENUINE HAZELTINE NEUTROFORMERS, KILLARK SHIELDED TRANSFORMERS, GENUINE HAZELTINE NEUTROFORMERS, TAPERED ENGRAVED BINDING POSTS, FRESHMAN GRID LEAK AND CONDENSER, FRESHMAN MICRON CONDENSERS, HAZELTINE BRIGHT NEUTRODYNE, JACKS GOLD PLATED, RHEOSTATS BAKELITE MAHOGANITE WITH GOLD PLATED INDICATORS, COMSCO II PLATE BAKELITE END CONDENSERS.

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COMPLETE LIST—Of Radio Stations in the United States, Canada, Cuba, Porto Rico and Mexico appeared in RADIO WORLD dated April 5, 1924, and was corrected up to the date of going to press. 15c per copy, or begin your subscription with that number. RADIO WORLD, 1493 BROADWAY, NEW YORK CITY

Complete Additional Operating Accessories **\$43.40—CABINET FREE**

Everything needed to operate after building—5 Treated Tubes (Type 201A), \$19.50; 2 45-volt extra large Variable "B" Batteries (for Neutrodyne), \$6.00; 1 80-ampere hour Storage Battery (guaranteed 3 years), \$11.95; 1 pair 2000-ohm Head Phones and Cord, \$8.75; 1 Antenna Equipment, \$1.50; COMPLETE OUTFIT, \$48.40 C. O. D. (Accessories also sold separately.) If you order Building Outfit and Operating Outfit both together we will include fine Mahogany Finish Cabinet FREE.

The RADIO-SHACK

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55 Vesey St., Dept. RW53
NEW YORK CITY

Programs

Monday, May 5 (continued from page 31)

ment of Agriculture, 10:30 P. M., program of popular dance music by Flush's Orchestra.

KFAE, Pullman, Wash., 330m. (910k), P. T.—8:30 P. M., "Can the Modern Church Prevent War?" Rev. Clay Palmer; soprano solos, Marguerite Miller, Spokane; mining talk, Dean L. O. Howard; saxophone solos, Louis Wersen, Mt. Vernon; plant pathology, Geo. Severance; piano solos, Irmingarde King, Spokane; guitar trio, Rex Turner, of Huntington Park, Cal., Reginald Cooper of Honolulu, and Horace Trimble of White Bluffs, Wash.

WGY, Schenectady, N. Y., 380m (790k), E. S. T.—7:45 P. M., program by the Georgine Servoss Choral Club of Amsterdam, N. Y., Hazel Wehr, director. Address, "Radicalism That Means Real Progress," by C. M. Ripley.

WEAF, New York, 492m (610k), E. S. T.—4 P. M., dance program by Kenneth Casey and his Steeplechase Orchestra. Women's program under the auspices of the Women's League of the United Synagogue of America, 7 P. M., Brooke Johns, popular songs, accompanied by Ray Perkins; talk on "Arbitration" by Judge Moses H. Grossman, acting president of the Arbitration Society of America; United Cigar Stores Daily Sport Talk by Thornton Fisher; Moses Levine, violinist, accompanied by Boris Jivoff; Lewis Wil-

liamson, tenor, accompanied by Everett Hall; Bella Girard, contralto, accompanied by Madeline Vose; talk by Paul Kravath; music by the A. and P. Gypsies.

WOO, Philadelphia, 509m (590k, E. S. T.—9:10 P. M., Fox Theatre Grand Orchestra, Erno Rapee, director, 10 P. M., Grand Organ Recital, Mary E. Vogt, 10:30 P. M., dance program by the Havana Casino Orchestra, 10:55 P. M., United States Naval Observatory time signal, 11:02 P. M., United States weather forecast, 11:03 P. M., continuation of dance program.

KFAE, Pullman, Wash., 330m. (910k), P. T.—8:30 P. M., Varsity Male Quartet recital; piano solos, Leighton Bailey, Spokane; tenor solos, Fred Marshall, Spokane; "Main Crop Potatoes,"

(Concluded on next page)



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BROOKLYN, N. Y.

Send for our new CATALOGUE No. "B" (just off the press). The greatest radio bargain list in the country. Don't buy anywhere before getting our prices. (Enclose 4c in stamps to cover postage).



