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RADIO WORLD

Title Reg. U. S. Pat Off.

ILLUSTRATED

EVERY WEEK

YOU'RE NEVER ALONE IN THE WOODS—IF YOU HAVE RADIO

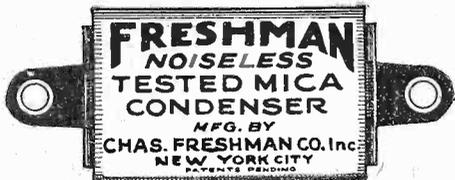


(C. Kael and Herbert)

Gets sorta lonesome these days for the girls up in the mountains, when nearly all the boys have gone back to work. But these lucky misses, Peggy Stohl, Betty Nevins and Muriel Harrison, do not seem to mind simply because they had the forethought to take their radio set along with them up to their woodland home in the Adirondacks. The photographer wanted to know why they didn't dress and dance like regular wood nymphs, but they said the music for such things couldn't be had by means of a jazz band and that is all that was on at the time, so he had to be content with a tango fox trot.

A PORTABLE SET FOR THE HIKE (See Inside)

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.00015	.35	.0025	.50
.00025	.35	.003	.60
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.00035	.35	.006	.75
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WGY Offers \$500 Prize for Radio Drama

WGY, the radio broadcasting station of the General Electric Company at Schenectady, N. Y., offers a prize of \$500 for the best radio drama submitted in competition during the three months' period beginning September 1.

The prize-winning play will be presented by the WGY Players during the winter months when transmission conditions are at their best.

The screen has evolved a distinct type of drama, which depends solely on the eye

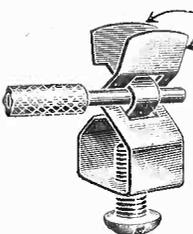
for its appreciation; tomorrow the radio drama will be so written that the listening ear and imagination unaided by the eye will be satisfied. It is for the purpose of stimulating and encouraging the development of the radio drama that the General Electric Company inaugurates this prize competition.

The author of the radio drama must place himself in the position of writing for a blind man. The lines of the characters must convey a picture of the scene in which the action takes place. This apparent limitation or handicap becomes an aid to action, however, as the writer need not restrict his play to three, four or five scenes. For example, he can depict an automobile race and carry his audience through its exciting phases by means of the lines. He may take his listener from room to room or floor to floor in a dwelling, if farce or melodrama call for such action. The chase, long a popular feature in the early motion pictures, may be brought into the radio play by means of speech. The radio drama requires no scenery. No careful search need be made for locations. The spoken words build the scenery.

Dramatic situations may be built up by the speaking voice and through the medium of sound-making devices. The writer is encouraged to make use of sound devices and the engineer will provide a means of producing through the air a counterpart of the prescribed sound. Rain, thunder, surf, the roar of a moving train, a pistol shot, an airplane, telegraph key or automobile motor may all be reproduced in sound to impart atmosphere and realism.

Those who have written short stories, books of fiction, scenarios or plays, successfully or unsuccessfully, may have the germ of a prize-winning radio drama. If you are interested address Prize Competition, WGY Broadcasting Studio, General Electric Company, Schenectady, N. Y., for a folder which sets forth the rules of the competition with an outline of the special requirements of the radio play.

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Station WEAF Sends Out Questionnaire

W. E. HARKNESS, manager of broadcasting for the American Telephone & Telegraph Company, New York, has sent to thousands of radio listeners in an elaborate questionnaire to which replies are requested without signatures. In an accompanying letter Mr. Harkness says:

"You want to have us provide you with the best possible programs. We want to do just this. You will realize that it is a difficult matter to cater to the tastes of an audience so large as that which we reach. In order that we may know more accurately of whom our audience is composed and what their desires are, we are sending the enclosed questionnaire to all our listeners who have been so kind and courteous as to write or telephone of their interest in Station WEAF.

"You will notice that the questionnaire is entirely impersonal and that you are not even asked to sign your name. All we want is to be able to compile statistics that will help us to conduct the station as efficiently as possible and to send on the air what will please our audience. A number of the questions may seem irrelevant, but we assure you that the information will help give us a real picture of our audience and their interests."

How to Treat a Friend

Treat a friend by sending us \$6.00 and having his name placed on our subscription list for one year (52 issues). We will send acknowledgement to name you send us, saying that subscription is sent with your compliments. Radio World, 1493 Broadway, New York City.

IT HAS HAPPENED TO ALL OF YOU IN A FRACTION OF A SECOND!

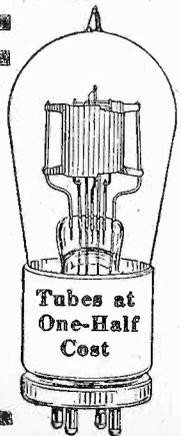
WHEN the filament burns out, at least \$5.00 goes with it to put the set in operation again.

WHY not save nearly one-half the cost of a new tube by sending us your burned out or broken tube to be repaired?

WE REPAIR EVERY TYPE OF tungsten wire filament receiving tube. All our tubes are TESTED and GUARANTEED to function as well as when new.

All tubes returned P. P., C. O. D.

HARVARD RADIO LABORATORIES
BOSTON P. O. BOX 1781 MASS.



RADIO WORLD

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

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Details of a Ship's Radio Compass

By Captain L. Mauriet, S. S. "Syria"

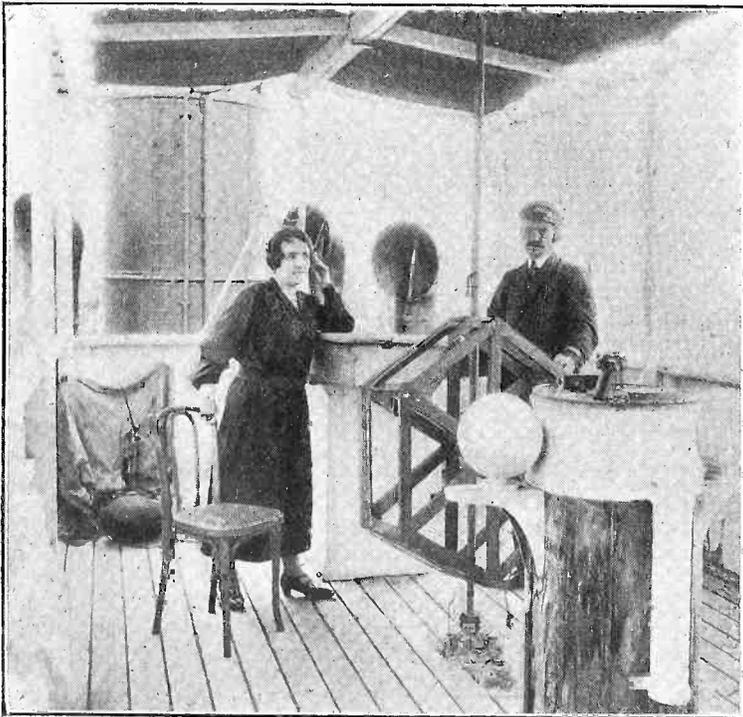
IN RADIO WORLD, February 24, 1923, I described a receiver constructed by myself and used aboard my ship that was suitable for a compass receiver for ship bearings and fog signals, and also for the reception of broadcast programs from distant stations.

Since that time I have put in two more stages of both radio-frequency and audio-frequency which has added considerably to the range of my receiver. The same circuit was used for both the radio and audio-frequency as before so I do not think it necessary to furnish additional diagrams, as anybody can add the necessary apparatus by simply following out the original plans.

I use two stages of transformer coupled radio-frequency and the original one stage of resistance coupled radio-frequency because of the fact that I find that a stage of resistance coupled radio-frequency after two stages of transformer coupled radio-frequency has

sides, with battery connections under the cabinet. This allows you to make a neat table of the entire set by setting it on a pedestal.

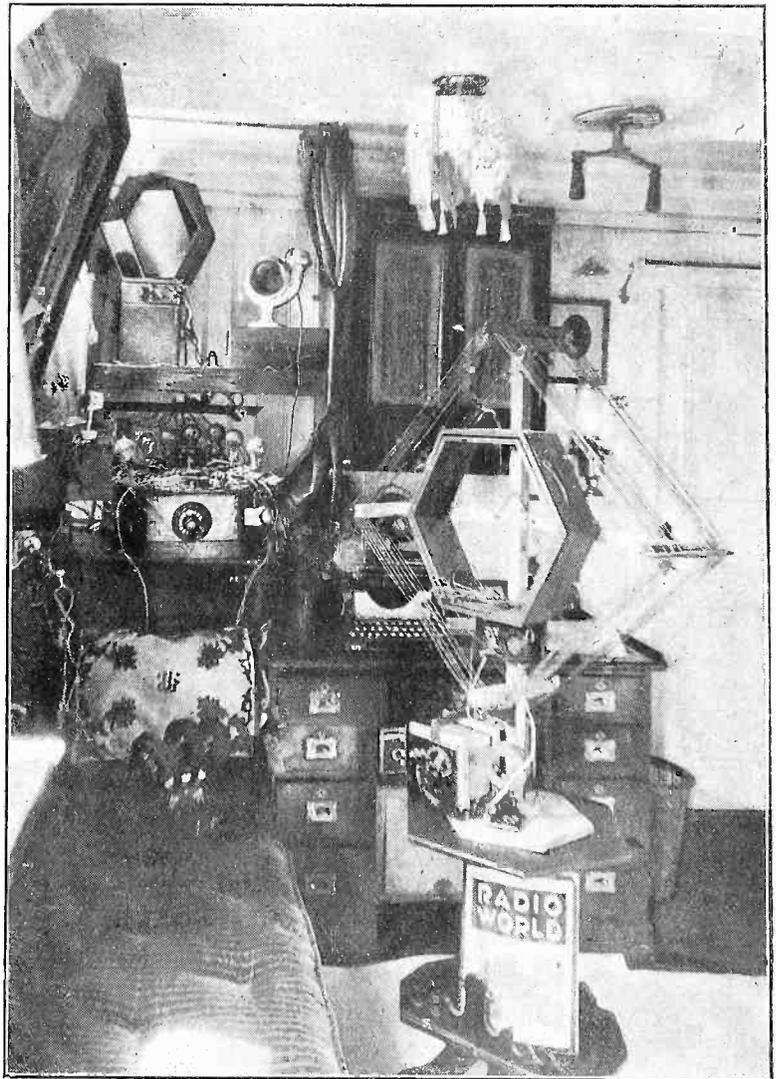
Of greater interest to ship builders and owners will be the construction of the practical loop, which is located on the top of the upper bridge, with the con-



Navigating bridge of the S. S. "Syria" with radio compass. The loop antenna can be operated from the room below. Mrs. Mauriet and Captain Mauriet listening in to a program.

a stabilizing effect, making the set easier to handle. As to the audio-frequency, transformers are used throughout.

The set involves identically the same principle as the first, being constructed in four cabinets so shaped that they form a hexagon, as shown in the drawing. Connections are made by means of binding posts on the



In the captain's room on the S. S. "Syria." Seven-tube receiver at left and two forms of tuned loops. Handle to operate loop shown coming through from deck above.

controls passing through the deck to the cabin below, where the receiver is located.

The principal dimensions of the loop proper are: Vertical diameter, 3' 3"; breadth, 10"; sides of hexagon, 1' 6"; turns of wire, 20; total length of wire used, 180'.

The loop standards are made of sound
(Concluded on next page)

Daylight Radio Test by Amateurs

HARTFORD, CONN.—On the morning of Sunday, September 23, radio amateurs of either coast will attempt to beat Old Sol across the continent in spectacular daylight tests. Their transmitters will be pitted against sunlight in their efforts to relay messages across the country between sunrise and sunset, according to an announcement made here by F. H. Schnell, traffic manager of the American Radio Relay League.

At least ten picked amateurs on both the Pacific and Atlantic Coasts will start messages as the sun comes over the horizon and they will be relayed by intervening stations. By evening it is expected that most of the messages will have reached their destination and, for the brass-pounders, the contest with Father Time will end in a radio victory.

These tests have a real scientific value since they will demonstrate to what extent the sun affects transmission. Everyone familiar with radio knows that reception over long distances is more difficult during the daytime than in darkness, this being caused, it is be-

lieved, by the ionization of the earth's atmosphere by the sun's rays.

The disastrous effect of sunlight upon radio has been noticed by broadcast listeners, as well as amateurs, and it is confidently expected by league officers that definite comparisons may be drawn which will prove helpful in an investigation of this subject.

In this connection some interesting information may be gathered from the experience of Donald H. Mix, league radio operator with the MacMillan exploration party bound for the Arctic, since he must transmit messages and news reports through both daylight and darkness from the Arctic seas to amateurs at home.

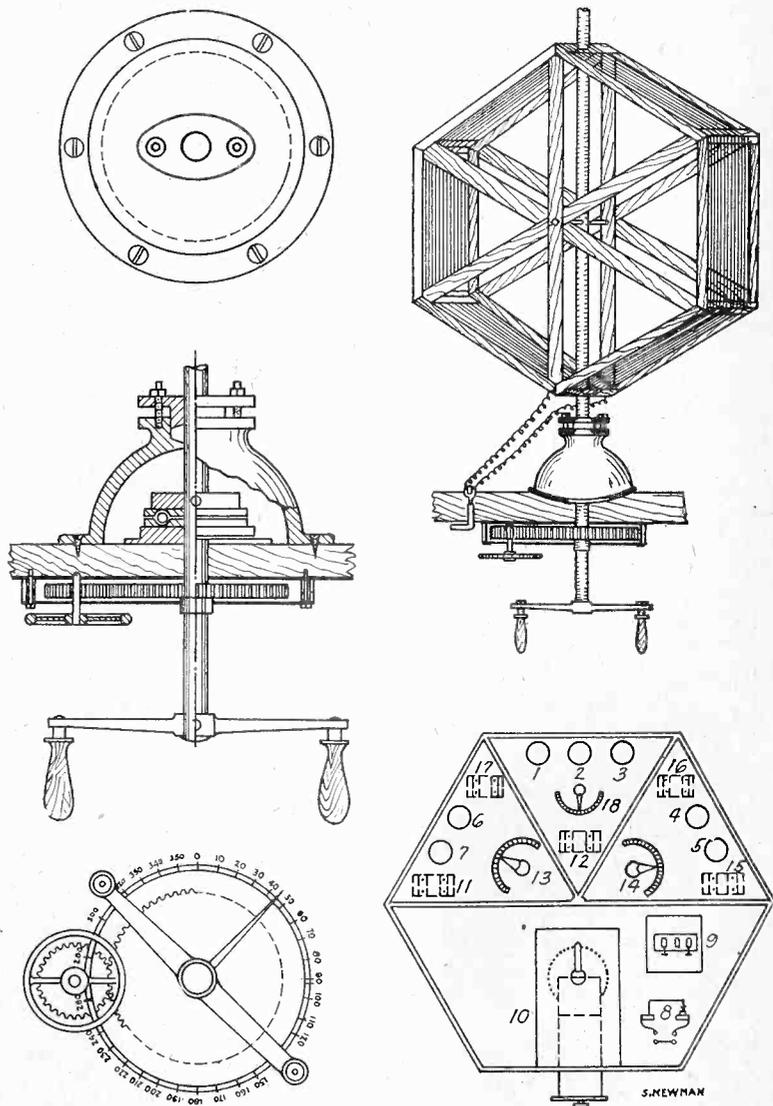
"No one will know from what stations the messages will start," says Mr. Schnell referring to the daylight tests. "Everybody will have the same chance of picking up a message and relaying it along the line." He advises all amateurs to keep a record of everything they hear and whether they use standard or daylight time. These records should be sent to A. R. R. L. headquarters at Hartford, Conn., by October first.

(Concluded from preceding page)

hardwood, such as oak or ash, which has been well kiln dried. The stock for the construction can be 1"x1/2" for all practical purposes, but for outdoor use I prefer to make it even heavier, using 1" square. Do not use iron nails or screws, or paint the standards as the metallic base of marine paint will form a conductor for the minute currents. Copper screws or nails should be used and countersunk, the top of the hole filled with putty and then the entire frame varnished with a good grade of marine varnish which is left to dry thoroughly before the wire is wound on.

The construction details of the stuffing box and bearings is clear from the drawings. They were constructed from odd material found laying around the engine room and consist of such odd parts as a Ford bearing and a discarded differential case (upper part, and two gear wheels). The handles are discarded control handles. Care should be taken if the installation is to be made on the deck that everything is carefully packed with oakum and oiled waste to prevent water from gaining entrance during a storm. The leads for the loop are brought down through a metallic bushing insulated with porcelain, and which has a heavy brass and porcelain collar to prevent leakage of water or radio energy. Such entrance insulators can easily be obtained from radio supply shops, as they are commonly used aboard ship to bring in the antenna.

By means of a chart located on the ceiling of the cabin and graduated into points of the compass bearings can be taken without having to take cross bearings, provided the course of the vessel is known, and the position of the transmitter on the map is known. The set will be accurate to a great degree, due to the construction of the loop and also to the sharpness of tuning obtained by use of the radio-frequency. If captains of ships realized the absolute comfort of knowing their bearings by radio, such as can be obtained by the use of the receiver described, every ship would have a loop receiver of some sort. During a fog when astronomical observations cannot be obtained for hours and sometimes days at a time, it is a great aid to the practiced navigator to be able to absolutely check his course in a few minutes and with as great accuracy as though observations were taken with the compass and sextant.



Constructional details of the loop for a ship's radio compass as well as the controls and packing box. Seven-tube receiver is shown in lower right hand corner. The references are as follows: 1—High frequency tube (radio-frequency); 2—Detector tube; 3—audio-frequency tube; 4-5—two stages of audio-frequency; 6-7—two stages of radio-frequency; 8—crystal detector; 9—honeycomb coils; 10—loose coupler; 11—radio-frequency transformer; 12—audio-frequency transformer; 13—condenser, 23 plates; 14—condenser, 43 plates; 15—audio-frequency transformer; 16—audio-frequency transformer; 17—radio-frequency transformer; 18—rheostat for detector tube. The set is made in four cabinets as shown—three triangular, containing the tubes, transformers and controls, and one large one containing the loose coupler, honeycomb coils and crystal detector.

How to Improve Your R. C. Set

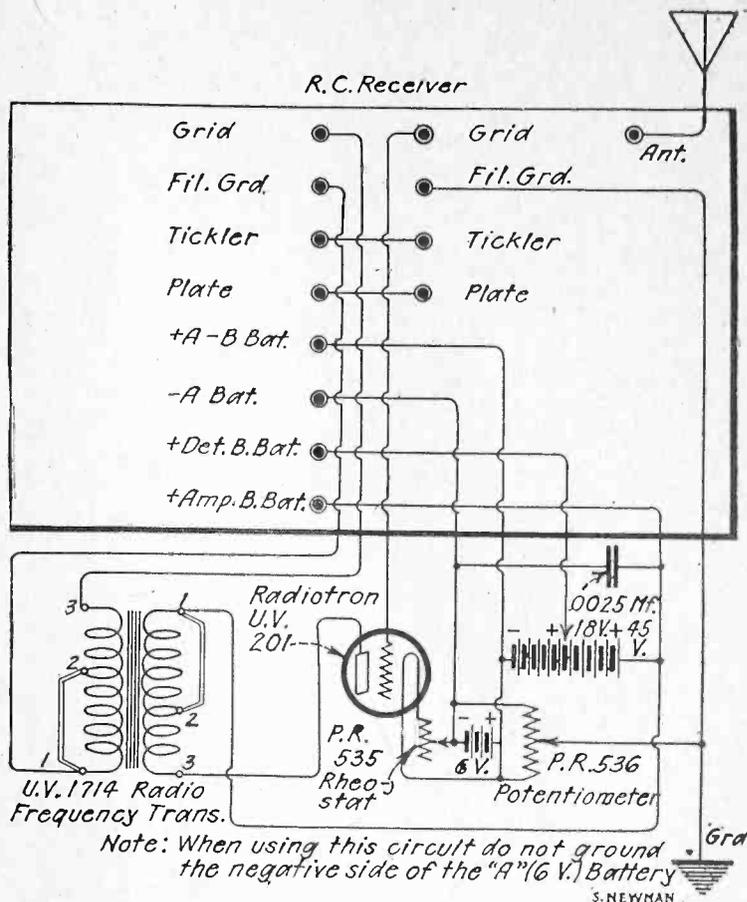
By R. L. Dougherty

MANY purchasers of the now famous RC sets, or the RA-DA combination receiver and amplifier units are well satisfied with the work performed by these receivers. However, it is only natural that they should inquire whether there is any method of improving the distance of these receivers, and also several other details.

Strange as it may seem it is extremely simple to add a stage of radio-frequency to these sets, *without disturbing a single connection on the inside of the apparatus.* Fig. 1 illustrates the method evolved by the engineers of the Radio Corporation of America for adding a single stage of radio-frequency amplification to their RC receiver. As the RC and the RA-DA combination are identical in every detail excepting that the RC is in a single cabinet and the RA-DA is in two only one diagram is required. With the RA-DA sets, the two units are in separate cabinets and the unit for the radio-frequency can be made and fitted between the two. If this is neatly done, and the general style of the manufactured cabinets followed out, the appearance will in no wise detract from the purchased receiver.

Referring to Fig. 1 it will be noted that the same A and B batteries are used for the radio-frequency and the detector and two stage, which simplifies matters considerably, and while a UV201 tube is recommended, with a six volt battery, the set will function if WD12 tubes are used throughout, with 1½ volt dry cells.

Note the fact that a potentiometer is used across the A battery of the first tube. This is necessary to the correct operation of the circuit and should not be omitted. It is not advisable to add more than a single stage of radio-frequency as it has been discovered that
(Concluded on next page)



Showing how a stage of radio-frequency can be added to an RC or RA-DA combination without disturbing a single connection inside the set. All connections are made outside by means of flexible wire, or the unit can be made in a separate cabinet and wired as shown. Circuit diagrams supplied by Radio Corporation of America. (Fig. 1).

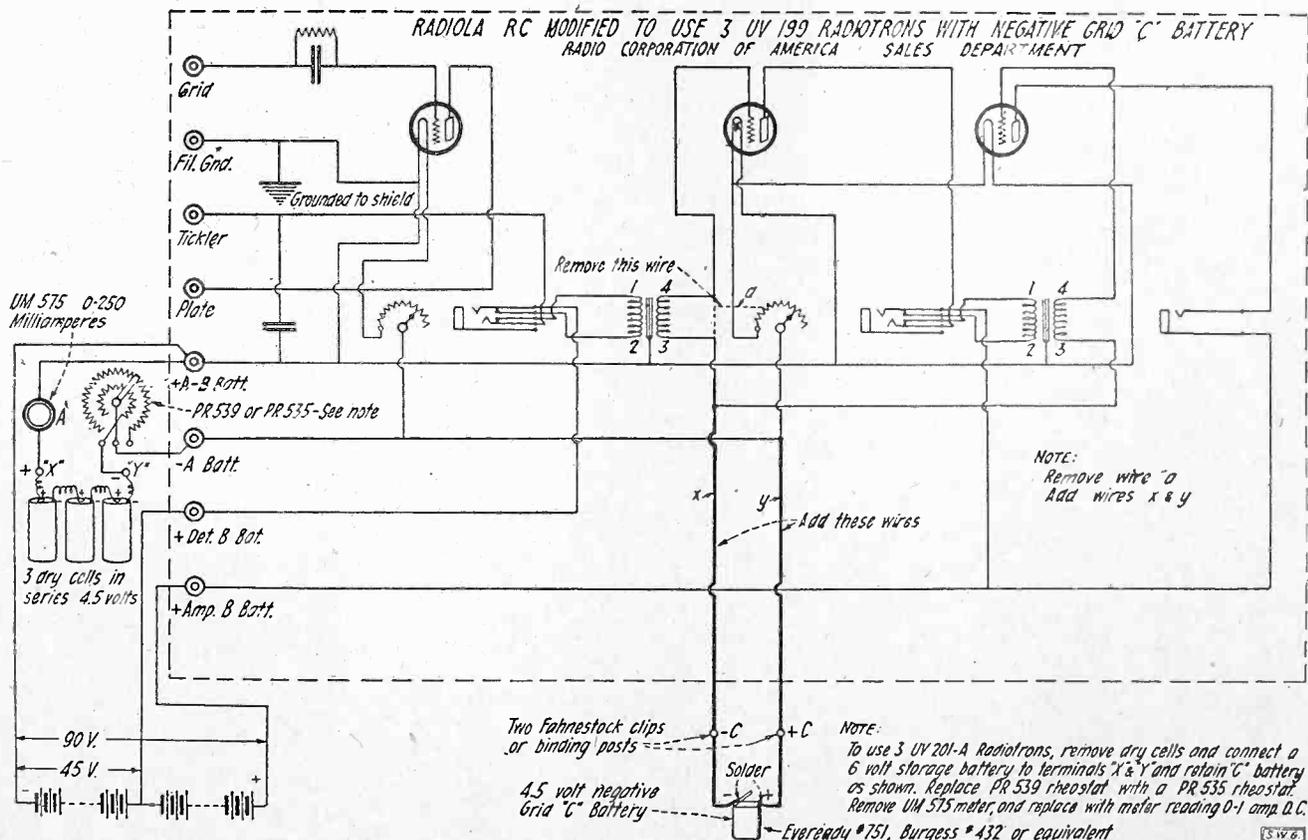


Diagram showing how it is possible to place a "C" battery in the DA unit of the RC set by the addition of two wires and the severing of the wire that taps on the rheostat of the audio-frequency filament control. The addition of this simple battery will make absolutely distortionless amplification on two steps possible. Carefully insulate and solder all leads, and trace connection before inserting tubes and turning on current. (Fig. 2).

(Concluded from preceding page)

the controls become so complicated that tuning with any degree of accuracy is almost impossible. For that reason only one stage is shown. Furthermore, as regeneration is used in combination with radio-frequency the set is perfectly capable of bringing in sufficiently distant stations to satisfy any except the fan who insists on hearing Los Angeles in New York.

Another handy hint that is sponsored by the Radio Corporation of America's engineers is the addition of a C battery in the grid circuit of the two stage amplifiers. It has been found that when working on two steps, or even one step, that there was some distortion due, of course, to a positive charge on the grid of the amplifier tube. In order to remove this, and give absolutely clear amplification free from distortion, a C battery was found absolutely necessary.

Any one can, with the help of a soldering iron, a little patience and a great deal of care in tracing the wires correctly add a C battery to this receiver in an hour's time. The battery may consist of a single dry cell battery such as used in the flat type flashlights, connected as shown in Fig. 2, and will last quite a long time, of course, depending upon the use that the amplifier is put to.

The use of the C battery will also conserve the A battery as it will not be necessary to burn the amplifiers up as high as before it was added. The diagram shows how by the addition of two wires, and the removal of one, the change can be accomplished.

Be sure that you have your connections right, however, before actually putting the set to use, as a wrong or crossed connection would cause trouble, and probably result in the blowing of two tubes should you have the set connected wrong.

With the addition of these two ideas it is possible to make your RC receiver a real long distance receiver capable of bringing in distant stations on your loud talker, with the minimum amount of labor and absolutely distortionless signals. As a further note it will be found that the radio-frequency signals will be clearest with a minimum amount of tickler in the circuit, but that, of course, will depend upon the operation of the set itself, and no fixed point can be recommended, but mention is made of it so that it can be used to advantage by any one who constructs the additional part and installs the necessary C battery.

Users of this type of receiver have doubtless noted the fact that when the tickler is turned down, it takes more current in the filament circuit to make the tube oscillate. If during the operation of the set, the tickler is turned down two or three taps, unless it is a local station, the signals will fade out. Now if the tickler inductance is turned down to the point at where the signals are just barely audible, and adjustment is made with the vernier until the signals are heard at their clearest and best, and the filament of the detector tube is turned up just slightly, it will be found that the signals are much louder and clearer than if they had been haphazardly tuned in.

Lighthouse Service Designs a Portable Receiving Set

By S. R. Winters

NOVICES and amateurs in the wireless game who may experience difficulty in hoisting antenna wires to tall trees, should profit from the experience of A. W. Tupper, assistant engineer of the Lighthouse Service, United States Department of Commerce. At his residence in Washington, D. C., he selected an oak tree of big dimensions for supporting the antenna wires. The first limb on this tree was about thirty feet from the ground, a condition which made it well-nigh impossible to climb the tree.

Evidently recalling his boyhood days when a bow was employed in shooting an arrow to dizzy heights, he considered its use for sending the antenna wire over the 90-foot tree. Consequently, one end of an arrow was loaded with lead and then tied to a string and shot over the oak tree. His first attempts were unsuccessful, but after repeated trials he succeeded. The completed antenna was 100 feet long, 30 feet high at the lower end and 70 feet at the upper end.

This particular antenna serves the experimental purpose of the use of a model radio-telephone receiving set designed by the Lighthouse Service for the keepers of lighthouses along our 44,000 miles of coast line. A radio club has been formed in Washington, about 50 of its 60 members being keepers of lighthouses. As an outgrowth of this, the Washington office of the Lighthouse Service has prepared blueprints of a portable wireless receiving set.

This compact radio-telephone receiving outfit, which is equally as adaptable to the home as to the lighthouse, weighs only a little more than twelve pounds, including the cabinet, instruments, and batteries. Only

one WD-11 vacuum tube is used. A dry-cell battery of 1½ volts lights the filament, and the plate circuit derives its electric energy from a 22-volt dry cell battery. Storage batteries are, therefore, dispensed with. The electric current consumed by this single vacuum tube in detecting and amplifying the wireless signals is almost negligible, the glow of the bulb being barely discernible.

Directions for building receiver as published by the Lighthouse Service using two spiderweb variometers, prescribe that the following apparatus as necessary:

1 WD-11 or other 1½ volt tube; 1 tube receptacle to fit tube; 1 pair of headphones; 1 22½ volt B battery; 1 dry cell; 1 23 or 43 plate variable condenser with vernier; 1 phone condenser, .0025 mfd.; 1 grid condenser, .0005 mfd.; 1 grid leak; 1 piece of fiber or hard bristol board about 1/32" thick and 8" square; ¼ pound No. 26 gauge enameled magnet wire; 1 rheostat for filament; 1 piece ¼" diameter dowel stock 5" long, 1 piece ½" diameter dowel stock 8¼" long; 7 feet tinned copper bus bar wire or heavy bell wire; 1 piece of tinfoil large enough to cover panel for shielding; 4 binding posts; 4 machine screws, No. 6, ½" long, with nuts; 1 piece brass 1/16" thick, ⅝" wide and 6" long for making end supports for coil shafts; 2 knobs and dials; 3 dozen copper wire terminals; 1 piece of bakelite, hard rubber, or perfectly dry, close grained wood for panel, size ¼"x13"x10¾".

The entire construction of this set is quite simple. The only difficulty likely to be experienced is in making proper connections with the spider-web coils. If the diagram is carefully followed, however, no serious

trouble will be found. One important point must be borne in mind. Each pair of coils must be assembled so that when the coils are together and viewed from one side the wire in each will be turning in the same direction. It is well to mark each coil with an arrow near the center of both sides, indicating the direction in which the wire is turning in passing from the center of the coil to the outside or end. Then when you assemble the coils, arrange them so that the arrow on each pair of coils is pointing in the same direction. If this is not done, it will be rather hard to determine the direction once they are on the set. Leave a connection wire about eight inches long at the beginning and end of each coil.

The shafts which hold the movable coils are made of a wood dowel. These shafts pass through the front

The cabinet for containing this compact radio-receiving set was built by the engineering construction division of the Lighthouse Service. It is made of common pine timber and is stained with a color resembling mahogany. The cabinet is covered with two coats of shellac. The panel board is made of seasoned oak, but rubber or bakelite may be used, being about 3/16" thick. The panel is first drilled and two coats of shellac applied if a wood panel is used. One coat of the latter is given to the holes in the panel, this application aiding in the prevention of moisture penetrating the wood. The back of the panel is covered with a sheet of tinfoil and the latter is grounded. The tinfoil was secured to the panel while the shellac was in a moist or soft condition. At points where the wireless instruments are attached to the panel the tinfoil is cut away as a means of avoiding electrical connections with the panel.

Since this portable radio-telephone receiving equipment is homemade, the cost of all the necessary parts will not exceed \$20. The simplicity of adjustment and operation of this portable set are factors which recommend its widespread adoption in lighthouses and in rural communities where people may have only a limited knowledge of electricity. Six of these model

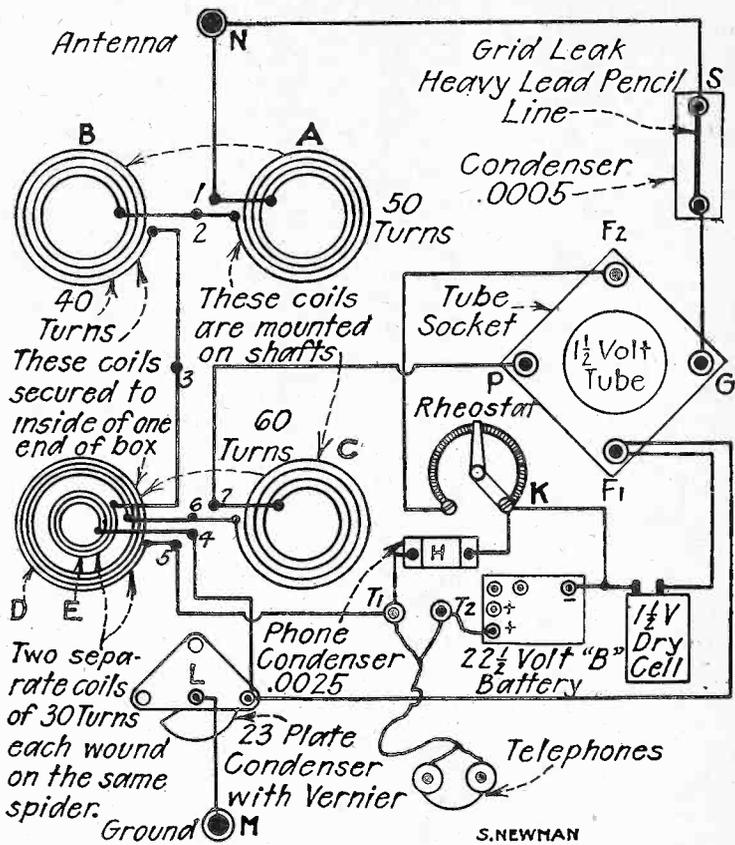


Fig. 1. Circuit diagram of lighthouse receiver using two spiderweb variometers. The figures 1 to 7 correspond with the numerals on the connection block shown in Fig. 2. Be sure to connect the rotary plates of the condenser L to the ground wire, to prevent capacity effect and howls.

panel and should be fitted with knobs on the front to permit manipulation of the coils. The rear end of the shaft should be sharpened to a cone-shaped point which will fit into a hole drilled in the spring brass elbow as shown in the drawing. This hole should be small enough to prevent the entire dowel passing through—1/8" is sufficient. The elbow should press with enough tension against the dowel to prevent the coils turning when in a horizontal position. The dowel is prevented from being pushed out of the front of the panel by either a screw collar, which can be made from a discarded spool, which holds it against the panel, or a pin passed through the dowel at the proper place.

The formers for the spider-web coils are cut from heavy cardboard. They are 4" outside diameter, the center being 1 1/4" diameter. Each has nine slots, giving an uneven number so that no two adjacent wires will cross on the same side of a given sector. After the wire is wound the entire coil should be given a coat of collodion, coil cement or thin white shellac, which is allowed to dry thoroughly. This is to prevent the wires working loose and to keep moisture out of the board. Four formers will be needed for the set, wound as directed on the diagram.

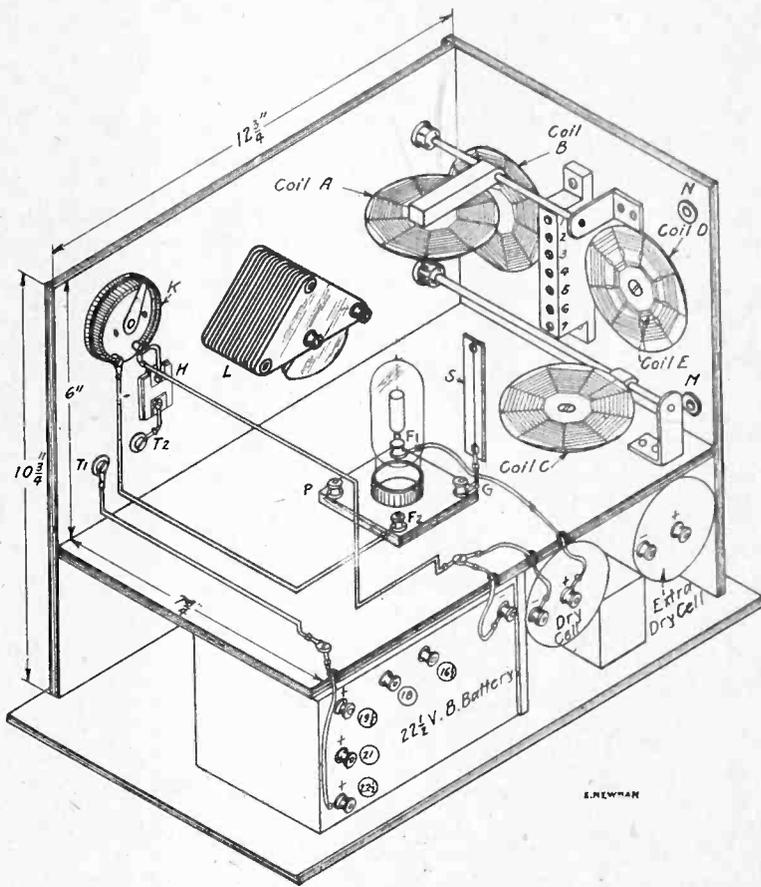


Fig. 2. Interior view of the completed lighthouse receiver with the filament circuit and B battery circuit wired to show the style to be followed. All other connections are made according to wiring diagram and brought to the connection block located between two stationary coils on inner right hand side. Numbers and letters in Fig. 1 correspond with lettering on the block to simplify connecting.

outfits have already been built by the Washington office of the Lighthouse Service, and their efficiency in the reception of radio communications has been sufficiently demonstrated. If atmospheric conditions are favorable, music and speech may be heard in Washington when emanating from Boston, Chicago, Detroit, Kansas City, Atlanta, Davenport, and occasionally Havana, Cuba. For instance, signals have been received in Washington from Buffalo with the rheostat placed at the extreme point of resistance.

The Lighthouse Service has written and published five pages of text outlining the details of this set.

Navy the First Broadcaster

By Col. Theodore Roosevelt

Acting Secretary of the Navy

THE Navy started its experiments on radio about the time Marconi gave his first public demonstrations. More than twenty years ago a radio station was installed at the Navy Yard here in Washington. The flag pole of the commandant's house was used to support the antenna, and messages were sent from there to Annapolis, where a flag pole likewise was used to receive. After this, the development went by leaps and bounds.

Our first big radio station, built to communicate with the fleet, was the Arlington station. Like all other developments it took a considerable length of time to get under way. * * *

Long before radio telephone broadcasting became the order of the day, thousands of persons all over the country, as well as ships over the seven seas, received from it time signals and broadcasts. * * * * *

At the present day, radio telephony is considered the ordinary thing. I don't suppose there is a member in the audience tonight who knows that the first modern radio telephone broadcast was transmitted from our station at Arlington as long ago as 1915. This broadcasting has not been the result of one brilliant idea by some genius; it has been developed step by step

Abstract of an address made at the opening of Station WRC, Washington, D. C.

through laborious investigation and experiment. In 1915 the radio messages broadcast by Arlington were picked up in Paris on the one hand and in Honolulu on the other. The success of the experiment largely contributed to the development of the science.

These are only a few striking instances of what the Navy has done for radio from day to day during the past 20 years. We have been selecting, testing, rejecting, and adopting devices in radio work. We cooperated with the General Electric Company in the organization of this Radio Corporation of America from whom this message is going. This is an American company financed by Americans and serving our country. At its head is a splendid American, General Harbord, whom I have known for years and am proud to call my friend.

In view of the close relationship between the Department and the Radio Corporation of America, the Radio Corporation has arranged to turn over to the Navy Department at least once a month its new broadcasting station. On these nights, experienced naval officers will tell the story of the Navy and our band will play for you. We are most anxious to do this, for we know that the more the people in the country understand what the Navy means to them, the stronger will be their support of it.

No Static Above 3,000 Feet, Balloonist Reports

By C. D. Wagoner

STATIC, that mysterious interference to the reception of radio signals which is perhaps one of the greatest puzzles to radio experts today, may be confined to an atmospheric belt about the earth. At least that is the possible conclusion reached in special tests made by Ralph Upson, one of the country's most prominent aircraft engineers who was a contestant in the national balloon race which started from Indianapolis last month.

Upson's balloon was equipped with a powerful light-weight radio set by the General Electric Company. For six weeks preceding the race Upson had used the set in his home and thereby became thoroughly familiar with its operation under various conditions. His experience had taught him what static sounded like and he also learned that the air seemed particularly filled with it when there was an electrical storm in the vicinity, so much so in fact that one of the uses he planned for his radio outfit in the race was to detect thunder storms before the lightning might be visible.

In his tentative report to the General Electric Company made after the race, Upson writes:

"One of the outstanding happenings in the use of radio in the balloon race was that at altitudes of 3,000 feet and above we observed absolutely no static whatever, although we could see lightning at various points on the horizon."

Upson's chief purpose of carrying radio was to help him win the race. Five of the principal broadcast stations had arranged to send out special weather reports on upper air currents during the first night of the race and the following morning. In regard to this Upson says:

"Andrus, my aide, acted as chief radio operator. He began listening in at 8:30 o'clock the night of the race. At first he could hear nothing but code signals, concerts from various stations and a radio drama that was being sent from a Chicago station. For an hour this was about all we could hear. Then at 9:45 o'clock, Central time, Andrus picked up the latter part of the weather report being broadcast from WGY in Schenectady. We heard just enough of it to make us wish we had heard the entire report. However, our disappointment was short for a few moments later the whole report was repeated, every word being received clear and distinct. It was just the news we wanted.

"As a result of the information, we decided to go a little higher but not to try any high altitudes unless forced to it by thunder storms. The report gave us full confidence of reaching New York State and possibly New England. Everything seemed so favorable that I turned in to sleep, leaving the balloon appendix partially closed. Then came the accident and you know the rest, a forced landing."

Omit the Condensers

A LOT of trouble in summer time receiving is caused by the use of series condensers in the antenna and ground circuit of the receiver. Do not use them unless it is absolutely necessary. They collect atmospheric charges and cause louder and more clicks and bangs.

A Portable Set for the Hike

By Kenneth Malcolm, A. I. R. E.

THE portable set to be described is very small and light of weight; and yet it is not a freak set as many small sets are, but employs a standard circuit that, within its limits, will give very good results.

It is trusted that all good bugs have a fair idea about radio, and are somewhat familiar with the apparatus used and its construction. So, therefore, only an outline will be given—leaving the drawings to do the rest. The measurements are only suggestive, and need not be strictly adhered to, except in the case of the number of turns on coils and the capacity of the condenser.