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OUR THREE

SUNBEAM LEADERS

The Air-King, 3 Circuit Tuner.....\$16.50
The Wonderful Ambassador, 1 tube...\$16.50
The Famous Journal, 1 Knob Set.....\$12.50
All three assembled and wired in handsome Cabinet. Each of these sets has brought in WOC from New York City.

SUNBEAM ELECTRIC CO.
71 Third Avenue New York City

SAMSON TUBES

201-A TYPE—1/4 Ampere, 5 Volt

\$3.50

Send in your C. O. D. order for the Samson tube which is as good as human skill can produce, and approved by high authorities.

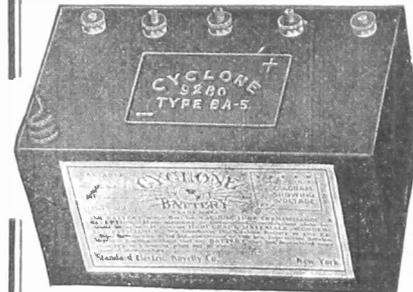
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DEALERS' AND AGENTS' TRADE SOLICITED
PHOENIX TUBE COMPANY
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The Missing Link in Radio

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"A" and "B" BATTERIES specially built for your Radio Set in all types. Highest quality GUARANTEED for DISTANCE, CLEARNESS, and LONG LIFE. Standard Electric Novelty Co.

NEW YORK CITY
Best proposition for Jobbers and Dealers. Some territory still available for New Distributors. Write for details at once.

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GENUINE 4 TUBE SUPERDYNE
More powerful than a 6-tube naval receiver. Easy to build. Complete parts:

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| 1 Superdyne Coupler | 4 Switch Stops |
| 2 23-Plate Variable Condensers, .0005 mfd. | 4 V. T. Sockets |
| 1 Variable Grid-Leak | 2 Acme Audio Transformers |
| 1 .00025 mfd. Fixed Condenser | 1 Single Circuit Jack |
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| 2 Switch Levers | 7"x24" Panel |
| 4 Switch Points | Bus Wires, Spaghetti and Diagram |

Special\$27.50

COMPLETE STANDARD PARTS FOR NEUTRODYNE 5 TUBE SET

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| 1 7x26 Baseboard | 1 30 ohm Bestone Rheo and Dial |
| 3 Neutroformers | 1 7x26 Drilled Panel |
| 2 Neutrodons | 1 .00025 Dubiller Condenser |
| 5 Nat'l Bakelite Sockets | 1 2 Meg. Leak |
| 2 Jefferson Transformers | 1 Cut-Hammer Battery |
| 2 Filament Control Jacks | 2 .006 Mica Condensers |
| 1 Switch | 8 Binding Posts |
| 1 Bestone Power Rheo and Dial | Spaghetti, Wire, Blue-Print and Booklet. |

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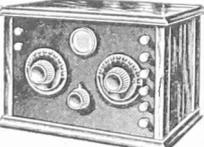
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Produces astonishing results. Receives music, speeches, information, instruction, sermons, etc., free to you, from broadcasting stations hundreds of miles away, often more than 1000. Easy to operate. Cheapest means of entertainment ever devised. No knowledge of radio required. No electricity except a battery included in offer. Satisfaction Guaranteed. Big bargain—only \$21.98 for all parts and accessories complete. No money in advance. SEND FOR RADIO BOOK FREE. Grammed full of offers at cut prices. Radio will help you. Investigate. Write today. Liberty M. O. House, Dept. 619, 106 Liberty St., N.Y.C.

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M. B. SLEEPER RADIO DESIGN & CONSTRUCTION FOR EXPERIMENTERS, REFLEX & RADIO FREQUENCY—Mailed on receipt of \$1.00. The Columbia Print, 1493 Broadway, New York City.

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RADIO WORLD,
1493 Broadway, New York City.