The apparatus needed includes a .0005 mfd. variable condenser of one of the new flat types having a mica dielectric; two fibre disks about 1/32 inch thick and 3½ inches in diameter; 40 feet of No. 22 single cotton-covered wire, and 70 feet of No. 24; a rotary switch

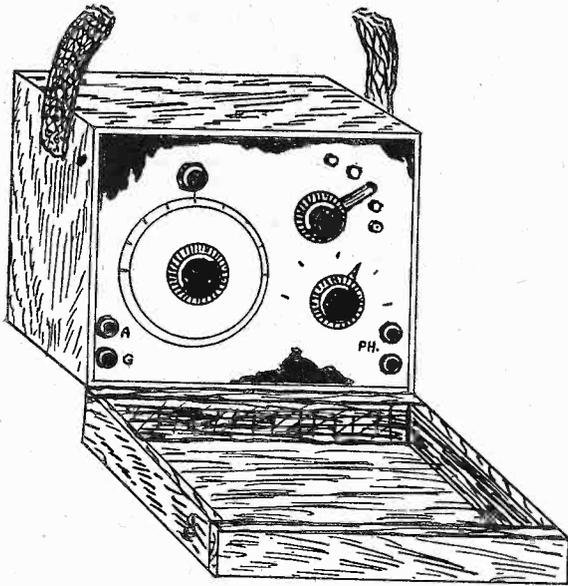


Fig. 1. View of the portable tube receiver as it should appear when completed.

arm and five contact points; a vacuum tube and socket; rheostat; grid leak and grid condenser; four binding posts; a short length of 1/16-inch brass strip and ⅛-inch round brass rod; a panel and cabinet; a small insulating knob; and the necessary aerial wire, batteries and phones.

The inside dimensions of the cabinet should be six inches wide, four inches deep, and five inches high. The hinged cover should have an inside depth sufficient to allow for the height of the knobs and dials. A panel of bakelite or some other good insulating substance about 3/16 inch thick, and a size that will fit the front of the cabinet, should be secured.

There are on the market several .0005 mfd. tuning condensers that have a mica dielectric and are very thin that would do very well for this set. However, a standard condenser may be used if the depth of the cabinet is increased. The mounting of the instruments on the panel should be done as the drawings show—the condenser on the left side, and the rheostat and the switch on the right. A little hole is drilled directly over the condenser dial, through which a ⅛-inch rod will pass freely.

The tube to be used depends upon your individual taste, though for a portable set the dry cell type is the only one that is practical. The WD-11 that operates on a single dry cell, and the UV-199 that will operate on a three cell flashlight battery, are both very suit-

able. The first mentioned tube requires a rheostat having a resistance of about six ohms, and the latter a rheostat of about 30 ohms.

The grid condenser should have a capacity somewhere between .00025 and .0005 mfd, and should pref-

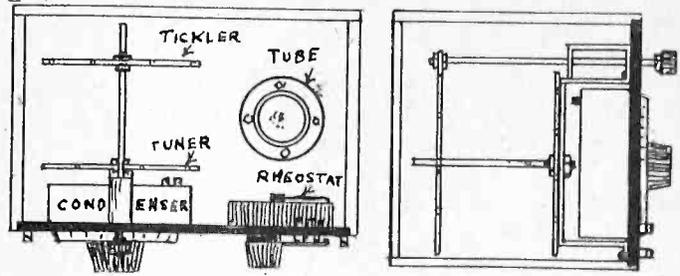


Fig. 2. Top and side views of the set showing the location of the various units and parts.

erably be of the mica dielectric type. The grid leak should best be variable, unless you have a number of different sizes that you could first experiment with, to find the correct resistance.

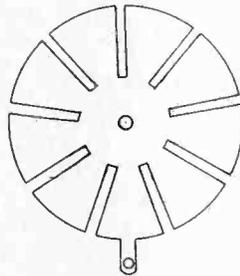


Fig. 3. Details of the spiderweb former used as an inductance.

Next, the coils may be made. Each disk should be cut with slits about ⅛-inch wide, so that there will be nine "wings" on each. In the center of each disk should be drilled a ⅛-inch hole, and one disk should have a projecting lug left on one of the "wings," about a half inch long, and drilled near its end with a ⅛-inch hole. This disk with the lug should be wound spiderweb fashion with 75 turns of the No. 24 wire; that is, the wire should be passed over one wing and under the next, and so on. The other disk should be wound by the same method with 45 turns of the No. 22 wire. This latter coil acts as the tuning inductance and the first coil as a tickler, for the purpose of regeneration, or for the receiving of C. W.

The coil used for tuning may be mounted on the back of the panel by means of a strip of brass, bent as

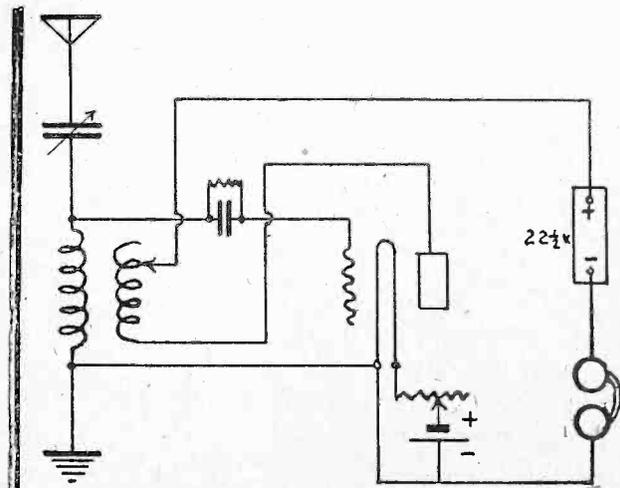


Fig. 4. Circuit diagram of the portable receiver. It is the conventional single circuit diagram. Care should be taken in the construction if success is desired, paying particular attention to the polarity of the battery leads.

shown. It will be observed that the upper end of the strip is bent up, back and down again, to form a sort of a bearing for the tickler adjusting rod. A length of

(Concluded on next page)

Amateurs Relay Naval Radio Messages

SPRINGFIELD, MASS.—Radio amateurs residing in this city are giving their services voluntarily in the First Naval District by relaying official messages requiring prompt attention, between the Reserve Division here and the Brigade Headquarters at Boston. Commander J. T. Nelson, in a recent letter addressed to Ensign H. F. Johnson, of Springfield, commended this work in these terms:

"The work of your division in training men for radio operators is greatly appreciated and your division is the only unit where training of this nature is being carried on. It is the brigade commander's wish that you continue this work and expand this radio department if it can be done without detracting from the general training of your division."

This practice under service conditions is valuable.

Concerning Plate Batteries

THOSE amateurs using dry cell tubes should be glad to get a little information relating to them and the dry cells used for their operation. It is always a good plan to use two dry cells in parallel for every tube used, by so doing the life of the batteries will seem to be everlasting because of the fact that they really do last so long. Six dry cells have operated a

three tube set for nearly 7 months and are just now beginning to show a voltage drop after they are in use about 30 minutes in the evening. Which is cheaper, buying six dry cells now and having them last seven or eight months or buying three and having them last one or two? There is a great difference between conservation and extravagance.

Important Future for Radio Compass

POSITION finding by wireless is destined to be one of the most important navigational aids of the future, whether employed alone or in conjunction with sound to obtain synchronous signals, according to D. W. Hood, M. Inst., C. E., engineer in chief to the Corporation of Trinity House, London, who was among those present at the International Congress of Navigation, held in London last month. George R. Putnam, Commissioner of Lighthouses, was among the American delegates to the convention, which was declared to be the most important meeting of the kind ever held.

In his report, Mr. Hood referred to the fact that various countries have different direction-finding systems of their own, and recommended that an investigation be made to find the most effective method, not by

individual countries but by one agency under an international agreement.

The establishment of radio fog signals was the most important advance in lighthouse work in the United States during the past ten years, according to a paper read at the conference by Commissioner Putnam. The first of these signals were placed in service on May 1, 1921, when three were put into commission in the vicinity of New York harbor. The number of such stations has been increased during the past year.

Each of the radio fog stations in United States waters sends automatically during fog or low visibility radio signals on a wave length of 1,000 meters, with a distinctive characteristic, which are used by vessels equipped with radio compasses. Very reliable results are being obtained, Mr. Putnam declared.

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the brass rod is cut, sufficient to reach from the tuning coil to the back of the cabinet. This is threaded at one end, and fastened securely to the tuning coil by means of nuts and washers. The other end is left free. Another length of rod is cut, sufficient to reach from the face of the panel to the back of the cabinet. Both ends of this are threaded for a short distance, and on the end that projects through the panel the small knob is fitted. After the tickler coil has been slipped over the center rod, the other end is fastened with nuts to the lug on the tickler. This allows the coupling between the two coils to be easily varied.

The tickler should be tapped at 55, 60, 65, 70 and 75 turns, and flexible leads should be carried over to the five switch points on the panel. The remainder of the wiring should be done with rather stiff wire, and it is imperative that all joints be soldered. The tube is mounted either on the base of the cabinet, or upon a sub-base attached to the panel—the latter is more satisfactory. The A and B battery leads may be brought to binding posts, or the batteries may be included in the cabinet by increasing its size. The aerial

and ground binding posts are mounted in the lower left hand corner of the panel, and the phone posts on the lower right.

The aerial for the hiker could best be of flexible insulated lamp-cord, in a hundred foot length. A stone could be attached to end of this and flung over the limb of a tree. A ground is more difficult to get in the open, but might consist of a counterpoise of a wire similar to the aerial wire strung out on the ground, or a long length of wire thrown in a lake, or buried in the bed of a stream. Old pumps and wire fences sometimes make good grounds. If it is large enough, the aerial and ground wires might be coiled inside of the cover when carrying.

To operate the set, begin by turning on the rheostat to some arbitrary point; next adjust the variable condenser until a station is heard; then vary the tickler coupling and adjust the switch until maximum response is obtained; a re-adjustment of the rheostat will now give the best results.

If a strap of leather or webbing is attached to the cabinet, it may be carried about as easily as a canteen of water.

The Radio Woman

SEVERAL of our friends who had not succumbed to the radio fever had been coming to our club every Thursday evening. It used to be that our Thursday nights were bridge nights, then Pung Chow, but both have been relegated to the things of the past. In their place we now have a "Radio Fest." That is, we used to have but one by one, the outsiders were prevailed upon to buy sets, and the recent sales by department stores of real sets at small prices have stolen most of our "club" from us. But just the same, we take great pleasure in comparing the working of our different sets on different nights, and F. H. says that going down to business in the morning, even the conventional poker or pinochle game has been stopped in order to compare notes on the evening before reception. "I am sure that if radio has done nothing else, it has developed more liars than golf ever did. Jack can be relied upon to keep quiet until everyone has told of his performances, and then he brings out a slip that he supposedly copied the night before and stops us all. Some of these nights I am going to drop in unexpectedly, when I know his storage battery is charged and everything including static is favorable to distance, and see just what he does or says when he has a witness."

Well, I believe that a little stretching now and then keeps the interest up, inasmuch as it makes the other fellows sceptical, and then again radio reception is such a freaky thing that anything is possible, even KYW on a crystal.

* * *

Which, by the way, reminds me that I received a letter from a little girl out in Wyoming addressed to me at RADIO WORLD, and wanting to know if I thought that it was in my opinion wrong for a little girl to "play with big brother's radio." It seems that she has become quite a fan and, of course, quite adept at the manipulation of Bob's radio set, but that he disapproved of it and kept telling her to "Keep your hands off, and play with your dolls." She asks me if I think that it is wrong for her to "listen in" if she knows how to work the set.

Well, Mae dear, all I can say is that I think that Bob is very selfish. I should think he would be glad to let you show that you are able to operate such an intricate mechanism as a four tube set. Girls these days are not the little wall flowers and feminine frailties that they used to be considered, and you just tell Bob that both F. H. and myself think that he is selfish.

* * *

Another thing that must be of interest to fans is this. I have noticed on several of the cooler days that reception during the early part of the evening will be remarkable. No static, or any other phenomenon. Even WGY will not fade quite as often or as much as usual. Then suddenly around 11 or 12 o'clock, static will start to rumble and crack and spit, and stations will start to fade in and out with unseemingly regularity. And nine times out of ten, the next day will be a bright, sunshiny warm day. I have noticed this for some time, and one fact especially is that on an evening when there was a lot of static, there were generally clouds in the sky, and the next morning the sky would be absolutely cloudless.

Watch these little things, and then you will begin to wonder. I have a faint suspicion that the clouds moving through the air have some bearing upon the static, but, of course, I am not up on it as a radio engineer, but I am entitled to my opinion, and now you have it.

WCAP Does Stunts

NEW radio history is being made daily by the Chesapeake & Potomac Telephone Station (WCAP) in Washington, D. C. As yet, no local programs have been put out by this station, which has confined itself to the broadcasting of the programs of WEAJ, New York, received in Washington over a special land line, and there "put on the air." However, the Washington station made arrangements whereby the concerts of the famous Marine Band were picked up at whatever point the band was located by means of a special automobile truck, equipped with microphones, controls, etc., from which the music was sent to the transmitting station by tapping in on the nearest telephone cable.

So successful did this method of pick-up prove that concerts by the Marine Band were sent to New York over the line usually used for the reception in Washington of New York entertainment, and broadcast by

Mrs. Coolidge Has Her Own Private Radio Set



(C. Underwood and Underwood)

Mrs. Calvin Coolidge, wife of the President of the United States, enjoying a few spare moments listening in on her private radio set. Mrs. Coolidge is a keen follower of radio, and is well versed in its possibilities. Radio has interest for everybody that is interested in life, because over it one may hear classical music, interesting talks—in fact anything and everything that is of value to the men and women of today. That is why it appeals to "the first lady of the land."

WEAF. The same system was followed when the memorial services held in Washington churches for the late President Harding were broadcast both from WCAP in Washington and WEAJ in New York. The truck used by WCAP has practically all the equipment of a Class B station.

"Save the Juice!"

THIS is an expression used in the studios where they make motion pictures whenever they have finished taking a scene and the huge arc and Cooper-Hewitts are not needed. It can be used successfully by the average radio fan. It is not necessary to use the loud speaker for local work when you are just entertaining yourself or two or three other people. Use your phones on the detector and get better and clearer reception—and "save the juice!"

President Harding Was a Good Friend of Radio

By Carl H. Butman

WASHINGTON, D. C.—The important part played in our daily life by radio was forcibly impressed upon the public when, following the death of President Harding, a majority of the broadcasting stations throughout the country closed down for varying periods as a mark of respect.

The almost complete cessation of broadcasting brought home as could nothing else the important niche which radio has carved out for itself in our daily routine in the past two years. People in all walks of life commented upon the gap in their evenings, which they found hard to fill, and while practically all agreed that it was but fitting that the broadcasting of entertainment should temporarily halt while the country sorrowed, probably nothing else connected with the final honoring of our dead President made as deep an impression.

In the death of President Harding, radio lost a good friend. He was one of the first officials of the Government to turn radio fan when, following the first radio conference in 1922, the attention of the country was turned toward the new method of entertainment. The set built for his use in the White House was the last word in reception but, while he liked to "play" with it, he had but little time to devote to amusement and found himself for a long time unable to cope with the interference which prevailed when there was but one wave length for broadcasting.

In many ways the President evinced his interest in

radio. He gladly accepted the invitation extended to him, by the National Press Club of Washington to attend the exercises incident to the "christening" of its receiving set, and while the music and speeches which were to have been broadcast from a nearby government station especially for the occasion failed to "come through" the President "stuck around" like the "good fellow" he always was, chatted with the members of the club—which is composed of newspaper men—and made them a little talk on the difficulties of being President which gave them much inside dope on the great task which confronts the nation's Chief Executive from day to day.

While the failure of Congress to pass the White Radio Bill kept radio from becoming an official subject of consideration at the White House, Mr. Harding frequently expressed his interest in the matter and the hope that legislation could be enacted to eliminate interference, give the amateurs the privileges they desired and which he thought they were entitled to, and put radio on a concrete foundation.

President Harding was radio's friend, and the silencing of the broadcasting stations of the country was but a fitting mark of respect to a man who laid down his life for his country as surely as if he had died on the field of battle. No finer tribute could have been paid than the silencing of more than 500 stations, quiet while the country ceased its activities and a hundred million people mourned.

Radio Serves in Peace and War

By Major General John L. Hines

Deputy Chief of Staff, United States Army

THE progress of civilization depends, in a material sense, upon the advances made in the technique of transportation and communication. These are the links which bind us into a social organization. This station alone will have a great influence in maintaining social unity in America in the face of the disintegrating effect of the rapidity with which we are beginning to move and to live. Its facilities will be a tremendous factor in commerce and industry. * * * All of this makes it apparent that such an undertaking is not a private concern but rather a public utility in the widest sense of application. Lending itself to the improvement of our unity, during peace time, it is equally suited to protect that unity and the public interest when our peace is threatened. * * * *

It is comforting to realize that in any future eventuality we would have the use of such agencies as

Abstract of an address made at the opening of Station WRC, Washington, D. C.

this station. It is not too much to say that these facilities would bring the people of our great country as closely under common guidance as were the Minute Men of Lexington when they were mustered by the single efforts of Paul Revere. * * * *

Typical of good Americanism is this action of the Radio Corporation of America in opening for public use an implement which it intends and hopes will be used for peaceful progress but which it would gladly turn over to our country for use in resisting wrongful aggression against our rights or our ideals.

I believe that many thousands of Americans will receive enjoyment from this agency. I trust that it will add to our great progress in civilization and that it need never be used to marshal our forces for defense. Above all, however, I hope that it will serve as an additional bond to strengthen that spiritual Americanism that is one of the most potent forces for good in the world today. * * *

Not Necessary—But Handy

VERY few of the home constructed sets have more apparatus than is actually necessary for the reception of signals. However, an added refinement, and one that will prove a valuable asset to the operator once he gets on to the hang of its use, is a plate milliammeter. Many times a set will function fine one night and suddenly the very next night be "out" and you go hunting for trouble where there is

none. If you include a small plate milliammeter in the set (it doesn't have to be an expensive one) you can have an accurate check on your battery by means of its variations. Some interesting facts will be noted also on the amount of current passing through the plate circuit in different distance work. Some stations will pass as much current as .5, while some locals, though much louder, will only pass .6.

California High School Installs Sending and Receiving Radio Station

By Charles Geiger

THE firm hold which radio has taken upon the people has made it necessary that instruction in this art be given in a complete manner, and in order that the instruction at the Piedmont High School in Oakland, California, should be properly demonstrated, the Board of Education has installed a radio sending and receiving set. This is complete in every detail and is unique in the fact that it is mounted entirely in an ordinary office desk.

To the right of the desk, and let into the top, is the amplifier. The center drawer and the drawers in the right hand leg of the desk are left intact for the storage of the apparatus and spare parts for the radio set and for instruction material, while the left leg has been converted into two compartments. The door to the left front is arranged to resemble the drawers, so that the general appearance of the desk is not disturbed. In the front compartment is mounted the motor-generator for supplying the plate voltage to the sending part of the set, and there is also mounted in this compartment the switchboard controlling the charging and discharging of the storage batteries. The second compartment, directly behind the first, entrance to which is by means of a door on the left hand side of the desk, is lead lined, and in this are placed the storage batteries.

Mounted on top at the right of the cabinet, is the chopper, used in sending code or telegraph signals. The sending key is portable and mounted on an insulating base with long, flexible leads, so that it may be placed at the convenience of the operator or student. The set embraces a fully equipped receiving set for reception of all kinds up to 600 meters; it includes a small broadcasting station on which both voice and music may be sent by radio telephone; it has the key and equipment for sending by code; it has the three types of tubes—detector, amplifier, and transmitter—and therefore provides equipment complete for instruction in the art of radio.

The wiring is all concealed and presents a compact, neat appearance. The current supply is brought from the main switchboard of the school directly to the convenience outlet in the chairboard of the radio room.

Another unique feature of this installation is its equipment of standard convenience outlets, which are placed along the back and let into the top of the desk. The two on top are the connections for the Magnavox and permit it to be placed at any desired distance in the room or the adjacent room. The other convenience outlets are for the direct current battery terminal, the alternating current terminal to the rectifier for the charging of the storage battery, the ground connection and the alternating current mains used for the operation of the motor-generator and the chopper.

The recharging equipment is located in the closet just off the radio room, so that the noise and vibration will not disturb the receiving or transmission of messages. In addition, it is mounted on thick cork to in a measure deaden the sound.

The antenna is located on the roof and is so arranged that the artistic trimming of the building masks it from view. One pole extends only ten feet above the roof, and it is set into a socket composed of a piece of 8" steel pipe securely fastened to the concrete structure and guyed against movement in any direction.

This socket provides a means of effectually making water-tight the opening through the roof, and also securely holding the pole in place. The other pole is secured in the corner of the concrete structure in the rear of the building. Both poles are turned and artistically capped. They are painted the same color as the building, and add to rather than mar the general appearance of the structure.



Radio sending and receiving set designed and built for the Piedmont High School. The apparatus is installed in an ordinary office desk.

The set and installation were made by the engineers of the Atlantic-Pacific Radio Supplies Company, Inc., of San Francisco, under specifications from the office of W. H. Weeks, architect for the Board of Education of the Piedmont High School, Oakland.

Another installation is a method of communication between the superintendent's office and each of the class rooms. This is designed and manufactured by the Magnavox Company and is known as the "general announcing system." There is installed in each room a "telemegafone," of which a duplicate is located in the superintendent's office. A selector panel provides a control arrangement by means of which the superintendent may at will talk to any one room or to any number of rooms.

An additional installation entirely new and unique is the combination of this announcing system with the radio receiving equipment. A special line has been run from the radio receiving set in the radio room and connected to the selector panel, by means of which the superintendent is enabled to divert the radio messages into any particular room or into any group of rooms which he may select. The arrangement is such that it is possible to have the "telemegafone" in any one room or every room working by radio at the same time.

Uses and Abuses of More Broadcasters the Dry Cell

By Velma Carson

ABOUT the time the farmer radio fan has invited some of the neighbors in to hear the fight returns and the lecture by Bryan, he finds that he can't tune in. Or if he tunes in at all, he gets a noise that sounds like a mouse whispering. The old thing simply won't show off. And he feels like the mother who has asked her precocious youngster to play "Humoresque" while the Ladies' Aid is meeting with her and never even gets the wretched, sulky child out from behind the door.

He explains apologetically that the battery must be worn out. Before he can get to town to have it recharged, the fight returns are in the newspapers and Bryan has traveled 900 miles to the next audience. The battery slips up on him this way about once every two months. In three years, beyond all coaxing, it gives its last, and dies a natural death. In the meantime, he has given it about \$36 worth of rejuvenation which, added to the original price of \$15, makes a total of \$51. This does not include the loss, possibly, of a piece of the living room carpet eaten up by some spilled acid.

A dry cell either performs or it doesn't. If it doesn't, all the farmer has to do is to take it to the door and throw it as far as he can, and reach in to a reserve supply of them and get out another. You buy them like you do cigars. The dry cells cost 35 cents each, last for a hundred hours, and will keep unused in good condition for more than six months. For \$51 one can purchase a ten years' supply. There is nothing in them that could possibly spill. They are what they say they are—dry cells. The dry cell can be carried around in a coat pocket, being only 2½" in diameter and 6" high. It is the only kind to use if the receiving outfit is to be taken on trips or carried from one room to another.

But there are several important things to remember in connection with the use of dry cells. One of them is not to burn the filament out by using the set continuously. Luckily, though, the broadcasting stations never accommodate such a desire. Just so the listener does not forget to turn the set off when the concert is over, this is not likely to happen. And it is important to not run more than one tube from one cell. If you have two tubes, use two cells in parallel. When possible use two cells in parallel to supply one tube. One point to be remembered when connecting cells in parallel is not to use an old and a new cell. Their voltages will be different and will set up local circulating current which will soon spoil the new one and will not improve the old one.

Safeguard Your Set

HOW many of you owning receivers have neglected to install lightning protectors? Do not run any chances with fate or lightning by neglecting this little item. It is only one chance in several million that it will ever be called upon to protect your set—but it's no use to lock the barn door after the horse is stolen.

DURING the past week three more broadcasting stations were licensed by the Department, as follows:

Call	Station	Class	Frequency Kcys	Wave Lgth Meters	Power Watts
KFJK	Delano Radio & Elect. Co., Bristow, Okla.....	"A"	1290	233	100
WTAF	Gallo, Louis J., New Orleans, La.	"A"	1240	242	20
KFBC	Nielson Radio Supply Co., Phoenix, Ariz.....	"A"	1260	238	10

List of Limited Commercial or Broadcasting Stations Deleted During the Month of July, 1923.

Call	Class "A"
W R A N	Black Hawk Electrical Co., Waterloo, Iowa.
K F A T	Donohue, Dr. J. T., Eugene, Ore.
W A B A	Lake Forest College, Lake Forest, Ill.
K F I C	Laskowitz, Philip, Denver, Colorado
K F J B	Marshall Elect. Co., Marshalltown, Iowa
Class "C"	
W Q A J	Ann Arbor Times-News, Ann Arbor, Mich.
W Q A K	Appel-Higley Electric Co., Dubuque, Iowa
W M A D	Atchison County Mail, Rockport, Mo.
K F D F	Casper Community Radio Corp., Casper, Wyo.
W I Z	Cino Radio Mfg. Co., The, Cincinnati, Ohio
W C A Z	Compton, Robt. E. & Carthage College, Carthage, Ill.
W P I	Electric Supply Co., Clearfield, Pa.
W P A S	J & M Electric Co., Amsterdam, N. Y.
W T P	McBride, George M., Bay City, Mich.
W A A Q	New England Motor Sales Co., Greenwich, Conn.
W I A V	New York Radio Laboratories, Binghamton, N. Y.
W N A B	Park City Daily News, Bowling Green, Ky.
W G A X	Radio Elect. Co., Washington C. H., Ohio
W F A G	Radio Engineering Lab., Waterford, N. Y.
W Q A T	Radio Equipment Corp., Richmond, Va.
W I A W	Saginaw Radio & Elect. Co., Saginaw, Mich.
W S A A	Sprague, B. S., Elect. Co., Marietta, Ohio
W M A W	Wahpeton Elect. Co., Wahpeton, N. D.
W N O	Wireless Telephone Co. of Hudson County, Jersey City, N. J.
W J A J	Y. M. C. A., Dayton, Ohio

Changes in Licenses

One new broadcaster and six transfers from Class C to Class A have been announced by the Department of Commerce, all in the western half of the country. The new broadcasting station is that of the Hardsocg Manufacturing Co., Ottumwa, Iowa, which has been given the call KFJL. This is a Class A station, having a wave length of 242 meters (frequency, 1240 kilocycles), of ten watts power. The recent transfers from Class C to Class A are as follows:

Call	Station	Class	Frequency Kcys	Wave L'gth Meters	Power, Watts
K F C B	Azbill, W. K., San Diego, Calif.	A	1080	278	20
K F C K	Colorado Springs Radio Co., Colo. Springs, Col..	A	1240	242	10
K F B K	Kimball Upson Co., Sacramento, Cal.	A	1060	283	100
K F A W	Radio Den, Santa Ana, Calif.	"A"	1070	280	10
K N V	Radio Sup. Co. of Calif., Los Angeles, Calif.....	"A"	1170	256	20
K D P T	Southern Electrical Co., San Diego, Calif.....	"A"	1230	244	50

Think This Over

MANUFACTURED sets are made by experts. Therefore, if anything should go wrong with your set, unless you are accustomed to fixing it, it is best to take it to the manufacturer or the manufacturer's agent and let him analyze the trouble.

Another "Neutro-Generative" Circuit

By C. White, Consulting Engineer

IN every radio fan there is the instinct and initiative to try the new. We are never satisfied fully with what we already have, and it is very good for us that we are not, because it is that spirit of perpetual search for something better that always leads to something better. Yet we are not all fully equipped to carry on a large amount of experimental work even if we should find the time. New circuits often mean new parts and apparatus which means more money to be spent. But it is often possible to try out a new circuit by using most of the apparatus already on hand. Nearly every radio amateur has a good variocoupler, several condensers and miscellaneous other tube accessories; hence, if he can only arrange what he already possesses and purchase just a few new items he is readily in a position to experiment. There is hardly a man who has a radio set that is not eager to try out some of the underlying principles of the "neutrodyne" in connection with his present regenerative receiver. Excellent results are easily obtainable for those who have the patience to fuss around the circuit until they get it balanced and working in good order.

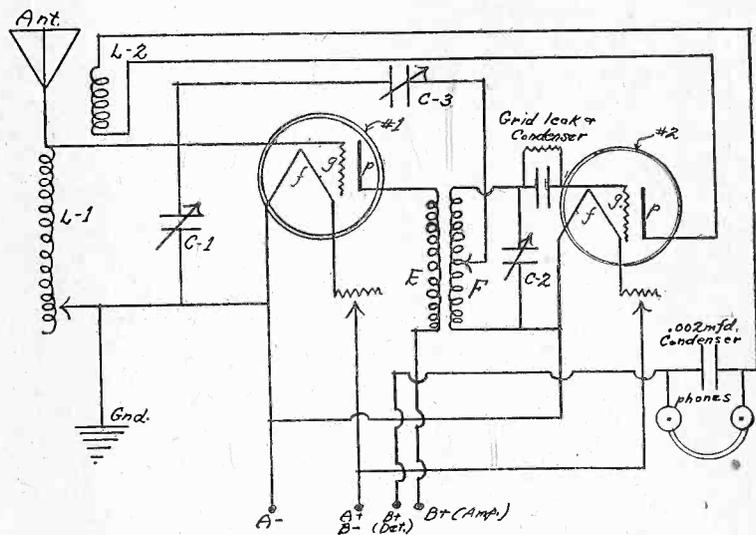
The circuit illustrated is nothing more than a simplification of a previous "neutro-generative" circuit. (See RADIO WORLD, August 18, 1923.) It has been expressly designed for those who do not feel inclined to go to the extra expense to purchase choke coils, telephone size condensers, and extra potentiometers. In brief, it is a hook-up for the man who wants to try out first without heavy expense. Of course the previous "neutro-generative" receiver is the better one owing to the fact that more controls afford easier and more flexible stabilizing adjustments, but this receiver will operate satisfactorily just the same and afterwards the extra controls can be added. Audio-frequency amplification can be added to this receiver, if it is so desired, to increase the volume for the use of loud speakers. The stage of radio-frequency will not increase the volume of local stations very much over the volume obtainable with the detector tube alone, but it will enable a large number of relatively distant stations to be brought in with the same volume as the local stations, and quite a number of very distant stations that were never heard before.

In order to keep down noise it is advised that a very short aerial be used. This not only means less static, but also far better selectivity between stations. I firmly believe that many amateur aerials are entirely too long and act as wonderful static collectors in the warm weather. Try shortening your aerial a little and notice the difference in static as well as signal strength. There is a certain balancing point in length where the best possible signal volume and clarity is obtained.

The constants for the circuit are as follows: The unit L-1 and L-2 is an ordinary variocoupler using the coil L-2 as the rotor, C-1 and C-2 are each 11 plate condensers, but if you have on hand two 23 plate condensers they can be used instead of purchasing new ones. The condenser C-3 is a *very small* two plate vernier used as a stabilizing condenser which controls oscillation and by its proper adjustment oscillation can be avoided over the entire wave range of the set. The unit E-F is the only special thing about the circuit. The coil E is wound with No. 22 S. C. C. magnet wire on $3\frac{1}{2}$ " tubing, having 60 turns in all. The coil F is similar, only being wound on 4" tubing and tapped for switch points at each tenth turn. In the complete

assembly of the unit E-F the coil E is placed inside of the coil F, thus rigidly fixing the coupling. If you fail to obtain an increase in volume as the coupling between L-1 and L-2 is increased, reverse the terminal connections to the coil L-2. Body capacity will give little or no trouble if the condensers are connected in as advised. The fixed plates of the condenser C-1 and C-3 are to be placed nearest the grid of tube No. 1, and the fixed plates of C-2 are attached to the grid side of F. In this way grid potential is removed from the shaft or movable plates of the tuning condensers and there is no howl as the hands are brought near the capacities for adjustment. To further cut down the little body capacity effect that remains, a small circular sheet of copper foil can be attached to the panel in front of each condenser. These shields should be connected to the ground terminal of the outfit. It is foolish to use too much copper foil for it would be of no particular avail.

Try this circuit if you can because it requires only



Simplification of the "neutro-generative" circuit described by Mr. White in RADIO WORLD for August 18, 1923.

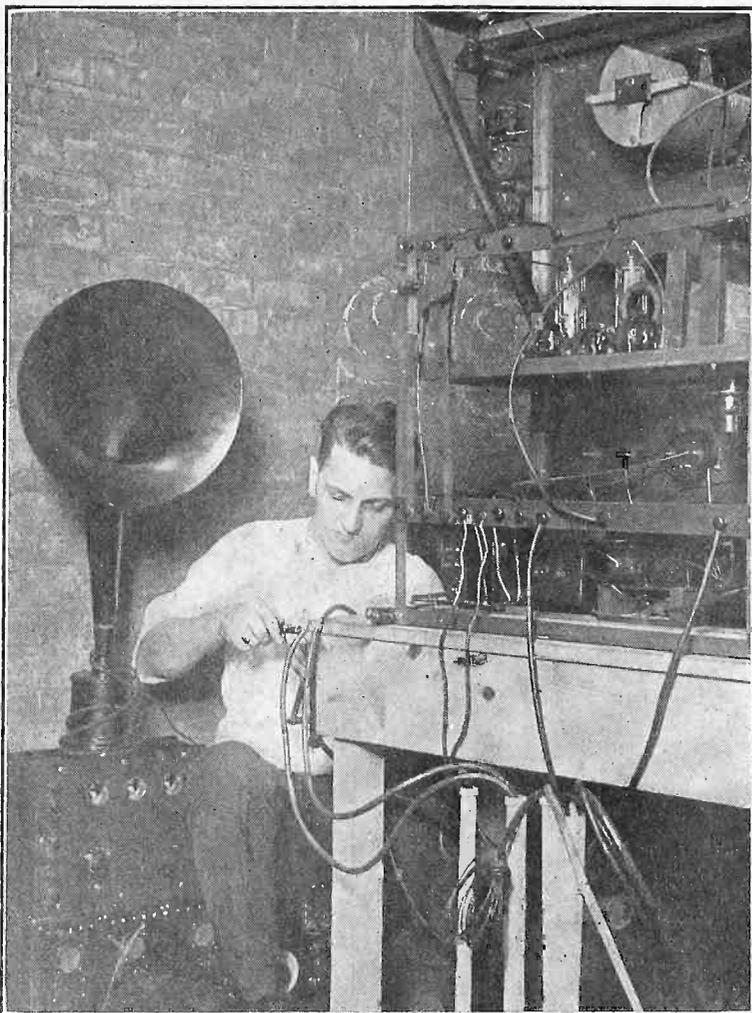
one special part, the coil E-F, which can be easily made at home, and you will find you have a set that will operate on an extremely short aerial, thus making a small indoor or portable aerial feasible.

Do You Yell?

WHEN talking to a friend over the telephone, do you yell? Then why burn your tubes up to their maximum when receiving? By doing this you are producing innumerable troubles for your neighbors and consequently causing them to bless you in no uncertain language—and you are not getting anything more out of your set than you would if you lowered the voltage and tuned your set properly. It is a mark of "amateurishness" to burn your tubes as brightly as they will, and it is also a blessing to the other fellows who are just as interested in radio as you are, when you shut off for the night. Conserve your tubes, their tempers and your signals by learning how to get maximum signals by the use of minimum filament current.

Our News Photographers Ke

U.S. Army Officers Tes



(C. Kadel and Herbert)

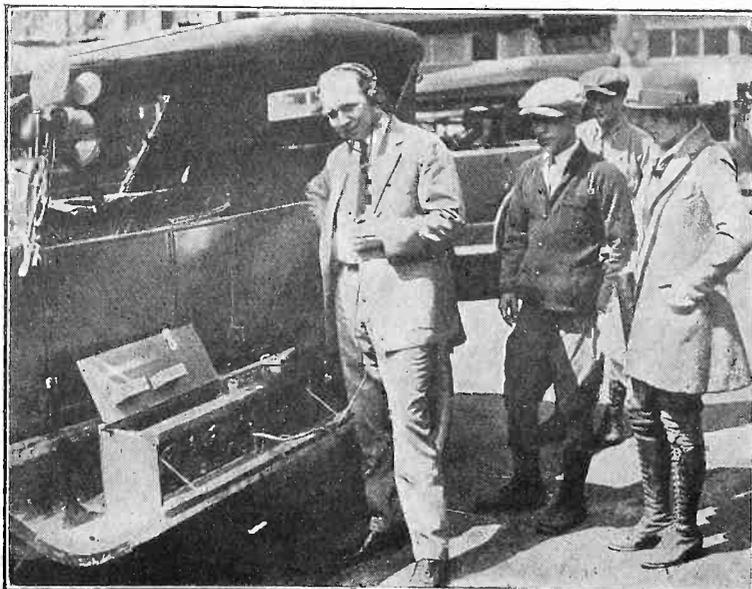
Here you are fans, the new home of WHN, the Ridgewood, N. Y., station that was so popular with the local listeners last Spring. It has moved over to Loew's State Theatre Building, 45th Street and Broadway, New York City, and is run by the Loew Theatre Enterprises. F. W. Boettcher, operator, is seen installing the transmitter and endeavoring to look as though he liked to work in close quarters.



(C. Kadel and Herbert)

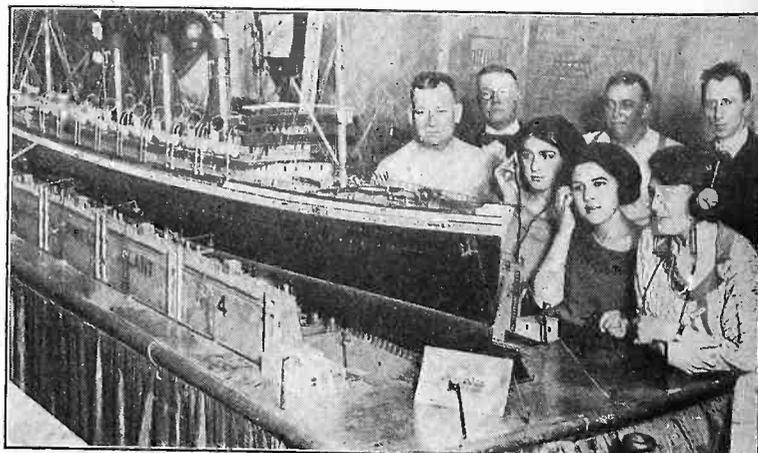
The 212th Anti-Aircraft Artillery, Radio Division of the Signal Corps is testing a portable radio receiver and transmitter. They are transmitting and receiving to ascertain the efficiency of the French short wave receiver and transmitter. A calibrated wave meter in the upper right hand corner. Each machine is easily carried in a scout plane, and operated by means of a wave meter. The change-over from transmitting to receiving is made by means of a wave meter. The same tubes are used for reception and transmission which are of such construction that a phone or microphone can be used in either way. The apparatus can also be used for telephone work, and is extremely flexibly.

Captions by Robert L. Dougherty



(C. Kadel and Herbert)

Frank H. Cromwell, Mayor of Kansas City, the "Home of the Nighthawks," is the first mayor to broadcast weekly talks concerning municipal affairs as a means of civic education. Mayor Cromwell is shown inspecting the "radio car," an automobile that is making a 'round the world trip. So far it has traveled 3,000 miles without breaking a tube.



(C. Kadel and Herbert)

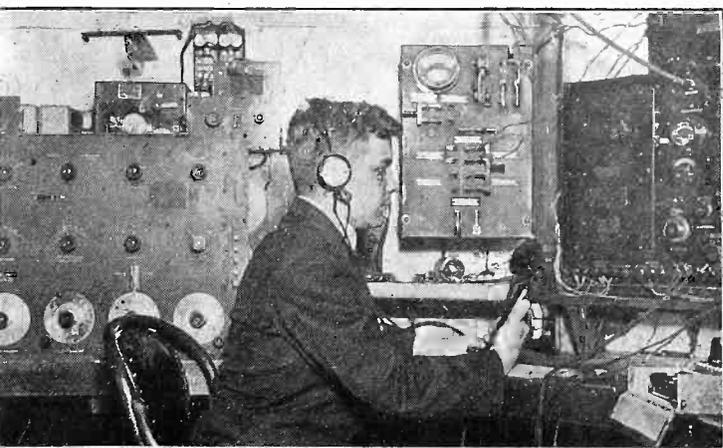
During the Silver Jubilee Celebration of Greater New York held at the Grand Central Palace this ocean liner, an exact model of one of the grayhounds of the waves, attracted interest because of the radio set that it contained, and which actually worked on the few feet of fine wire strung back and forth on the antenna and masts of the ship.

Keep Pace With Radio Events

Using French Radio Sets

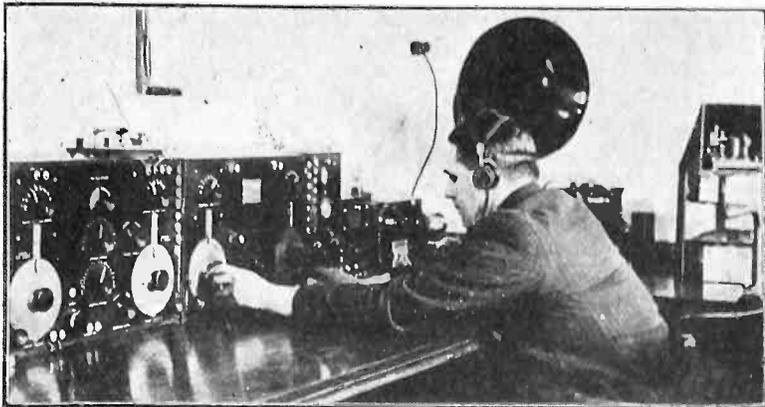


Testing out the famous "Porte E10" French Army portable messages to planes manoeuvring over the field to litter. Note the apparatus on the left, showing the complete receiver and transmitter, capable of being driven generator. Each machine has six tubes, and a triple pole double switch seen directly under the bank simplifying matters considerably. Note also the jacks, to be inserted in the right manner, due to the slots cut a certain it a wonderfully compact but at the same time marvellous.



(C. Kadel and Herbert)

The radio room at the supply base of the U. S. Naval Reserve which is used for inter-fleet communication between the eagle boats and the supply base of the naval forces. Chief Radio Officer Harold Cook at the Western Electric 9-36 transmitter. This is a popular type of transmitter on the destroyers and smaller boats because of its ease of operation and its power.



(C. International Newsreel)

The interior of the radio station maintained by the U. S. Shipping Board at Bush House, London. This is one of the most powerful stations in England, as communication clear across the Atlantic is an every day occurrence. Constant communication with Annapolis and Panama are assured due to the powerful transmitters and latest type heterodyne receivers, but, of course, on the longer wave lengths.



(C. Kadel and Herbert)

Addison and Fowler have taken advantage of the free jazz music over the radio to practice their tangos. They are shown in one of the difficult steps in their original dance, "Old Madrid," in the Venetian garden of Miss Fowler's Long Island home to the tune of "La Paloma" received on their three-tube loop receiver.



(C. Kadel and Herbert)

Miss Anna Louise Kadel listening in on the lawn to some of the broadcast tales. By the look of the "pup" they must be telling bedtime stories, or else giving a talk upon "how to hold a masher correctly and acquiring the correct stance," which, of course, is of little interest to the canine mentality, so Mr. Pup follows his instinct instead—and snoozes.

RADIOGRAMS

WORLD NEWS HAPPENINGS BRIEFLY
PHRASED FOR OUR BUSY READERS

The late Warren G. Harding was the first President of the United States to talk to the people through a radio microphone, and thus spoke to more persons directly than any other Chief Executive. President Coolidge has already spoken by radio through Station WJZ.

* * *

A radio organization known as the Radio Sociedade do Rio de Janeiro has been formed in Rio de Janeiro, and already has more than 100 members. Several influential men of the city are among the officers and directors. It is also announced that a daily broadcasting service will be inaugurated by the Praia Vermelha station.

* * *

Station WGM, Atlanta, Ga., has been donated to Georgia School of Technology, making it one of seventy-eight educational institutions now operating radiophone stations. The power of 500 watts ranks it as one of the most powerful stations in the educational class. The equipment will be used for research work.

* * *

Mrs. Calvin Coolidge, new "First Lady of the Land," is an ardent radio fan, and derives much pleasure from her set, which is a large one of improved type. Mrs. Coolidge for some time has had a set in her room at the New Willard Hotel, used temporarily as a White House following the death of Mr. Harding and the elevation of Calvin Coolidge to the Presidency, and will probably take it with her when President Coolidge takes official possession of the White House.