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A Storage Rechargeable Battery

ECONOMICAL—EFFICIENT—ATTRACTIVE

Made of Edison Elements

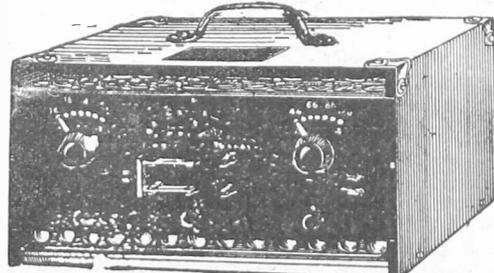
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The Superiority of the Roberts "B" has been acclaimed by users and experimenters. It is of Alkaline type. No acids to corrode the furniture or to harm anybody. Gives volume, clarity and distance to your set, for it is POWERFUL and NOISELESS IN OPERATION.

A swing of the switch levers gives instant voltage changes on detector and amplifying tubes.

No change of wiring necessary. Only three (3) main terminals to connect.

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5 Tube Neutrodyne \$47.50

BUILT FOR YOU FREE

The most beautiful and efficient receiver in the World. Guaranteed to equal in efficiency the highest priced Neutrodyne set.

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25 West Mt. Eden Ave. New York

Supremacy Proven by Every Test

FILKO-STAT
THE SCIENTIFICALLY CORRECT
RADIO RHEOSTAT

(Concluded from preceding page)

C. L. Vincent; "The Art of Home Furnishing," Dean Florence Harrison; "The Business of Farming," R. N. Miller; lecture by Dr. E. A. Bryan.

Tuesday, May 6

WBAP, Fort Worth, Texas, 476m. (620k), C. S. T.—7:30 P. M., concert offered by the Reagan Literary Society of Denton, Texas. 9:30 P. M., concert offered by Miss Virginia Jackson.

KFI, Los Angeles, Cal., 469m. (640 k), P. T.—4:45 P. M., Evening Herald news bulletins. 5:15 P. M., Examiner news bulletins. 6:45, vocal concert; 8 P. M., Ambassador-Max Fischer's Coconut Grove Orchestra. 9 P. M., Examiner concert. 10 P. M., special Music Week concert.

KPO, San Francisco, 423m. (710k), P. T.—2:30 P. M., organ recital by Theodore J. Irwin. 4:30 P. M., Rudy Seiger's Fairmont Hotel Orchestra. 5:30 P. M., children's hour stories by "Big Brother" of KPO. 6:30 P. M., "Cleveland Six" Orchestra of the Chandler-Cleveland Motor Co. 7 P. M., Rudy Seiger's Fairmont Hotel Orchestra. 8 P. M., program by the 30th Infantry, U. S. Army Band.

CKAC, Montreal, 425m. (705k), E. S. T.—4 P. M., weather, news, stocks. 7 P. M., Kiddies'

stories in French and English. 7:30 P. M., Rex Battle and his Mt. Royal Hotel Orchestra in a super-classic program. 8:30 P. M., La 'Presse' studio program. 10:30 P. M., Jos. C. Smith and his Mt. Royal Hotel Dance Orchestra.

WFAA, Dallas, Texas, 476m. (630k), E. S. T.—12:30 P. M., address, DeWitt McMurray, editor The Semi-Weekly Farm News, in a medley of humor, pathos and wisdom. 8:30 P. M., dramatic and musical program by the Council of Jewish Juniors. 11 P. M., Mrs. Anna Ledford in piano-logic, followed by the Lone Star Five Orchestra in popular music recital.

KGO, Oakland, Cal., 312m. (960k), P. T.—1:30 P. M., New York Stock Exchange and U. S. Weather Bureau reports. 4 P. M., Concert Orchestra of the St. Francis Hotel, San Francisco, Fermin Cardona, conductor. 6:45 P. M., final reading, stock exchange and weather reports and news items. 8 P. M., address, Charles K. Field, editor Sunset Magazine, "Editorial Arrows." Musical program. 10 P. M., St. Francis Hotel Dance Orchestra, San Francisco.

WHAH, Joplin, Mo., 283m. (1060k), C. S. F.—9 P. M., Maurice Jones Dance Orchestra.



"37 distant stations heard in one night"

"IF ANYTHING is good, I sure believe in praising it—and I can't begin to praise your Shamrock Kit enough. I threw out a high priced regenerative set because of poor selectivity. . . . I am enclosing original list taken Thursday, February 28th, 1924. At all times at least two Chicago stations were on. "The month of February I received 577 stations outside Chicago. Of course, these are not all different. So far in March (17 days) have received 300 stations."