* * *

A new agreement between the Chinese Government and the Federal Telegraph Company, in conjunction with the Radio Corporation of America, has been signed for the construction of five wireless stations in China. Announcement was made by Richard P. Schwerin, president of the Federal Company, upon his arrival from the Orient at San Francisco last week. The American Legation at Peking later confirmed the news. Two of the five stations will be erected at Shanghai, one of them to be the most powerful in the world. The others will be at Peking, Harbin and Canton. Their aggregate cost will be about \$13,500,000.

"Jazz fog" is the descriptive name applied by the neighbors of Col. E. H. R. Green to the programs broadcast every evening from his private radio station at South Dartmouth, Mass.

* * *

On the outskirts of Niagara Falls, N. Y., the city has provided a camping ground for tourists. Over the week-ends the camp numbers several hundred persons, and in the evening after the sightseeing for the day is finished radio equipped automobiles entertain the tired travelers.

* * *

One hundred and fifty children between the ages of 1 and 5 years are playing on the lawns of Tranquillity, the country home of the Israel Orphan Asylum, breathing air free from the heavy heat of the city and romping with a freedom impossible in a city institution. Radio equipment makes it possible for them to listen to bedtime stories and music broadcast from various stations. It is said that Tranquillity is the first institution of its kind to be radio equipped.

* * *

French Ministry of Posts, Telegraphs and Telephones is taking steps to give ships in French ports telephonic connection with land. At present a ship is in touch by wireless with the land until she reaches dock. Then, when only a few yards of water separates her from the shore, she is isolated. This handicap is to be overcome by means of a short submarine cable which will connect the ship with the city telephone system. In a few months passengers arriving at Havre can telephone to friends in Paris before leaving the ship.

* * *

Professor W. De Sitter, a Dutch savant, has propounded the novel theory that the earth is not solid, but built on the order of a trembling ball of jelly. De Sitter bases his theory on observations of wireless. It is frequently observed that there is a difference of several hundredths part of a second in the time of transmission of messages between two fixed points. Hitherto this difference has been ascribed to atmospheric conditions. De Sitter, however, declares the earth is a trembling mass and that the two points moved nearer or further away from each other.

RADIO PRIMER

By Lynn Brooks

INCREASING THE POWER OF YOUR AMPLIFIER—With many circuits an amplifier is necessary in order to get volume in anything outside of local work. The main trouble with such circuits employing two amplifying tubes is that the distortion of voice and music is so bad that it robs the original signal of any vestige of its inherent qualities.

There is one way in which distortion can be removed from amplifying circuits. That is by the employment of a grid "C" battery. As is probably understood, the grid in the amplification circuits should always have a negative potential. The moment a positive charge is allowed to affect the grid, the signals will be distorted.

The proper place for such a battery is in the filament circuit side of the amplifying transformer. For this purpose a single flashlight battery of the No. 751 type will be sufficient. The negative pole should be connected in the grid lead, and the positive in the lead that goes to the filament. A battery such as this will last for six to eight months with ordinary use.

In the second stage of the amplifier, it is best to employ two such batteries connected in series. This will effectively cut out all distortion in the amplifying circuits and signals will be amplified with all their

For the New Army of Radio Beginners

original characteristics which is something that cannot be said of the majority of home-made amplifiers and even most of the factory-made products. In the case of the factory-made product, this will probably necessitate the breaking of a connection and the soldering in of the battery line, but in any case the advantages of doing it are so many that it overcomes any objections you may have toward rearranging your set.

USE OF CONDENSERS SHUNTING TRANSFORMERS—In many cases builders are mystified because of the fact that some diagrams show condensers across the primary and secondaries of audio-frequency transformers, and other diagrams do not. They therefore do not know whether these capacities can be shunted across all the transformers, whether they are specified or not.

In the case of the high ratio transformers that are sometimes used, the transformer ratio is so high that a condenser across the primary and secondary windings will materially help the amplification. It does not matter whether it is specified or not in the diagram, because simply as a matter of experiment it can be tried, and in ninety-nine cases out of a hundred the results will prove satisfactory.

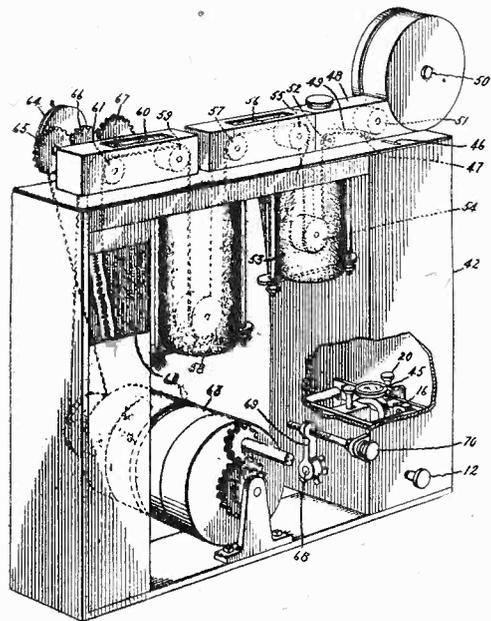
Latest Radio Patents

Recording Apparatus

No. 1,456,595: Patented May 29, 1923. Patentee: Charles A. Hoxie, Schenectady, N. Y.

My present invention relates to an apparatus for and a method of making a record of small electric current impulses and more particularly for recording photographically impulses corresponding to received radio signals.

In receiving radio messages it has been customary heretofore to employ at the receiving station some form of detector which will be acted upon by the high-frequency wave received, in such a way as to produce a current capable of operating an ordinary telephone receiver. The reception of the message has depended upon the ability of the receiving operator to translate the sounds heard by him in the receiver into the characters or letters making up the message. This method has the disadvantage that in case the operator fails to understand any of the



Method of recording slight electrical impulses similar to radio signals, which can be reproduced at will.

letters or words it is necessary to have part of the message repeated in order to make sure that it is correctly received. In case the receiving apparatus is affected by stray impulses or so-called static, which may be of much greater intensity than the signaling impulses, the response in the receiver produced by these stray impulses is so much greater than that produced by the signaling impulses that their effect upon the ear persists even after the stray impulse has passed and the effect of a single stray impulse may be of sufficient duration to prevent the operator from hearing several of the characters of the message. This method of signaling also has the disadvantage that it is physically impossible for an operator to receive messages which are sent at a rate greater than twenty to thirty words per minute.

The object of my invention is to provide a receiving system which will overcome the disadvantages above mentioned as well as others. In carrying out my invention I provide means for making an oscillographic record upon a tape, of the signaling current which in the old system acts upon the telephone receiver. The

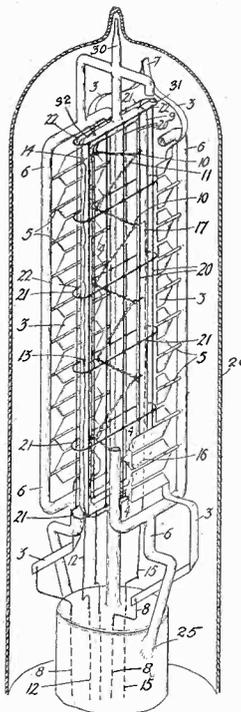
photographic impression upon the tape is automatically developed immediately after it is made and the apparatus so arranged that the message may be read from the photographic record very soon after the record has been made. The apparatus which I provide is also capable of recording messages at a much faster rate than they can be received by ear, the possible speed of the operation being several hundred words per minute instead of twenty to thirty. The effect of stray impulses upon the recording device will last only as long as the impulse itself lasts and will not affect the reception of any of the succeeding characters of the message. Hence a stray impulse, which with audio receiving might obliterate a whole word, may affect only a single letter of the photographic record and not interfere at all with the proper receiving of the message. It will also be apparent that the degree of skill required to read a photographic record of the message will be much less than that required to receive the message by ear.

Arnold's Electric Discharge Device

No. 1,456,528: Patented May 29, 1923. Patentee: Harold D. Arnold, East Orange, N. J.

This invention relates to electric discharge devices and in particular to an improved construction and arrangement of electrodes for the purpose of producing a large current output therefrom.

In designing devices of this type for large current output it is sometimes essential among other things that the tube or vessel enclosing the various electrode elements should be evacuated to as high a degree as possible; a process which in-



New means of constructing the elements of a three-electrode tube, rendering it easier to exhaust due to the construction allowing heating of anode as well as cathode.

volves driving out any gases which may be occluded by the various metallic surfaces within the tube. This can best be done by heating the various electrode elements by some external means during the

process of evacuation. Where large electrode surfaces are employed the problem of heating them to a sufficient degree to drive out these occluded gases becomes a matter of some difficulty. This is particularly true in the case of the anode or output electrode, which is customarily in the form of a plate and cannot readily be heated by passing current through it owing to its low resistance and the consequently high currents which would therefore be necessary.

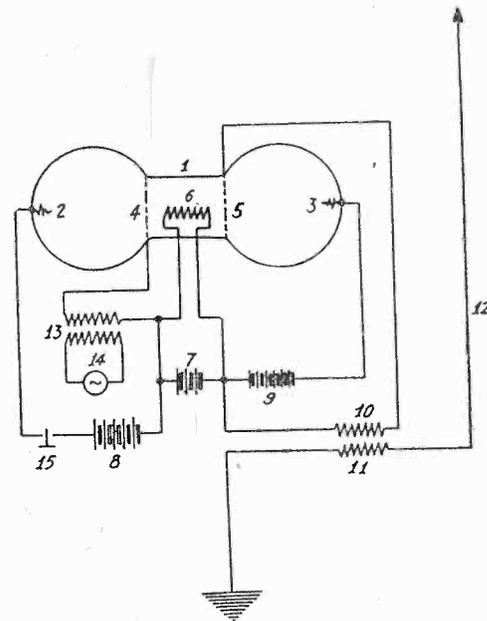
This invention provides an output electrode which is made up of a plurality of bands or strips serially connected and thereby capable of being heated by the passage of an electric current through its length, thus making possible the heating of the anode during the process of evacuation without the employment of unduly high currents.

A further object of this invention is to provide a substantially continuous anode surface composed of a plurality of serially connected sections.

Receiving Arrangement for Wireless Telegraphy

No. 1,454,328: Patented May 8, 1923. Patentee: A. Meissner, Berlin, Germany.

The object of the invention is an improvement on the wireless telegraph



Method of utilizing alternating current to actuate radio transmitter.

receiving arrangement disclosed in German Patent 332,581.

In accordance with the main patent, a cathode relay is actuated by means of an alternating current generator at the receiving station, whereby the received high frequency energy is at the same time transformed and amplified. The changes in the intensity of this alternating current may then be observed by well known means, such as an ordinary telephone. The sound of the local alternating current source may then be heard corresponding to the signal received.

In accordance with the present invention, a particularly advantageous arrangement consists in that the cathode relay is a tube having two anodes and two amplifying grids, whereby one grid is operated by the incoming high frequency, and the other by the alternating current

INTERESTED IN THE STAGE?

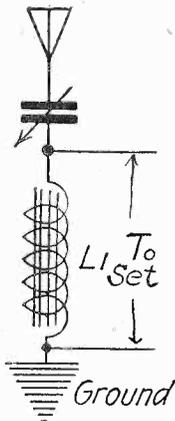
Send 10c. for sample copy of New York Star, the great illustrated weekly theatrical paper. Trial subscription three months (13 issues) \$1.00. New York Star Co., 1493 Broadway, New York City.

Answers to Readers of Radio World

I have constructed a one tube reflex set and am bothered by the A. C. hum from the lighting circuits. On local stations this hum is not very pronounced, but when tuning for distance it is so noticeable that it drowns out the other stations. This is not due to arc lights as they are not used. The lights go out at 11 P. M. and when they are out everything is fine, but while they are on, the working of the set is almost impossible. Also I get the carrier wave of the station. This is not supposed to be noticeable in reflex sets, but the fact that it oscillates does not seem to hurt reception. What kind of a coupler is best to use with this circuit? Where can I purchase a variocoupler using the honeycomb type winding on both primary and secondary? What type of crystal has been found to work best in reflex circuits? Can you suggest any manner of getting rid of the A. C. hum?—Earl A. Wright, Cole Camp, Mo.

* * *

One method of decreasing the A. C. hum is shown on this page. It consists of about 25 or 30 turns of No. 20 SCC wire wound on an iron core and connected as shown. This will probably cure your troubles. Induction hum in a set of your type is extremely bothersome and just about as hard to get rid of. Another way would be to find out if any light wires run parallel to your an-



One method of decreasing the induction hum from nearby light and power lines. It is a choke coil connected across the antenna and ground leads of the set which acts as a frequency choke for the low tension induction.

tenna and change your antenna so that it runs at right angles to them. The carrier wave you mention is due to your set oscillating. This is common with reflex sets due to feedback through the transformer windings. If it does not seem to hurt your reception it is probably not serious, but suggest that you do not place your transformers in such a position that inter-coupling would be possible. Also do not run your leads parallel. You may use any well made coupler that reaches the desired wave lengths. Apply to your nearest dealer. He can supply you with the information as to where to obtain the coupler you desire. A galena or synthetic crystal is best for reflex reception, using a fine catwhisker and setting the detector proper on a felt or rubber pad.

* * *

Kindly advise me how I can use the enclosed diagram so as to operate a loud speaker. I do not wish to reassemble my set, as it works fine now. What will be necessary?—H. Burroughsford, 54 Parkway Avenue, Toronto, Canada.

A circuit suitable for your use appeared in RADIO WORLD, page 20. If you wish, you can construct this apparatus in a separate cabinet and by using separate batteries for your amplifiers and detector you need not disturb your receiver connections.

* * *

Can I use a 43 plate condenser in a single circuit regenerative or must I use an 11 plate

condenser?—Charles Robertson, 15 Second Street, Lowell, Mass.

Where the diagram calls for an 11 plate condenser, use an 11 plate condenser. If you are just asking for information as to whether a 43 plate condenser can be used in a single circuit—yes, it can.

* * *

In regard to the crystal set published in RADIO WORLD by Richard B. Wilbur, will you kindly inform me if the beginning and ending of the primary coil are left open or are they brought to taps for the first and last turns?—H. E. Lemback, 1953 Randall Road, Cleveland, Ohio.

The turns you mention are used as the first and last turns of the coil and should be brought to taps.

* * *

Will you kindly furnish me with the circuit diagram used in the Radio Corporation set, the RA with two stages of audio-frequency amplification?—R. D. Campbell, Room 816, 949 Broadway, New York City.

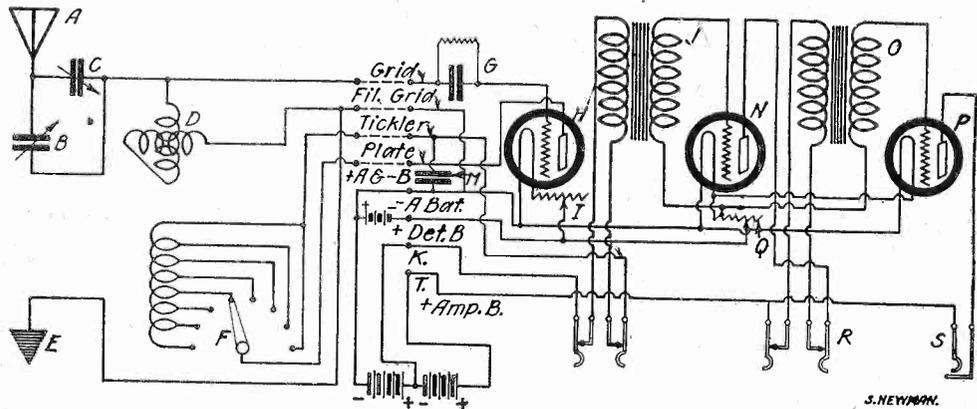
The circuit diagram you wish is published herewith. For your information, the variometer and condenser turn on the same shaft at the same time, both being at maximum or minimum together. The plate coil used for regeneration is preferably wound on the same tube as the stator of the variometer. The regenera-

time?—Charles E. Stevens, M.D., Gogebic Hospital, Bessemer, Mich.

The two ends of the loop go across the variable condenser which is in the first tube circuit. (See RADIO WORLD, July 28, page 13, which will illustrate this.) It makes no difference whether it crosses in front or in back of the loop. The nails should make no difference if the wire is well insulated. Both ends of the loop are used at the same time. When you use a loop it is not necessary to use the coupler, and it should be disconnected from the circuit. The fact that you note a difference in tuning when you use a loop and when you use an outside coupler with antenna and ground is due to the fact that when the change is made, the constants of the circuit proper are changed and therefore the condensers will have to be tuned higher to compensate for the loss of inductance. This does not signify that the circuit is not working properly, so you need not bother looking for trouble where none exists, provided the circuit works properly with both loop and antenna and ground, when each is used separately.

* * *

What causes station WGY to come in strong on my receiver one minute, and then gradually fade away? I have a three-tube



Circuit diagram used in the RC and RA-DA combination receivers. A—antenna, B—condenser on same shaft as rotor of variometer, C—3-plate vernier, D—variometer, E—ground, F—tickler wound on same tube as stator of coupler and tapped, G—grid leak and condenser, H—detector tube, I—detector rheostat, J—first audio transformer, K—detector B battery lead, M—condenser across phones, N—first amplifier tube, O—second audio transformer, P—second amplifier tube, Q—amplifier rheostat with tap for grid return of amplifier transformers, R—first stage audio amplifier jack, S—second stage audio amplifier jack, T—amplifier B battery plus tap.

tion control is governed by the taps on this coil, while the wave length is controlled by the variometer and condenser. A 23 plate vernier condenser is used, with the three plate vernier separate.

* * *

Kindly give me a suitable circuit for adding two steps of audio-frequency to the Rumford All Wave Universal Receiver described in RADIO WORLD April 7, 1923.—J. A. Beauchamp, Montreal, Canada.

A suitable diagram for this purpose was published in RADIO WORLD August 18, page 20. It is not necessary to reprint the detector circuit as this additional apparatus can be constructed in a separate cabinet connecting it as shown, and just plugged in to the present set, or connected by means of two bridging contacts.

* * *

I have made a four-foot standard for a loop and began at the outer end of each arm and placed 24 small nails one-half inch apart. I began at the inner end of the arm and strung my wire (annunciator bell wire), giving me 24 turns on the loop. Where does the inner end of the loop go? Does it make any difference whether it is strung across the front or back of the wires in order to get it to the receiver? Does the fact that I used wire nails make any difference if the wire is well insulated? Are both ends of the loop used at the same

set made by the — Co. and local stations are fine, but on this station and on some of the Philadelphia stations, I cannot seem to keep them tuned in. Is it the fault of my operation, or my set? How should I tune my set to remove this?—James Phelan, Hudson Street, New York.

The "fading" you notice is not the cause of either your tuning or your set. It is very noticeable on the stations you mention. You cannot remove it by tuning your set. The station will "fade" in and out like that continually for some time, and then will settle down to a steady volume for a while only to commence fading again. You cannot stop it.

* * *

In RADIO WORLD, February 10, you describe a set built by E. M. Pace. Kindly give me directions for building a coupler suitable for this receiver.—George K. Menyersen, Chicago, Ill.

For building a coupler suitable for this set, get a 3½" fibre or composition tube, 6" long, and a 3" rotor. On the tube wind 15 turns of No. 22 DCC wire without tapping; then drop the winding down about ½" to allow space for the shafting of the rotor, and wind on 70 turns, tapping each tenth turn, and bringing it out to the switch points as shown. Wind both sides of the rotor full of the same size wire (about 25 turns to the side).

Properly Installed Antenna Greatly Aids Better Reception

ALTHOUGH the receiving sets that are in use among the majority of broadcast listeners to-day will function fairly on even poorly constructed aerials, says a writer in the New York Tribune, it will surely improve matters if the antenna is well designed and the factors which constitute the design are known. The aerial is the source of the energy which directly operates the receiver, and it is obvious that if we can increase the amount of energy collected by the antenna, through judicious design, we can thereby also increase the over-all efficiency of the receiver.

There are more factors entering into the problem of constructing a good aerial than one would imagine from a superficial glance at the subject. These factors include height, length, insulation, grounding, material, proximity to other objects, etc., on the requirements of which a brief resumé will be given.

Height.—It is a well known fact that the higher above the earth's surface one is the greater is the degree of electrification of the atmosphere, varying with local conditions. By way of example an insulated antenna 400 feet high will soon become charged to a potential in the neighborhood of 10,000 volts. This charge has to leak off in some way and will jump small gaps, such as the separation between the plates of the series antenna condenser, in order to get to ground. This produces X's, otherwise known as strays, static and atmospherics. Hence as a rule it is advisable to keep the receiving antenna low, of course, within limits. It has been found that a height of about forty feet is most suitable for good reception. It must be pointed out, however, that strays which come from a distance are not cut down, relative to signals, by using a low aerial. Such discharges are highly damped wave trains and affect the aerial in the manner of an ordinary signal.

Ground.—Since the whole aerial circuit should have a low resistance the ground selected should have as great a surface as possible exposed to the earth. In city districts the best ground is the cold water pipe, it being sometimes desirable to connect both gas and water pipes together for the ground. In country districts several metal plates, about two or three square feet in area, should be imbedded in the ground, surrounded by some charcoal. The plates should be connected to each other by rubber covered wire, soldering the connection. In dry weather the place may be watered, the charcoal retaining the moisture for some time. A type of ground such as this also would be of use as a transmitting ground. The ground wire should be at least of the same size as the lead-in wire and should be short—the shorter the better. The aerial itself should not be more than seventy-five feet in length.

Insulation.—It is of the utmost importance that the insulation of the aerial wires should be nothing but the best if any pretense to efficiency is made. Thoroughly glazed porcelain insulators are the accepted standard for insulation quality, though other materials, such as rubber, bakelite and mica compositions have their adherents. Instead of using one single long insulator it is better to use two or three small ones strung out one after another, as this offers less chance of leakage taking place. The lead-in should be given special attention where it enters the house. Most of the energy losses occur at this point and it does not pay to

use the best insulation at the aerial only to lose the carefully hoarded energy by installing a poor lead-in insulator.

Material.—For receiving purposes a single wire is all that need be used. Four wires do not bring in a station better than one. It is a common error to suppose that four wires can pick up four times as much energy as one in receiving. It is true, however, that in transmitting four wires can and do carry a great deal more energy than one. The use of iron wire is not recommended in any form. Instead, use aluminum, copper or phosphor bronze. The lead-in can be made of the same wire, keeping it well away from the side of the building, six feet not being too great a distance by any means. A rather large size of wire should be chosen for the aerial, the thought to increase the surface being the reason for the heavier wire. A small wire is a poor investment for the reason that it corrodes very soon, leaving but a thin core of metal, surrounded by a coating of oxidized matter. This corrosion causes the wire to lose its original strength and, further, the electrical resistance is greatly increased. The latter is the most serious of these two disadvantages. With a heavy wire, or one that is composed of a number of smaller strands, these difficulties are offset for a longer period of time, although they too will not give everlasting service.

Proximity to Other Objects.—If possible the antenna should be stretched over a clear space, free from buildings and trees. It should not be strung in between two tall structures, as then these objects will cut off and screen the passing radio wave. If one end is supported by a tree allow the insulator at that end to extend at least ten feet from the branches. The tie rope or wire only needs to be lengthened to do this. The position of the lead-in has already been touched upon. Keep all wires tightly stretched.

Do not run the aerial parallel to any electric lighting or power line, nor the telephone lines. It is not advisable to get too near any other neighboring antenna either. When in such a position too much interference is apt to result, being caused by the phenomenon of induction.

It will repay you to go over your present aerial installation, keeping the above facts in mind. You will be surprised at the difference that a few changes can make if carried out in all earnestness.

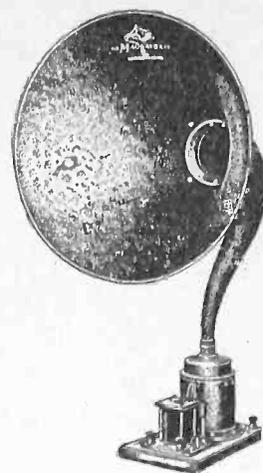
Radio Broadcasting Plant Unharmed by Lightning

IF any further evidence were necessary to prove the safety of radio, there was plenty furnished during a recent severe electrical storm. Lightning entered Station WGI, Medford Hillside, Mass., during the worst of the storm. Investigation showed that it was attracted by the electric light wires, which it completely demolished. The electric light service was paralyzed. However, the 320 ft. steel antenna tower was not touched, nor the powerful broadcasting apparatus, proving that a radio antenna and a receiving or transmitting set does not attract lightning.

Time was when uninformed persons thought the installation of radio provided an extra fire hazard. This belief has been somewhat dispelled by the experts who call the lightning hazard of radio a "childish bugaboo."

MAGNAVOX

Radio Products



R2
Magnavox
Radio
The
Reproducer
Supreme

The Utmost in Sound Amplification

Where the reproduction of broadcasted programs is desired in large volume, the Magnavox Reproducer R2 should be used.

Thanks to the Magnavox (electro-dynamic) principle of construction, this result is secured with minimum electrical energy.

Without Magnavox equipment, no Radio receiving set is complete.

Magnavox R3 Reproducer and 2 stage Power Amplifier . . . \$90.00

R2 Magnavox Reproducer with 18-inch curvex horn: the utmost in amplifying power; requires only .6 of an ampere for the field . . . \$60.00

R3 Magnavox Reproducer with 14-inch curvex horn: ideal for homes, offices, etc. . . \$35.00

Model C Magnavox Power Amplifier insures getting the largest possible power input for your Magnavox Reproducer.

AC-2-C, 2-stage, \$55.00
AC-3-C, 3-stage, \$75.00

Magnavox Radio products can be had of good dealers everywhere. Write for copy of our new booklet.

The Magnavox Co.
Oakland, California
New York Office: 370 Seventh Avenue

"Saving money by NOT advertising gives the sheriff and auctioneer most of their business."—F. S. C.

Radio Merchandising

Advertising Rates: Display, \$5.00 an inch, \$150.00 a page. Classified Quick-Action Advertising, 5 cents a word.

Telephone Bryant 4796

Appreciates Our Exposure of Fakes

RADIO WORLD,
Editor:

I am not given to writing to the editors of newspapers and magazines, but your paper has done one thing which is very commendable, and that is the publication of articles relative to spurious radio corporations, etc. Some months ago you published articles regarding the defunct International Radio Corporation, and now your paper carries an article dealing with imitation Brandes 'phones. Fine! It would be better if more magazines did this. It is a public service and one which should be appreciated by the public at large, and the publication that follows this policy should have the support of the public to the fullest extent. You have mine.

*Whatever became of the International Radio Corporation? Might it not be of interest to your readers to state how well this corporation "died"? Several Baltimore "investors" would be interested.

Very truly yours,
M. J. HITCHCOCK.

Baltimore, Md.

*EDITOR'S NOTE: Write to National Radio Chamber of Commerce, 165 Broadway, New York City.

New Radio and Electric Firms

Radio Mfrs. Outlet, New York City, radio materials, \$10,000; A. Wellington, J. Morganstein, S. Kassever. (Attorney, D. G. McConnell, 45 Cedar street, New York City).

Service Appliance Co., Schenectady, N. Y., electrical contractors, \$50,000; H. G. Vedder, J. M. Brucker, Jr., E. E. Grigaleit, Jr. (Attorneys, Blodgett & Smith, Schenectady.)

Sorenson Scientific Corp., New York City, make laboratory apparatus, 250 shares preferred stock, \$100 each; 100 common, no par value; active capital, \$10,000; C. M. Sorenson, F. A. Boersch, T. S. Wood. (Attorney, the company, 177 East 87th St.)

Nylco Electric, Jamestown, N. Y., \$25,000; F. A. and F. R. and A. C. Nelson. (Attorney, R. M. Bates, Jamestown).

Radio Sales Corp., \$50,000; J. R. Davis, T. Davis, R. Fitzpatrick, Wilmington, Del. (Lawyers' Corporation Co.)

First Radio Mystery Serial from WJZ

SERIAL stories are a well-known feature of magazines, but as items of radio programs they are practically unknown as yet. Doubleday Page and Company believe that the idea is practical—WJZ thinks it is—and from now on the radio audience will have a chance to decide the question every Thursday evening as long as "The Waddington Cipher," a Doubleday Page publication, runs. Just what the listeners will think of the radio serial is an interesting question—it is a new departure in programs, and the reception of new departures is always a matter of interest.

Radio Trade Notes

The Radio Electric Shop, 421 East 31st St., Kansas City, Mo., has entered the retail radio business.

* * *

W. P. Harper, 360 Juan Manuel St., Guadalejara, Mexico, is reported to be in the market for broadcasting stations, transmitters and transmitting sets.

* * *

P. L. Spencer, 4129 North Eighth Ave., Birmingham, Ala., has opened a retail radio store.

* * *

Radio Limited, 497 Phillips Square, Montreal, P. Q., Canada, is in the market for an extensive list of radio goods.

* * *

Clement E. Anderson, Unionville, Mo., has started a retail radio business.

* * *

Fred Wittig, Cohocton, N. Y., wants to buy choke coils.

* * *

National Radio Engineering Co., Atlanta, Ga., is in the market for an extensive list of radio apparatus and mailing lists.

* * *

Gilbert H. Ludlow, 306 Market St., East Liverpool, Ohio, wants prices on receiving sets and vulcanized fibre sheets.

* * *

The Van Blaricom Co., Helena, Montana, are in the market for cartons for shipping goods.

Daily Newspapers Publishing Radio News and Programs

AS a part of its service to readers RADIO WORLD publishes herewith the names of daily newspapers which carry radio programs and radio news. Wherever possible the name of the radio editor of the paper is given. Additions to the list will be published as received.

Morning Oregonian, Portland, Oregon. Publishes daily radio programs of its own Class B station, KGW, and other Pacific Coast stations, and on Sunday a complete page of technical news and features. Radio editor, Saul Emanuel.

A Warning to WHN!

RADIO WORLD has received complaints from a number of fans regarding the "rough stuff" broadcast from Station WHN, Loew's State Theatre, New York City. Mixed with a hodge podge of vaudeville and variety songs and music are remarks from the announcer and some performers that closely approach the offensively vulgar.

WHN is reminded that almost every sound in the studio is transmitted and the audience reached always includes refined people of both sexes. Here is a case where responsibility and obligation should go hand in hand with privilege.

Radio Literature Wanted

Manufacturers of and dealers in radio apparatus and accessories are notified that literature and catalogues describing their products have been requested, through the Service Editor of RADIO WORLD, by the following:

R. M. Seward, 107 Logan St., Altoona, Pa.

Frank La Valle, 2529 Cambrelleng Ave., New York City. (Wants to establish retail radio business on small scale.)

J. P. Fitters, 224 Adam St., Steubenville, Ohio.

Clarence Gibbons, 342 Exchange St., New Haven, Conn.

J. E. Greene, 64 Sheffield Ave., New Haven, Conn.

C. B. Gowan and R. L. Lockett, 515 Galveston Ave., Fort Worth, Texas. (Retailers. In market for parts.)

Michael E. Kondrat, 94 Exchange St., New Haven, Conn.

Einar Aarnodt, Room 310, Hort Bldg., University Farm, St. Paul, Minn.

C. F. Colton, 26 Ningkno Road, Shanghai, China.

Robt. B. Clark, 1247 Texas Ave., Sawtelle, California.

A. C. Pforzheimer, Broadway, Woodmere, N. Y. (Wants agencies for reliable manufacturers.)

Paul Nilsen, Box 1010, South State St., Jackson, Miss.

Joseph M. Edwards, P. O. Box 207, Tukegee, Alabama.

Roy Ruskin, 314 Morgan St., Boonville, Mo. (Retailer. Wants wholesale prices.)

Merle Abrams, Box 894, Burkburnett, Texas.

Harry A. Muir, 532 Cherokee St., Denver, Colorado.

L. W. Macomber, 377 Somerset Ave., Taunton, Mass.

George C. Blackwood, 243 East Upsal St., Mt. Airy, Philadelphia, Pa. (Wants hinged lid cabinets, 12x14 or 12x18, or sizes between these.)

Chas. Whiting, 7120 Fifteenth Ave., Brooklyn, N. Y.

The Radio Sales & Service Co., 609 Freeman St., Lyndhurst, N. J.

Wesley Blalock, P. O. Box 315, Montgomery, Ala.

Alfred T. Maund, Jennings, La. (Dealer.)

L. J. Hamilton, 909½ Steiner St., San Francisco, Cal.

G. D. Wilcoxon, 1414 Seventh St., Santa Monica, California.

C. W. Ferguson, 15 Wyoming St., Roxbury, Mass. (In market for a three or four tube set.)

Byron Miller, Star, Oregon. (In market for parts of a good commercial set and a 50 watt transmitting outfit.)

Lake County Overland Co., Leesburg, Florida. (Installing radio department.)

Jack A. Segel, 800 Dorian Court, Far Rockaway, N. Y. (Wants to purchase receiving set.)

Richard Burch, 30 Fifth Ave., New Rochelle, N. Y. (Wants receiving set and loud speaker.)

E. C. Giggly, Orosi, California.

L. L. Price, 514 Chestnut Ave., Du Bois, Pa.

C. G. Richardson, 2012 Avenue G, Brooklyn, N. Y. (Interested in fixed mineral detectors for reflex circuits.)

Louis Nathan, 72 Rodney St., Brooklyn, N. Y.

J. A. Shields, 688 Howard Ave., Bridgeport, Conn.

J. G. Kaufman, 117 Avenue C, New York City.

New Brandes Factory

C. BRANDES, Inc., 237 Lafayette St., New York City, manufacturers of the popular "Matched Tone" headsets, have purchased a new factory at Newark, N. J., containing over 46,000 square feet of floor space. With its other factories the company will now utilize over 70,000 feet of floor space all devoted to the manufacture of headsets.

Broadcasters Urge Change in Copyright Law

IN a friendly suit brought by M. Witmark & Sons, well-known music publishers of New York City, against L. Bamberger & Company, department store proprietors and owners and operators of broadcasting station WOR, Newark, N. J., in the United States District Court for the District of New Jersey, to determine whether the broadcasting of copyrighted music by radio violated the copyright law, Judge Lynch decided that it did, and ordered:

"A decree will be entered in favor of the plaintiff, but restraint will be withheld pending a review of this opinion."

Judge Lynch concluded a lengthy opinion as follows:

"There is another point which, although striking us as immaterial, deserves some comment. The defendant argues that the plaintiff should not complain of the broadcasting of its song because of the great advertising service thereby accorded the copyrighted number. Our own opinion of the possibilities of advertising of radio leads us to the belief that the broadcasting of a newly copyrighted musical composition would greatly enhance the sales of the printed sheet. But the copyright owners and the music publishers themselves are perhaps the best judges of the method of popularizing musical selections. There may be various methods of bringing them to the attention of music lovers. It may be that one type of song is treated differently than a song of another type. But, be that as it may, the method, we think, is the privilege of the owner—he has the exclusive right to publish and vend, as well as to perform.

"Considering all of the facts and circumstances, it is the conclusion of the Court that the broadcasting of the defendant was publicly for profit within the meaning of the Copyright Act as that meaning has been construed by the United States Supreme Court."

The National Association of Broadcasters, 1265 Broadway, New York City, through Paul B. Klugh, executive chairman, has issued a statement in connection with the decision, as follows:

"This decision justifies the position taken by this association from its inception:

- "1. That our efforts be directed toward a revision of the Copyright Act, rather than any contest in the courts under the present ambiguous law.
- "2. That, because of the proven value of broadcasting in creating sales of sheet music, phonograph records, and piano player rolls (now admitted by Judge Lynch in his decision) it is unreason-

able for any musical copyright owner to demand payment for use.

"3. That the American Society of Composers, Authors and Publishers controls but a small percentage of the copyrights recorded in Washington and therefore are in no position to make any concerted demand.

"4. That our Bureau of Music Release furnishes weekly (for use by members only) good, new, copyrighted, popular music without the payment of any fee or tax.

"With our rapidly growing membership and the strength which comes from numbers, the future of the broadcasting art becomes clearer."

RADIO WORLD, in its issue of April 21, 1923, pointed out a way by which the broadcasters could beat the music publishers. This advice seems worth repeating at this time. In brief, it was as follows:

"Let us assume for a moment that we are running a broadcasting station. We receive nothing directly from this service. We do not want to be penalized for broadcasting songs and instrumental pieces which not so long ago the music publishers were dying to have everybody use, and in some cases paid handsome weekly or lump sums to vaudeville singers and other musicians for using. As broadcasters we know we are offering a great public service to radio and the public at large, and feel that the fees demanded should not be paid.

"Supposing, however, that a fair argument does not bring the publishers to terms, what then can be done? The answer is simple. Every music publisher is obliged to boost his numbers so that singers will put them in their repertoire, phonograph companies will record them, and eventually the public will buy them.

"Broadcasters can adopt practically the same method. Good song writers—and some of the most popular and successful in the business—can be engaged on a salary or royalty basis and if their output is released through all the other broadcasting stations there would soon be such a demand for these numbers that the music dealers throughout the country would be placing their orders for hundreds of thousands, and, in some cases, millions of copies. These new numbers could also be released through singers, orchestras, etc., and practically the same method of boosting procedure adopted as is now used by the biggest music publishers.

"Broadcasters should not worry at all when it comes to a matter of getting up-to-

date material. They can make their own. They can popularize it in a more expeditious and thorough way than was ever known in the old days of 'song-plugging.' All they have to do is to adopt the methods of their friendly enemy and go right into the song and instrumental sheet music business themselves in the manner indicated."

False Rumor Mongers Being Sought

AN investigation to determine which of the nineteen commercial broadcasting stations, or 2,600 amateur stations, within the second radio district, started the false report previous to the actual event, that President Harding was dead, and that Mrs. Harding had died from the shock has been started by Arthur Batcheller, United States Supervisor of Radio, who has offices in the Custom House, New York City. If the originator of this fraud is discovered his prosecution will be asked, under a Federal radio communication law.

Bolton Hall Tells How to Bring Good Times

WHAT a joke it is to prove that if no one bought anything but hash and corduroy, we would all be rich—at least if we handed our money over to the bank, writes Bolton Hall in *Forbes Magazine*. But what the bank would do with the money if no one spent anything does not appear.

Simply cutting down our expenditures is simple enough—almost idiotic. It is simply cutting down business, making a "buyer's strike," which is the most stupid of all strikes. To avoid hard times we must keep our expenditures up, increase them if possible; but see that they are made not wastefully but productively.

Don't try to "save" paint on your house or wear shoes with the heels worn down. These are wastes that make want.

We laugh at the old lady who took the remainder of the emetic after she was well "to save it," but we sometimes eat food when we are not hungry "to save it." Better give it to the poor and save your ice, or to the chickens and save your digestion.

True Thrift is the philosophy of saving by spending, particularly by buying productive things, including securities. "Life is not made for savings; savings are made that life may be more abundant here and now."

Can't Sell American Radio Goods in England

THE restrictions against the use of any radio equipment except that licensed by the British Broadcasting Company are making it impossible for English merchants to sell American radio products, according to a report just submitted to Washington by United States Consul Ross E. Holaday, from Manchester, England.

Consul Holaday, making an investigation of the radio situation, found that the restrictions upon the use of equipment and the regulations governing the use of wireless sets give the British Postmaster General, through his arrangement with the British Broadcasting Company, an ironclad control over radio. There is no prohibition against the importation of foreign radio products, or against their sale after importation, but this freedom is nullified by the difficulty of securing a license to use any equipment other than that endorsed

by the "B. B. C." which collects a royalty on every set manufactured in England.

There is now under consideration by the British authorities the issuance of a new form of license to be known as the "constructor's license," under which people with no technical knowledge will be permitted to assemble wireless sets and use them to receive broadcast and other matter. Even those who purchase the sets manufactured under B. B. C. restrictions are required to secure a license before they can make use of their outfits. This is known as a "broadcasting license" and costs approximately \$2.50. Only those persons having "experimental licenses" are permitted to assemble their own apparatus, and to secure such a license the applicant must have a knowledge of the technical side of radio which the majority of would-be listeners do not possess.

Marvel Capacity Switch



Three-Ways Series, Parallel, Direct-ground

Patents pending

DIAL MOUNTED

Efficient reception is the ability to switch from the short wave lengths to the long, or from the long to the short.

The Marvel three-way switch receives short waves in the series position; long waves in the parallel position, and waves of medium length in the direct-ground by eliminating the condenser entirely.

Strictly of anti-capacity type.

Price . . . \$1.25

Attractive discounts for dealers and jobbers.

MARVEL SWITCH CO. 28 West 25th St. New York City

The Wireless Oracle Speaks

By Billy Bronx

WGR seems to get through regularly these days in spite of all the static. Their programs sure are the berries.

Had some 95% vocal talent from WIAD, the Ocean City Golf Club, of Ocean City, N. J.

Say, WEAf, where do you get all those good orchestras? This time it's the Bruno Brothers' Orchestra. They sure are some jazz babies. What do you say?

We sure did miss you last Sunday evening, Roxy. Let's hope that this unforeseen occasion will not arise again.

William Bruno, you may be another Lopez at the piano, but you're far from another Gilbert or a Charley Tobias with your voice.

Too bad you're not on the air more often, WJAX. Your popular programs sure do make a hit with me.

Have you noticed how busy Lillian May Challenger, the soprano, is these days? She is another one of our prominent art-

ists who always seems to be thinking of the listener-in. Isn't that your impression also?

WMAF is another station that gets through regularly these days. Your programs are a delight, but your modulation is still too full.

By the way, WMAF, is your slogan "The Land of the Pilgrim Fathers" or "Away Down East"? At present you've got me guessin'.

The Melody Belles are some Toodlety-Oot-Tum-Tums and plenty of it. If you didn't hear them you sure did miss something.

You may think that Loew's, Keith's, Fox's or Proctor's offer you the best in vaudeville, but if you tuned in WHAZ last Monday night you would have heard something that has them all beat. To those who listened in: Do you agree with me?

More competition for you, Roxy. First it was the Strand Theatre and now it's Marcus Loew and his crowd. You'd better keep a steppin' lively!

We fight fans sure did enjoy your short talk, Jimmy De Forest. Some of you other limelights of the fighting game ought to make it your business to keep it a-goin'.

Phil Ohman and his Trio sure did make a hit with us. Too bad they were not booked for the evening hours.

Now that we've heard "Adrienne" over the air, we're going to see it. Are you with us?

No doubt you have heard or have seen pictures of amateur stations that are claimed to be as good as broadcasting stations, if not better. Well, to be convinced that this may be true, I would suggest you listen some evening to 2RB who uses phone a great deal and is on a wave length of about 190 meters.

Have you noticed the way the stations in the East, or New England States especially, come through these days? Seems as if the weather agrees with them.

You may have heard two stations broadcasting the same program at the same time, but did you ever hear three stations broadcasting the same program at the same time? If you want to try this, then tune in WEAf on 492 meters, WCAP on 469 and WMAF on 360.

Do You Want LONG DISTANCE on Your Set?

The following stations have been heard with a COAST COUPLER

- WDAP—Chicago
CFCN—Calgary
WWJ—Detroit
PWS—Havana
WSB—Atlanta

And Many More



The COAST COUPLER is a necessary part of your radio hook up. Manufactured of the best materials obtainable and thoroughly tested before leaving the factory, it has immediately won recognition in the radio market.

ANYWHERE IN THE UNITED STATES—\$5.00

Write for catalogue.