A few of the stations tuned in:
WOR, Newark; WSB, Atlanta; WEAP, Ft. Worth; CKCK, Regina, Can.; KHL, Los Angeles; KGW, Portland; WKAQ, San Juan, P. R.
The above is only one of hundreds of letters that we have received, praising the wonderful efficiency of the Shamrock Kit. Inspect this kit at your dealer's today. If he hasn't it in stock, send us the coupon below.

Kit, list price \$20

SHAMROCK MANUFACTURING CO.
Dept. 8, Market Street, Newark, N. J.

SHAMROCK
FOR SELECTIVE TUNING

SHAMROCK MFG. CO.,
Dept. 8, Market St., Newark, N. J.
Gentlemen:—Please send me detailed information on the Shamrock Kit.
Name
Address
Dealer's Name



MARION, ILL.
401 West Main Street
March 16, 1924.
Phenix Radio Corp.,
5 Beekman Street,
New York, New York.
Gentlemen:
With the Ultradyne I
have logged 47 stations in
two evenings on a three-
foot loop. K.F.I., at Los
Angeles, California, comes
in consistently on a loud
speaker.

Yours truly,
C. M. COLE.

PENACOCK, N. H.
63 Water Street
March 31, 1924.
Mr. R. E. Lacault,
Dear Sir:
The Ultradyne has brought
in everything from the West
Coast to the locals on a loop.
It also does a mighty good
job with no loop or aerial up
to 1,000 miles. I logged 156
stations in fifteen days. The
tone quality is A-1 and there
is no distortion.

Sincerely,
J. C. BARBOUR.



"The Standard of Comparison"

ULTRADYNE
The Improved
SUPER-HETERODYNE

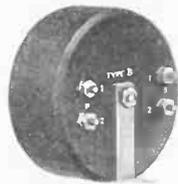
THE Ultradyne employs the "Modulation System," a basic development by R. E. Lacault, A.M.I.R.E., radio engineer of this company and formerly Radio Research Engineer with the French Signal Corps Research Laboratories.

The "Modulation System" places the Ultradyne years ahead of all present methods of radio reception. This new principle increases the sensitiveness over that of any known receiver. Weakest signals are made to operate the loud speaker.

Results secured by Ultradyne owners are amazing and exceed even those obtained with any other receiver under the same conditions. For range, signal audibility and faithful performance, the Ultradyne commands your first consideration.

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HELENA, MONTANA**Wandering Husbands
Converted by Radio
Into Stay-at-Homes**

THERE perhaps was an element of humor in the remark of a certain hen-pecked husband that radio was a great boon to married men. His wife, he related, had lately become so engrossed in listening to the radio set in their home that he could go out nights as much as he wished without even having to use his threadbare alibis. In fact his wife was so interested in the new set that she didn't care any more whether he went out or not!

But there was more humor than truth in his statement so far as it applies to the average man and the average American home.

The fact is that since radio came in most husbands don't want to stay out. The air is so full of interesting programs, high-grade orchestras, entertaining public addresses, and sport news, that they look forward to getting home at night so they can listen in.

It begins to look as if the answer to the question of the ages, "What will keep a husband home nights?" is, "Get him to build a radio set."

A Long Island man recently told the writer of moving into a new house and of a delay of two or three weeks in beginning to operate the radio set to which he had been accustomed. Home didn't seem the same to him or his family. Spare time hung heavily on their hands, evenings seemed dull and flat. The whole family had begun to get on each other's nerves, when they realized that all that ailed them was they were lonesome for radio. The set was quickly put in commission and promptly restored the household to its normal charm and cheerfulness.

YOU DON'T NEED TUBES to hear programs from stations 400 to 1000 Miles Away. I can show you how to get them on YOUR CRYSTAL SET. Changes often cost Less Than One Dollar. Send self-addressed envelope for picture of my set.
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Portable Set Expected to Solve Army Problem

WASHINGTON.