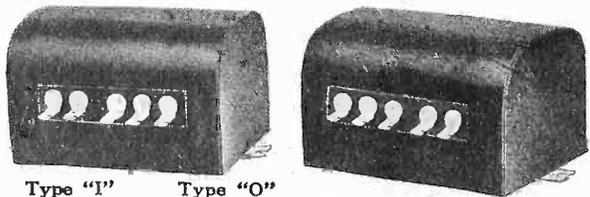
COAST COUPLER COMPANY

245 EAST SEVENTH STREET

LONG BEACH, CALIFORNIA

COMO DUPLEX TRANSFORMERS

The COMO DUPLEX SYSTEM of audio-frequency amplification gives the maximum volume without distortion and tube noise.



Type "1" Type "O"

COMO APPARATUS COMPANY

168 DARTMOUTH STREET

BOSTON, MASS.

There is a combined filtering action which assures perfect results when ordinary amplification fails.

It can be added to your present amplifier, giving you power amplification on the weak signals that more of the ordinary amplification would kill.

Sold only in matched Pairs, \$12.50

A copy of C. White's "HOW TO MAKE A POWER AMPLIFIER" is yours for the asking.

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Please send me RADIO WORLD for months, for which

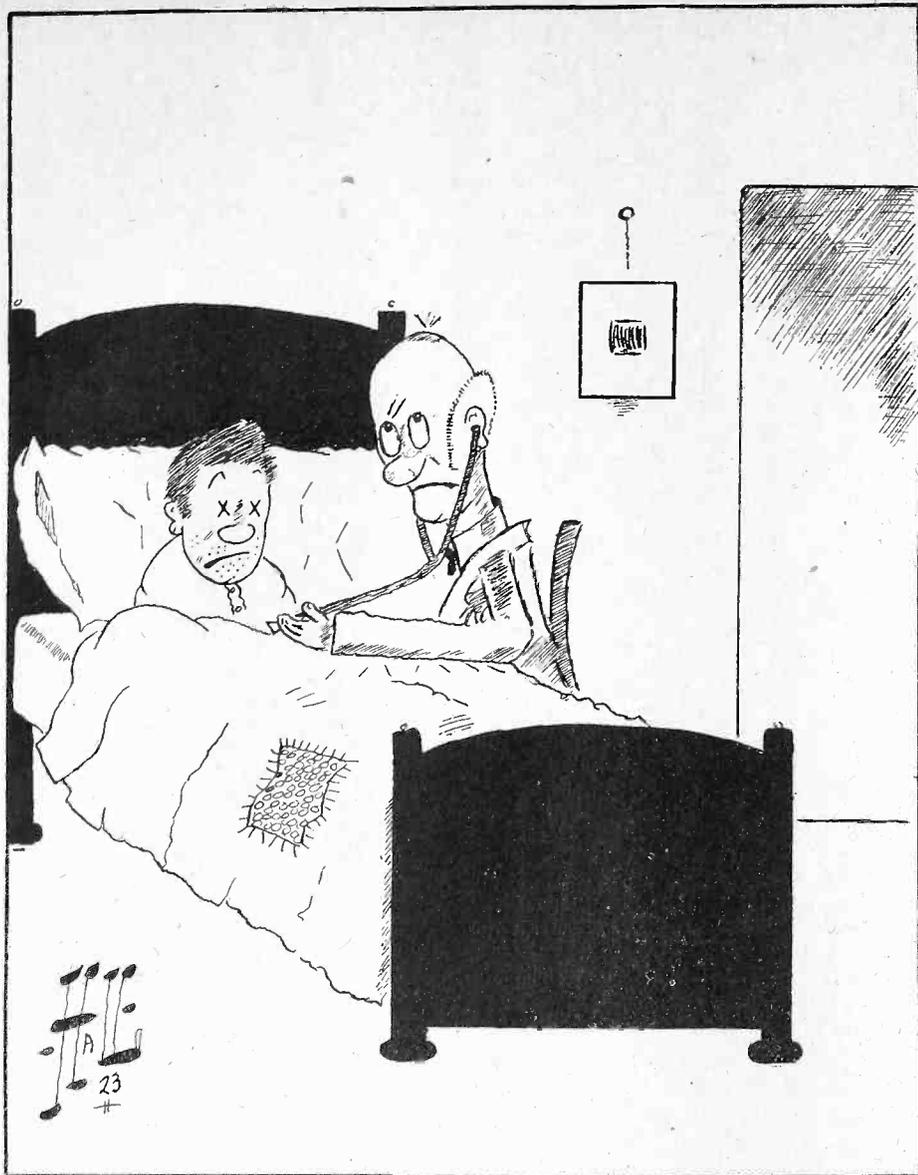
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Three Months 1.50
Six Months 3.00
One Year, 52 Issues..... 6.00
Add \$1.00 a Year to Foreign Postage; 50c for Canadian Postage.

No Age Limit in Radio Broadcasting

THE all-embracing auditorium of the air knows no limitations as to age. The great radio audience asks only that the artists entertaining it shall be capable, pleasing and entertaining. Radiophone Station WHAZ, at the Rensselaer Polytechnic Institute, Troy, N. Y., having presented in its weekly concert program of July 30 the oldest singer ever heard through the broadcasting medium, Calvin Dater, of Troy, an eighty-five-year-old baritone, who was greeted with a "storm of applause" in the form of messages of appreciation, swung to the other age extreme the next Monday evening, and offered in its concert program solo numbers by Beatrice Gilbert, a nine-year-old pianist of unusual skill for her age, and duet numbers with her brother, Eugene Gilbert, a thirteen-year-old violinist.



“Listening In”

How Do Crystal Sets
Get Distance?

EDITOR RADIO WORLD: Much has been said and written in technical books pro and con regarding the fact that re-radiation of receivers and the oscillations from nearby transmitters are the cause of distance reception on crystal sets.

I am the owner of a receiver of the crystal type, using a tuner, crystal detector, variable condenser and phones, and have done some fine work up to 100 miles.

The other evening while listening in, I tuned down to 200 meters to enjoy a little of the spark work of some of my neighboring amateurs, but soon growing tired, tuned back to phone wave lengths. My neighbor on the next block has an amateur 20-watt phone transmitter and he started in to talk to a friend of his. While he was on (about two minutes), I distinctly heard station WGY, Schenectady, and the moment he signed off, WGY faded right out and things went along on the usual plane.

Located as I am hundreds of miles from that station, I think that this proves that most of the long distance work of some of these crystal fans is due to enforced oscillation from nearby CW and phone transmitters and multi-tube sets rather than to superfine crystals.

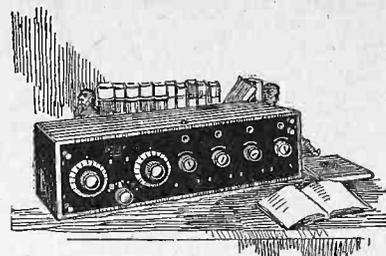
If it doesn't prove it in anybody's mind, I would like to have them explain the phenomenon to me in a manner that will convince me. I am open to argument, but they will have to use some good common sense.

Yours for an early argument on the matter,

PHILIP KEANSBY

Wilmington, North Carolina.

Note: This should hit somebody's pet theories on re-radiation and crystal sets hard.—Editor.



TUNE IN THE WORLD
WITH A
CROSLEY MODEL X

No matter where you live, the news and pleasures of the world are an open book to you if you own a Crosley Model X.

A man from Belleville, Kansas, writes: "I have found the Crosley Model X to be the best radio receiving set I have used, and permit me to say that I have been interested and using radio sets since the spring of 1922, including all standard makes."

In spite of new features such as the R. F. T. A. Coil and the Multistat, the Crosley Model is still priced at \$55.00.

Write for Descriptive Pamphlet.

For Sale by Best Dealers Everywhere.

CROSLEY MFG. CO.

8404 Alfred Street

Cincinnati, O.

HEAR 2000 MILES
ON ONE TUBE!

Easily made by anyone. No trick circuit. Few parts. Distance, Volume, Selectivity.

GUARANTEED TO WORK

Complete parts, including drilled panel, genuine mahogany cabinet, phones, batteries and diagram only \$12.95

Diagram alone, 50c Circular Free.

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DON'T WAIT

SPECIAL INTRODUCTORY OFFER

BRAND NEW

\$26.98

(Type R-3)
Magnavox
Loud Speakers

\$26.98

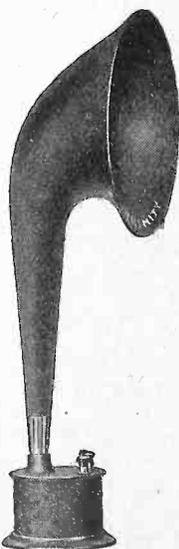
COREY HILL BATTERY CO.

1354 Commonwealth Ave.

Boston 34, Mass.

Subscribe for RADIO WORLD, \$6.00 a year, \$3.00 six months, \$1.50 three months.

THE TRINITY LOUD SPEAKER

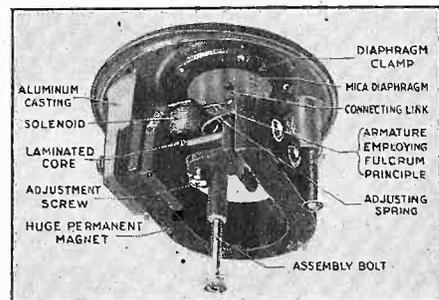


TYPE "A1"
21" FIBER
HORN

\$25.00

TYPE "B"
(For Phonographs)

\$12.50



INTERIOR CONSTRUCTION

An ear phone is an ear phone no matter how fancy the horn that covers it may be, and, due to the delicate construction of an ear phone it is utterly incapable of giving true tone reproduction, especially, when relatively large currents are passed thru its coils, such as the output of a two-stage or power amplifier.

The Trinity Loud Speaker element embodies the well-proven and tested principles of the phonograph reproducer with the soundest principles of electromagnetic design best adapted for loud speaker operation. It is not an ear phone when placed on a head band and a loud speaker when covered with a horn. It is a sturdy loud-speaking element ALWAYS.

Send for Literature.

TRINITY RADIO CORPORATION

168 DARTMOUTH STREET, BOSTON, MASS.

WORTH SENDING FOR!

New Duo-Control Reinartz Receiver
The latest achievement in simplified control. Two dials control a super-selective three circuit receiver. Simple to build and simple to operate. Complete blueprints, including full size panel layouts, 50c.

RADIO EQUIPMENT CO.
727 W. 8th St. JUNCTION CITY, KANS.
"Veel We have the parts."

Don't Ask for Rheostat—Say

FIL-KO-STAT
FOR REAL FILAMENT CONTROL

**RADIO
TUBES REPAIRED
\$2.00**

New filaments inserted in

U.V. 200—C. 300	\$2.00
U.V. 201A—C. 301A—U.V. 199—C. 299— D.V. 6A.....	2.00
U.V. 201—C. 301—D.V. 6.....	2.25
U.V. 202—C. 302.....	3.00

WD11-12, VT-1, VT-2, VT-216A Not
Accepted

24 Hour Service, and on the
Above Types ONLY.

Terms—Cash with order. We will ship
C. O. D. if 1/3 price is remitted with order.

All tubes are guaranteed to operate like
new and to arrive in good working order.

DEAL DIRECT !!

SPECIAL—Ship us 5 of the above named
tubes and we will ship by return mail one
repaired tube FREE of all cost. What do
you say? Swap?

Send all tubes parcel post prepaid to

Radio Tube Repair Co.
192 Main St., Milford, Mass.

Program for the Amateur Convention at Chicago

EVENTS of absorbing interest to all radio men are to be crowded into five days of concentrated activity, including technical talks fertile with most recent developments in the radio world, when the largest gathering of amateurs in history convenes in Chicago September 12-15 for the Second National American Radio Relay League Convention, under the auspices of the Chicago Radio Traffic Association, according to the elaborate program just prepared.

Never has there been such a widespread turnout of amateurs as that expected to roll into Chicago from all sections of the United States and Canada, opening the fall radio season with a spectacle excelling all previous conventions and "hamfests." Officers of the A. R. R. L. and other speakers of national prominence call for a full attendance at technical meetings for DX men during a discussion of international amateur tests and achievements.

One of the most timely subjects to all amateurs who have participated in recent transoceanics is the proposed two-way communication tests over the Atlantic and the Pacific. Every conceivable kind of oceanic amateur traffic, from transmissions of signals to complete messages, has been successful, but never have two amateurs established direct contact.

This question and tentative plans for the two-way tests will be taken up at a meeting Thursday afternoon of the A. R. R. L. Traffic Department under chairmanship of F. H. Schnell. Other semi-technical meetings will be held during the convention.

An elaborate banquet at the Edgewater Beach Hotel will precede, rather than wind-up the events as the custom has been in the past, the object being to provide at the outset an opportunity for delegates from all sections to become acquainted.

Some of the time will be given over to field events and various games and contests will be staged between groups of amateurs representing the various A. R. R. L. operating department divisions.

One of the stunts designed to furnish a great deal of amusement will be the search for a hidden transmitting station by means of portable loop receiving sets. This scheme will carry visitors here and there throughout the city on foot, or in automobiles, looking for the mysterious operator, whose position will be carefully chosen.

A special effort is being made by R. H. G. Mathews, central division manager of the League, and other committee men to provide a program which will be of interest to the broadcast listener as well as the amateur and talks covering all phases of broadcast transmission and reception are scheduled for the convention.

A "Night of mystery" is the term selected for the last evening when visitors will be invited to witness the initiation of candidates into the "Royal Order of the Wouff-Hongs." A weirdly elaborate ritual has been prepared and the initiation itself is to be in charge of a group of amateurs from Flint, Mich., at which city the amateur secret order originated.

The weapon known as the "wouff-hong" is an instrument of torture designed by the "Old Man," for years an anonymous contributor to the League's official organ, "QST."

Coming Events

AMERICAN RADIO EXPOSITION,
Grand Central Palace, New York City,
October 6 to 13, 1923. J. C. Johnson, gen-
eral manager.

ANNUAL HOME AND CITY BEAU-
TIFUL EXPOSITION, featuring radio
exhibits, Atlantic City, N. J., June 16 to
September 8, 1923.

AMERICAN INSTITUTE OF ELEC-
TRICAL ENGINEERS, Pacific Coast con-
vention, Del Monte, Cal., Oct. 2-5. F.
L. Hutchinson, 33 West 39th St., New
York.

A MERICAN RADIO RELAY
LEAGUE, second national convention, Chi-
cago, Ill., September 12-15, 1923. Chicago
Radio Traffic Association, 959 The Rookery,
Chicago, Ill.

Seek Relaxation of German Restrictions

EFFORTS to secure a relaxation of government restrictions under which private radio installations are prohibited in Germany are being made by a radio club established in Berlin early this year, according to a report from Consul E. Verne Richardson to the Department of Commerce.

It is commented that Germany lags far behind many other countries in private radio enterprise, a great contrast to pre-war times, when Germany was well in front in radio matters.

At a recent meeting of the Berlin club there was demonstrated a loop antenna by means of which London could easily be heard.

SUBSCRIBE DIRECT OR THRU NEWS DEALER

Radio World is \$6.00 one year (52 issues), \$3.00 six months, \$1.50 three months. Radio World, 1493 Broadway, New York City.

*Yours
Sincerely*

Greenwich Radio Co

185 GREENWICH STREET NEW YORK, N. Y.

Pathe

Moulded Variometers
and Couplers...\$2.25

Guaranteed 600 M.
Pathe Loud Speaker \$17.50

Crown Transformers,
Adapted for
ALL TUBES, \$2.95
Ratio 5 to 1

U. S. L. VERNIER BAKELITE ENDS
CONDENSERS

17 PLATE	\$2.95
23 PLATE	\$3.25
43 PLATE	\$3.45

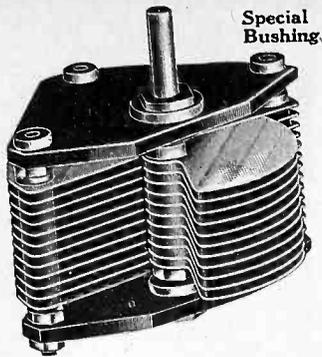
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RADIO FANS Do you want to sell your old set?
Do you want to exchange anything for something?
Do you want to buy something?

If so, why don't you use the Classified Department of Radio World? You can get fine results for five cents a word, minimum ten words. Your message will reach thousands including other fans, dealers, etc., etc.

Try Radio World's Classified Department
for your personal radio and other needs.

RADIO WORLD, 1493 Broadway, New York City



Aetaco Condensers

Are made with just the one purpose in mind of giving you the most serviceable condensers obtainable. Fine adjustment. Accurate spacing.

- 43 Plate Condenser.....\$1.75
- 23 Plate Condenser.....\$1.35
- 17 Plate Condenser.....\$1.25
- 11 Plate Condenser.....\$1.00
- 3 Plate Condenser......60c.

AETACO

Back Mounting Inductance Switch...75c.

Complete line of Receiving and Transmitting Apparatus.

American Radio Stores

235 Fulton Street New York City

DX STATIONS ON A ONE TUBE SET

Easily Constructed by Anyone
Guaranteed to Operate or Money Refunded

COMPLETE PARTS

1 Genuine Mahogany Cabinet; 1 Drilled Hard Rubber Grade A Panel; 1 23-Plate Condenser; 1 Variometer; 1 Rheostat; 1 Tube Socket; 2 3-Inch Dials; 8 Initialed Binding Posts; 3 Lengths of Spaghetti; 3 Lengths of Bus Wire; 1 Grid Leak and Condenser; 1 Bezel; 1 Diagram Free.

Only \$8.50

Ask for free price list on all standard Radio merchandise. Orders promptly attended to.

GLOBE RADIO SHOP

115-117 West 23rd St. New York, N. Y.

DO YOU WANT PLANS FOR MAKING THE SLEEPER DUOTOL RECEIVER, USING THE SLEEPER TWINS. Two Variometers and the fixed Coupler? SEND 10c for the June issue of RADIO AND MODEL ENGINEERING.

SLEEPER RADIO CORPORATION
88 W. Park Place New York City

Back numbers of Radio World supplied at regular price of 15c. a copy. Any 7 copies for \$1.00. Radio World, 1493 Broadway, New York.

A B C of Aviation

By CAPT. V. W. PAGE. This book describes the basic principles of aviation, tells how a balloon or dirigible is made and why it floats in the air. Describes how an airplane flies. It shows in detail the different parts of an airplane, what they are and what they do. Describes all types of airplanes and how they differ in construction; as well as detailing the advantages and disadvantages of different types of aircraft. It includes a complete dictionary of aviation terms and clear drawings of leading airplanes. The reader will find simple instructions for unpacking, setting up and rigging airplanes. A full description of airplane control principles is given and methods of flying are discussed at length.

This book answers every question one can ask about modern aircraft, their construction and operation. 275 pages, 150 specially made illustrations with 7 plates. Price, \$2.50

THE COLUMBIA PRINT
1493 Broadway, New York City

A Good Tip for DX Nite Owls

EDITOR, RADIO WORLD:—I have in the course of my reading RADIO WORLD since it started always had a sneaky idea that I would like to write a letter to the editor, but have never had a chance to get anything to talk about, as everything always seemed to be answered before I could ask it. However, I have at last found an outlet for my wish.

I note that you have had article after article, small and large, concerning the importance of grid leaks being variable, yet never have I seen an article concerning the grid condenser being variable. Personally I have found out that it is equally as important for the grid condenser to be variable as for the rheostat to be variable. I have tried out numerous single circuit sets by White, Gordon, Thompson, Dougherty, and others of your writers. I am not the kind of an amateur that is satisfied with a set, but get most of my fun out of life by making and trying them all. I scarcely keep a circuit more than a week, if that long. I sometimes construct three and four at a time by means of a board with clips, and compare the working of them on a single DX station under the same conditions.

Instead of using the conventional fixed condenser, I use a small three plate variable, connected in parallel with three fixed condensers, so that I can obtain any value from .00001 (pretty small, but I have it) up to .005, and find that a variable condenser of this sort is just as necessary to tuning in DX with volume as any grid leak ever made. I use two .002 fixed condensers in parallel with a .001 fixed and a three plate variable.

I have noticed when using the new UV199 tubes in connection with radio-frequency that this arrangement improves my detector over 100 per cent, and therefore I am giving the idea to the fans through my favorite periodical, RADIO WORLD, hoping that it may help some of the other readers solve some of their DX problems this fall and winter, when they try out some of the new circuits that you publish.

Yours for a DXing year,
JOSEPH BENDA.
Palo Alto, California.

Information from WKAQ About Porto Rico

PORTO RICO—What and Where It Is" is the title of an interesting booklet sent out by the Radio Corporation of Porto Rico, San Juan, Porto Rico. This statement is made:

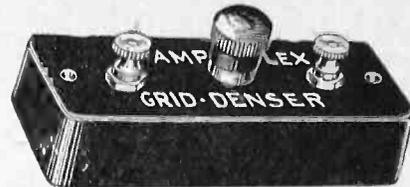
"In the radio logs of thousands of listeners in the Western Hemisphere, two broadcasters occupy honored positions. These stations are WKAQ of the Radio Corporation of Porto Rico, and PWX of the Cuban Telephone Company, Havana, Cuba, both affiliated with the International Telephone and Telegraph Corporation of New York.

"That they are of invaluable service in building a better knowledge of these two lovely islands is proven by thousands of letters received, and which come from Alaska, Canada, the United States, Mexico, and our sister Republics of Central and South America.

"WKAQ hopes that you will enjoy this pamphlet and will tell you more about Porto Rico by radio."

AMPLEX GRID-DENSER

A Variable Condenser (.0005) for the Grid Circuit.



"Delighted with results." — Scientific American.

"Use in our Laboratory."—Prof. L. A. Hazeltine.

"Works like a charm."—Dallas Times Herald.

"Have an excellent set, but failed to get long distance. Placed 'Grid-Denser' in and have picked up 1,000 miles."—Chas. F. Smisor, Editor, Radio Digest.

Approved and recommended by Radio Laboratories of Radio News, Radio World, New York Mail and other experts.

DOUBLES the efficiency of your set.

Greater distance
Sharper tuning.
Louder and clearer signals.

PRICE \$1.25

At your dealers—otherwise send price and Grid-Denser will be sent immediately.

Amplex Instrument Laboratories

57 Dey Street New York City

SPECIAL PHONE SUNBEAM PRICES DICTOGRAPH PHONES

\$5.25

BRANDES PHONES, \$5.00

Send us your address—Get our Special Weekly Offerings.