THE most difficult communication problem in the Army, according to Maj. J. O. Mauborgne, has heretofore been that of keeping in contact with advanced troops

in battle. All forms of communication in use in the past war proved inadequate, he stated. He then told of a portable radio set developed toward the end of the war which is expected to solve this problem.

There are a great many radio sets on the battle front, he said, and the problem of assigning wave lengths to them all is a very complicated one. The wave lengths and call letters must be changed every day or so, in order to avoid giving the enemy a clue to the nature of the sending station. Radio sets are carried by tanks, airplanes, and advanced infantry units, and form part of the equipment of all grades of headquarters and of artillery brigades.



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RADIO broadcasting from Luna Park, Coney Island, may be one of the features at the resort this summer.

The management is trying to obtain a license to broadcast and is looking for a plant.

Inquiries among the jazz band impresarios of New York during the last week showed that the park people wanted a strong band combination for their dance hall and broadcasting.

Other summer resorts, throughout the country, are considering the same plan.

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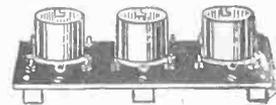
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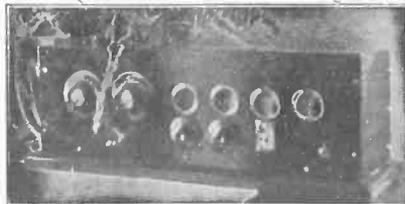
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The quality of the tone is pure, clear and full. Reproduction is perfect, due in large measure to the Erla fixed rectifier which is employed.

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College Boys on Cruise to Test Short Waves

BOSTON.
THE Harvard Radio Club has planned a Summer trip at sea. J. M. Woods, of the class of 1925, president of the club, and

Theodore Graves, of the class of 1922, conceived the idea of a cruise across the Atlantic with the special purpose of carrying out radio experiments.

The Harvard men will experiment with the use of continuous waves, the Master's tube and various problems in connection with static.

These radio experimenters will do most of their work at night.

They have made arrangements to take over the *Nereus*, an old square-rigged schooner, for the small body of wireless operators in the club, who will sail with a radio outfit costing several thousand dollars. They will be in continual touch with radio stations on both sides of the ocean. They have made arrangements with these stations for help in carrying out their experiments.

These experiments are concerned chiefly with the use of a short wave length on the radio outfits of ocean-going vessels. Great difficulty has been experienced hitherto, especially during rough and stormy weather, in sending messages which can be distinctly heard. The rocking of the ship has caused interference and unevenness in the oscillations, with resulting lack of clearness.

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Italian Society Starts Radio Branch

THE Italian society Amici del'Arte has constituted as a new branch of its activities the "Radio Club Lombardo," with headquarters at Milan, via Amedei 8, and with sections in other cities and towns of Lombardy.

The organization intends to encourage students and amateurs in radio communication to advance the adoption and improvement of radio, promoting and supporting the erection of well-organized distribution stations, and obtaining for the members of the club all possible facilities for the purchase of apparatus, and for obtaining the necessary license, etc.

The society's activity is so far seriously limited by the fact that while a person or an organization may purchase a radio outfit, it is up to the present time impossible to obtain Government's sanction to use it.

The scope of the new club will therefore undoubtedly be more educational than otherwise, until the Italian Government announces its decision relative to radio work in this country.

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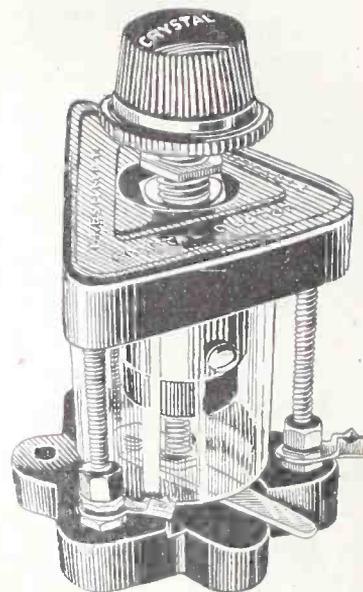
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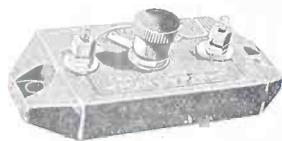
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