SUNBEAM ELECTRIC CO.

71 THIRD AVE. NEW YORK 207 East 14th St.



Cram's Radio Broadcasting Map of the UNITED STATES AND CANADA

Scale 100 miles to the inch
In two colors—Size 34x28"

PRINTED ON HIGH-GRADE MAP PAPER UP-TO-THE-MINUTE INFORMATION INDICATING ALL AMATEUR AND STANDARD BROADCASTING STATIONS WITH COMPLETE INDEX OF STATIONS 35c (POSTPAID)

THE COLUMBIA PRINT
1493 BROADWAY, NEW YORK CITY

WANT TO REPRESENT RADIO WORLD?
If you can get subscriptions for Radio World let us know and we will send you a generous proposition. Radio World, 1493 Broadway, New York City.

COMPLETE YOUR SUMMER FILES!

If you were away this summer and missed any copies of RADIO WORLD, we can send you the summer back numbers at 15c a copy; any seven numbers for \$1.00. If you wish, you can have subscriptions start with any issue during the spring or summer, so that you will be sure of having a complete file.

RADIO WORLD, 1493 BROADWAY, NEW YORK

DO YOU WANT TO BUY, SELL OR EXCHANGE RADIO OR OTHER GOODS? TRY THIS DEPARTMENT AT 5c A WORD

RADIO WORLD'S QUICK-ACTION CLASSIFIED ADS

This department is intended for everybody who wants quick action on short announcements covering the buying, selling, exchanging or general merchandising in the radio and other fields. Readers of RADIO WORLD will find that it pays to read these columns every week. Advertisers will get an eight-day service here—that is, copy received for this department will appear in RADIO WORLD on the news-stands eight days after copy reaches us.

The rate for this RADIO WORLD QUICK-ACTION CLASSIFIED AD. DEPT. is 5c. per word (minimum of 10 words, including address), 10% discount for 4 consecutive insertions, 15% for 13 consecutive insertions (3 months). Changes will be made in standing classified ads. if copy is received at this office eight days before publication. RADIO WORLD, 1493 Broadway, N. Y. C. (Phone, Bryant 4796).

Home Builders, ATTENTION!

Are you after something new? Do you want to construct a tuner that will allow you to experiment with circuits, and yet which is totally different in construction from any you have ever seen, and which you can make in the course of an afternoon? If so, send 15c. to RADIO WORLD for the issue of February 10, and turn to page 4. RADIO WORLD, 1493 Broadway, New York City.

Distance Reception with Two Controls.

If that is what you are after, and have not yet succeeded in finding it, send 15c for RADIO WORLD of Feb. 17, and see hook-up by G. W. May on page 11. RADIO WORLD, 1493 Broadway, New York City.

SECOND-HAND Westinghouse R. C. Regenerative receiver, consisting of detector and two-step amplifier, \$65.00. Three Erla Radio Frequency Transformers, \$6.00; Crosley two-step amplifier, \$14.00. All of the above is good as new and will work with all standard bulbs. Address Randolph Whitehand, Albany, Georgia.

SPECIAL TUBES—UV-199, UV-201A, WD-11, WD-12, C-299, C-301, C-301A, \$5.50. Radiola (RC) or (V), \$120.00. C. H. Anderson, Lewistown, Montana.

ALL ESSENTIAL PARTS for building Neutrodyne Receiver, complete instructions, etc., \$21.50 C. O. D. Reinartz tuning coils, \$1.50. R. Schwartz, Buchanan, Mich.

LEARN THE RADIO CODE in 3 hours or less by the Corydon Snyder Code Method. Money back if not satisfied. 50 cents postpaid, or particulars for stamp. Corydon Snyder, 1161 So. Ridgeland Ave., Oak Park, Ill.

GET OUR PRICES on Plate and Filament Heating Transformers. L. Werts, 409 St. Julian St., Pekin, Ill.

60,000 MILES ON A HOME-MADE RECEIVER. 2,600-mile range. 100 station log and hook-up for the asking. Maitland Roach, 2908 Columbia Ave., Philadelphia, Penn.

150 FUNNY PARODIES on latest songs, 25c. Book catalog, 2c. R. W. Collins Co., 197 Fulton St., Brooklyn, N. Y.

WANTED—One K. W. used Navy Quenched Spark Gap. Also Price wanted. Harvard Radio Laboratories, P. O. Box 1781, Boston, Mass.

CALLS HEARD CARDS for DX reports. Station call in color. Printed on government postals or bristol cards. \$80 hundred up. Samples. "Used Everywhere—Go Everywhere." 9AVO, 746 So. Armstrong, Kokomo, Indiana.

MAGNAVOX TYPE R3.—Latest curvex, improved acoustic models, in original sealed factory cartons. List \$35. Introductory offer \$25. RADIO CENTRAL, Dept. W, Abilene, Kans.

VACUUM TUBES REPAIRED. Reasonable. Send for our price list. Vacuum Electric, Station C, Toledo, Ohio.

WOULD YOU LIKE TO RECEIVE RADIO LITERATURE? Are you in the market for radio goods of any kind, either as a consumer, a distributor or a retailer? If so, send us your name and address on a post card and we will see that your name reaches the right people so that you will receive pamphlets, circulars, etc., regarding the goods you want. Address SERVICE EDITOR, RADIO WORLD, 1493 Broadway, New York City.

SUPER-SIMPLICITY CIRCUIT—1,000 to 1,500 miles on one tube, one control, 150 to 25,000 meters. No rheostat, storage battery, vario coupler, variometer, 3-coil mounting, variable inductance, taps or radio frequency. Nothing to guess about. Complete hook-up and particulars, \$1.00. No checks. Build your own. Save 50% and get better results. RADIO EXPERIMENTAL LABORATORY, Box 194A, Berkeley, Calif.

CHEAPEST TO BUILD—Easiest to tune. Get particulars Rokay Single Control Hook-up. Describe your set. Rokay Electric Company, Ingomar, Ohio.

STANDARD ELECTRICAL DICTIONARY—By Prof. T. O'Connor Sloane. Just issued an entirely new edition brought up to date and greatly enlarged—Price, \$5.00. The Columbia Print, 1493 Broadway, New York City.

EDISON Elements for making "B" Batteries, 6c per pair; tubes, 2c each. Nickel Wire, Insulators and Cabinets at reasonable prices. TODD ELECTRIC CO., 178 Lafayette St., New York City.

OLD MONEY WANTED—\$2.00 to \$500.00 EACH paid for hundreds of Old and Odd Coins. Keep all old money. Send 10 cents for New Illustrated Coin Value Book, 4x6. You may have valuable coins. Get posted. We pay CASH. CLARKE COIN COMPANY, Ave. 83, Le Roy, N. Y.

EXCHANGE JOLLY, INTERESTING LETTERS THROUGH OUR CLUB. Betty Leo, Inc., 4254 Broadway, New York City. Stamp appreciated.

LONESOME! MAKE NEW AND TRUE FRIENDS. Confidential. Write DOLLY GRAY AGENCY, Box 186B, Denver, Colo.

RADIO WORLD'S FALL BUYERS' NUMBER

DATE OF IMPORTANT ISSUE—OCTOBER 3

(LAST BLACK FORM CLOSSES SEPTEMBER 27)

Hundreds of thousands of radio enthusiasts who will be returning from their vacations, to say nothing of the army of new radio fans that will come into the radio fall season for the first time, will look forward to the buying of sets and general radio equipment in the autumn. Radio World will devote a special issue to these potential purchasers of goods—the **FALL BUYERS' NUMBER**.

Our regular advertising rates will be in force as follows: \$5.00 per inch, single column \$50, \$150 per page, with discounts of 10% four times, 15% thirteen times, 20% fifty-two times (yearly) contract. Classified, 5c a word.

Special service and value to advertisers in Radio World's **FALL BUYERS' NUMBER**. All advertisers who give us copy for quarter page or more space in Radio World's **FALL BUYERS' NUMBER** will, on request, have their announcements appear in **two colors at the price of one**—in case copy is in our hands by September 22.

Radio World is already at work on a country-wide circulation campaign for **FALL BUYERS' NUMBER**, which will be so interesting from a pictorial and text standpoint that it will have an unusually large sale and advertisers will receive unusually fine value.

Write, wire, or phone now for special positions

RADIO WORLD, 1493 BROADWAY, NEW YORK CITY

PATENTS
 promptly procured. Trade
 Marks designed & registered
FREE INVENTION RE-
CORDING BLANK
 Phone Vanderbilt 7212

FREE MANUFACTURERS
PATENT CO., INC.
 800K 520 FIFTH AVE.
 NEW YORK

**WD-11 and WD-12
 TUBES REPAIRED**

WD-11 or WD-12.....	\$3.50
C-300 or UV-200.....	2.75
C-301 or UV-201.....	3.00
C-302 or UV-202.....	3.50
C-301A or UV-201A.....	3.50
Moorehead Detectors.....	2.75
Moorehead Amplifiers.....	3.00
DV-8 or DV-8A.....	3.00
Also the new UV-199.....	3.50

All tubes guaranteed to work like new.
 Mail Orders Given Prompt Attention
 "24 Hour Service"

NEW DX 1 1/2 VOLT TUBES..... \$4.00

RADIO TUBE CORP.

55 Halsey Street Newark, N. J.
 TUBES SENT PARCEL POST, C. O. D.

YOU SAVE 50% OF THE USUAL COST



**WORLD
 RADIO
 Batteries**

Are Guaranteed
 2 years in Writing
 Will ship C. O. D.
 subject to inspection,
 or allow 5% discount
 for cash with order.
 Order shipped same day
 received. WRITE TO-
 DAY.

World Battery Co.
 Dept. 17
 1219 So. Wabash Ave.
 Chicago, Ill.

2 VOLT STORAGE BATTERY for	WD11—WD12 \$5.00
6 V., 60 Amps.	\$10.00
6 V., 80 Amps.	12.50

6 Volt, 100 Amps.	\$14.50
6 Volt, 120 Amps.	16.00

**AN AUDIO FREQUENCY TRANS-
 FORMER THAT IS WORTH WHILE
 ALEMCO**



Specially designed to produce superior results with any standard tube.
 Produces maximum amplification without distortion or howling. Moisture, hard knocks and abuse will not affect its efficiency.
 Windings completely surrounded with laminated iron and sealed in a non-inductive bakelite housing eliminating leakage. Adaptable to any stage of amplification.

Ratio 4 to 1

The Alemco Coil also gives equal or better results on the first stage than transformers on the market wound as high as 9 or 10 to 1.

Will stand any voltage.

Price, \$5.50 Postpaid

ALEMCO, Poughkeepsie, N. Y.

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 CIRCUIT HOUNDS**

Did you miss it? Do you want it? If you do you can get it by writing in to Radio World for any one of these back numbers, as per dates:

Good 2 tube WD-11 Circuit for DX.....	Jan. 27
Satterlee Circuit.....	Feb. 3
G. W. May's Wonder Circuit.....	Feb. 17
Multi-tube Reflex Circuits.....	March 3
One tube Superregenerative.....	March 3
Lewis Three Tube Circuit.....	March 10
Regenerative Radio Frequency Circuit for 5 tubes.....	March 24
Hazeltine Neutrodyne Receiver.....	March 31
2VK's Transmitter circuit.....	April 21
Compact Universal Receiver.....	April 28
Stockelburg Pup receiver.....	May 5
Coskaday receiver.....	May 12
Improved Grimes Circuit, A. D. Turnbull's Long Distance Circuit, Combined Receiver and Transmitter, Improved 1 tube Rlenartz.....	May 19

Any number for 15c. Any 7 numbers for \$1.00. All 12 numbers for \$1.50. Or start subscription with any number. Radio World, 1493 Broadway, New York City.

RADIO WORLD

TELEPHONE, BRYANT 4796

PUBLISHED EVERY WEDNESDAY (Dated SATURDAY OF SAME WEEK) FROM PUBLICATION OFFICE, 1493 BROADWAY, NEW YORK, N. Y. BY HENNESSY RADIO PUBLICATIONS CORPORATION

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Robert L. Dougherty

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 San Francisco—Stevens & Baumann, Inc., Holbrook Building.

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

Receipt by new subscribers of the first copy of RADIO WORLD mailed to them after sending in their order, is automatic acknowledgment of their subscription order.

ADVERTISING RATES

One page: One time—\$150.00.
 Half, Quarter, Third and Two-thirds pages at proportionate rates.

One inch, one time—\$5.00. Per agate line \$0.40.

On four consecutive issues, 10% discount.
 On thirteen consecutive issues, 15% discount.
 Cover and preferred-position rates made known on application.

Terms: 30 days net. 2% 10 days.

CLASSIFIED ADVERTISEMENTS

Five cents per word. Minimum, 10 words. Discount of 10% on 4 consecutive issues—15% on thirteen consecutive issues. Cash with order.

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

IMPORTANT NOTICE

While every possible care is taken to state correctly matters of fact and opinion in technical and general writings covering the radio field, and every line printed is gone over with a scrupulous regard for the facts, the publisher disclaims any responsibility for statements regarding questions of patents, priority of claims, the proper working out of technical problems, or other matters that may be printed in good faith and on information furnished by those supposed to be trustworthy. This statement is made in good faith and to save time and controversy in matters over which the publisher cannot possibly have control.

**A Sharp Stick Is Better Than
 Radio Commands for Elephants**

YES, we don't care much for wireless," was the verdict of Indarini, one of the elephants of the Regent's Park Zoo, says a London cable to the New York Tribune, when an experiment was made to see whether the animal would obey the keepers' voice, coming from a loud transmitter of a wireless telephone set.

Pondering on the spread of the broadcasting craze, some zoo officials wondered whether it would not be possible for the keepers to give orders to their charges over the wireless. They arranged a demonstration, with Indarini as a subject.

At 6 o'clock Syed Ali, the Indian mahout who rules over the zoo elephants, began issuing orders in Hindustani over the radio. His first command was, "Lie down!" Indarini glanced contemptuously at the horn just outside her cage and went right on eating her potatoes.

The second command, ordering her to "Stand up," seemed merely foolish to her, as she had not obeyed the first order. While other instructions were being issued from the set she simply finished her dinner and looked disgustedly at the horn.

Then the keeper, who was present, advanced and gave the same orders. Incidentally, he emphasized them by jabs with a sharp stick. Indarini obeyed immediately, but did not even glance up when the good-night signal came over the wireless. Zoo officials have decided for the time being to stick to the old-fashioned methods.

**Federal Standard
 Radio Products**

Standard of the Radio World, 130 separate units, each fully Guaranteed.

Write for Catalog.

Federal Telephone and Telegraph Co.,
 BUFFALO, N. Y.



**Pruden Reliable
 Radio Specialties
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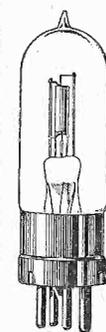
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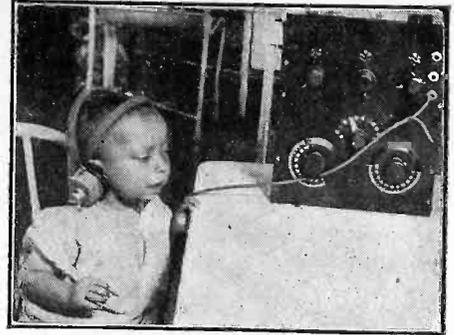
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Why Rita Cries



(C. Fotograms, N. Y.)

Here is a poser for you, radio fans. You should be able to tell at a glance just why Rita Kaplan, the amateur radio fan, is crying her eyes out. It is simple, and yet it is enough to make her "shed tears salty, and cry loud and long." Well, have you found it out yet? No? Just take a peek at the upper right hand corner of the receiver and you will see that one of the phone cords has come loose and the program stopped just as "—the big brown bear jump—" and incidentally spoiled the entire evening for Rita, who never, never, never can sleep unless she hears her "bed-time story."

Antennaless Radio

DR. LE ROY SATTERLEE, the famed X-ray expert and radio inventor, delivered his first radio lecture from Station WOR (L. Bamberger & Co.), Newark, N. J., last Saturday night. His subject was "The Possibilities of Antennaless Radio."

Dr. Satterlee has devoted twenty-five years of his life to the development of the X-ray and he is directly responsible for many important discoveries. He is one of the half dozen survivors of the pioneers in Roentgen ray work. He owned the second Crookes tube in America and had much to do with the development work which led to the perfection of the lead glass screen now used to safeguard X-ray operators. He is also credited with making the first dental X-ray photograph and was laughed at by dental experts and physicians in dental work, though the same system is now used universally in modern dentistry.

The scientist-inventor is indeed a real martyr to his work. He has given the best years of his life, at the cost of both wealth and health, to science and humanity. At the present time he is practically an invalid. Some months ago when he was forced to abandon X-ray experiments because of terrible X-ray burns, which caused the amputation of half of his left hand and also seriously affected his heart action, he took up radio. Since then he has perfected a new type of receiver.

Among other things, the Doctor maintained that radio waves and light waves are much alike, though the latter are of a much higher frequency and shorter wave length, and claims that electromagnetic waves may be reflected and refracted by properly arranged units just as light waves may be controlled by mirrors, prisms and lenses. In the last instance his argument is very well borne out by the work being done by C. S. Franklin, in England, which Marconi himself dwelt upon so forcibly in his lecture before a joint meeting of the Institutes of Radio and Electrical Engineers on his last visit to the United States.

Franklin's work, however, deals with a system for directing the waves sent from a transmitter while Dr. Satterlee has devised a method for directing the waves within a receiver in order that they may be properly focussed upon the unit used in the secondary circuit.

A few weeks ago a series of experiments were made on board moving trains in Canada by the aid of Dr. Satterlee's receiver, with astounding success.

Sleeper's Two Latest Radio Books

Two new and remarkably good radio books by M. B. Sleeper—one is entitled "Six Successful Radio Sets," with design data and instructions for receiving sets specially selected for exceptionally long distance reception. The other is "101 Receiving Circuits," being a most complete compilation of diagrams including circuits for a regenerative, superregenerative, Reinartz, Flivver, Flewelling, super-heterodyne, reflex and radio frequency sets. Each book mailed on receipt of fifty cents and ten cents extra for postage. Both books for \$1.00 and no extra charge for postage. The Columbia Print, 1493 Broadway, New York City.

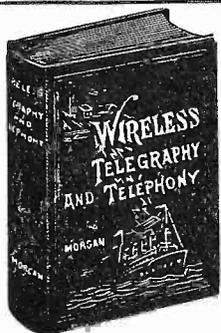
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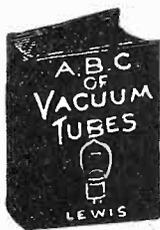
Telling How to Operate a Radio Set—How to Build a Set—Principles of Vacuum Tubes and Other Radio Problems



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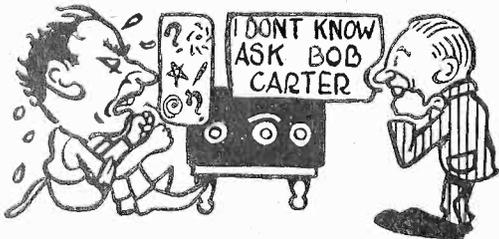
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"Just the same, Bob is an expert!" said Harry, defiantly.

"Huh!"—you've got to show me," I sneered. "Why don't you phone that nine-day-wonder to come over here and see what he can do with this set?"

"All right, I will," said Harry.

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"Nothing much," I replied non-committally—I didn't want him to have any clues.

"Dandy set!" he commented, surveying my outfit—and I had to admit he sure handled the thing like a seasoned amateur. "There's **n**othing wrong with it," he said, after a moment, "except—"

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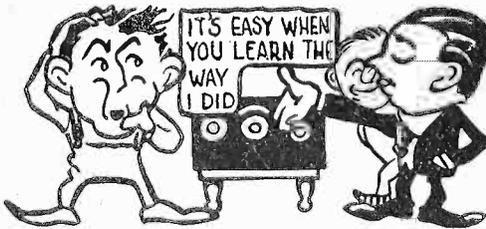
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I was quite prepared to believe the moon was made of hard-rubber by this time. "Of course, we aren't a bit anxious to know how you did it!" I said ironically.



"There's nothing much to tell," said Bob. "You remember I didn't know a thing about Radio, but I was anxious to learn. Still, I didn't feel like wading through miles of mathematics and verbosity to reach my goal. One day—reading a radio magazine—I happened to glance at the advertisement of the Radio Guild and saw that Kenneth Harkness had written a new kind of home-study book on **a**dvanced Radio, a book that assumed you hadn't the **s**lightest knowledge of Radio, yet which dealt with the most advanced phases of the subject. This was exactly what I had been waiting for. I mailed the coupon and they shot me the book by return mail.

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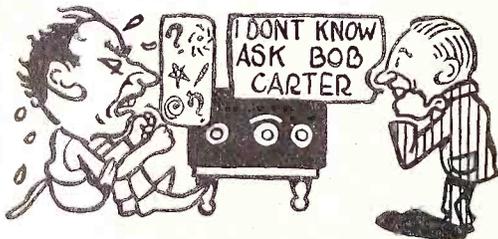
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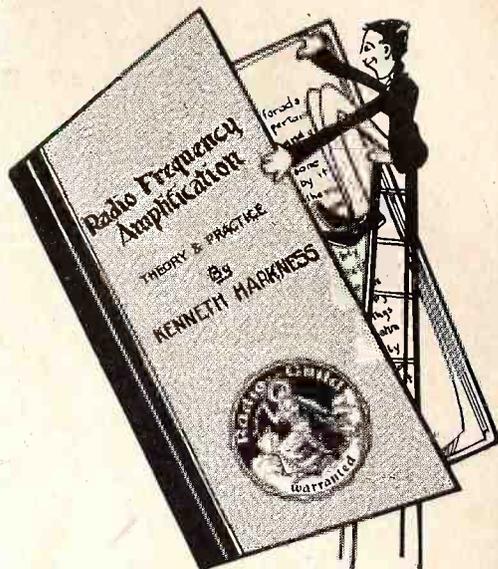
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