The Radio Weekly

June 10

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RADIO WORLD

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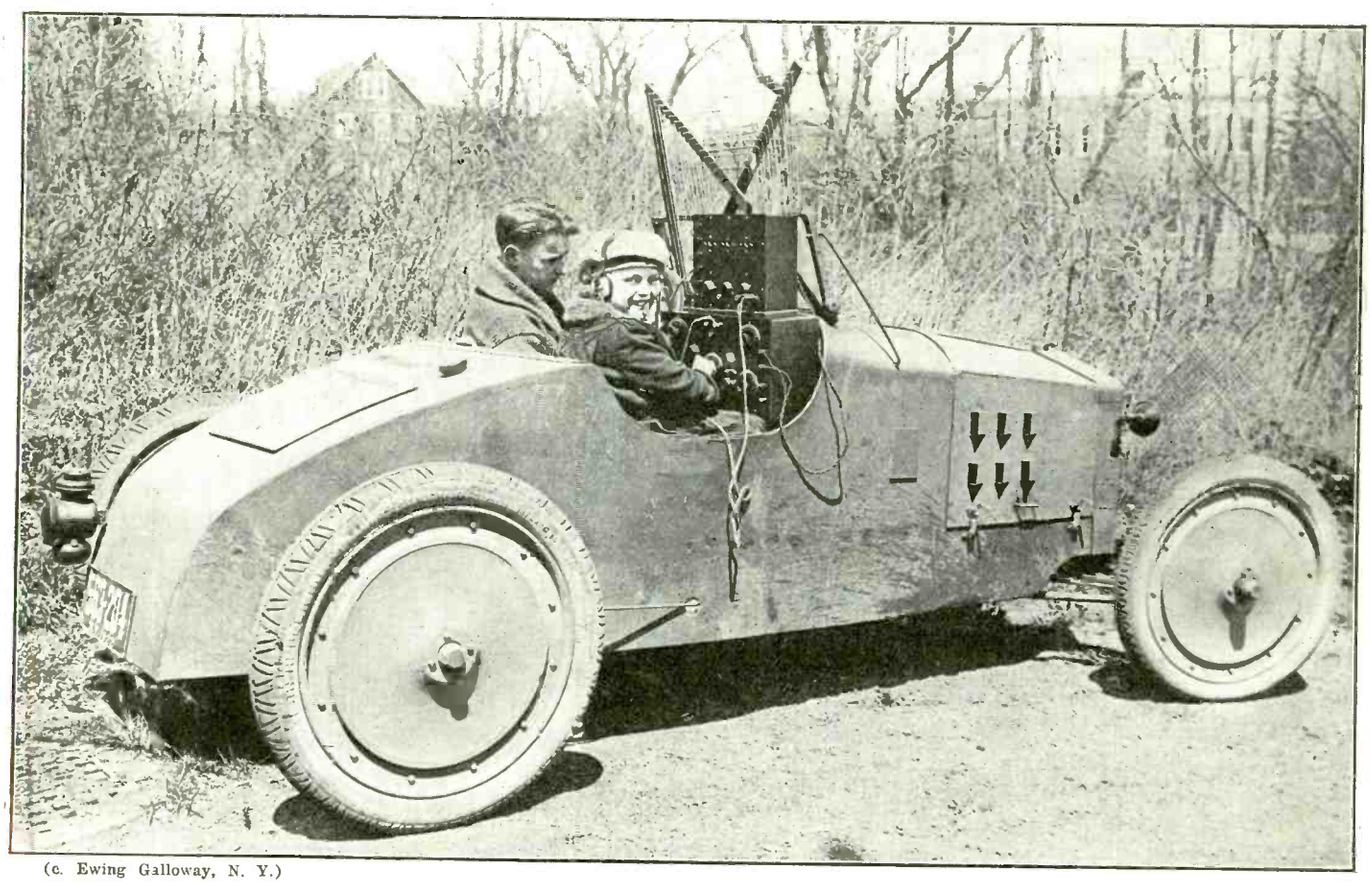
ILLUSTRATED

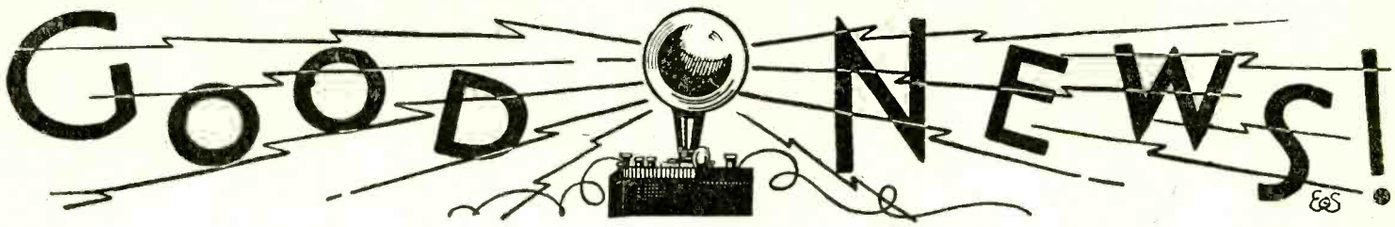
Designed Car and Installed Radio Set



(c. Ewing Galloway, N. Y.)

R. E. Leppert, Jr., age seventeen, in his car with his sister, Vera Leppert, age eleven. Mr. Leppert designed the car. It is his idea of what a roadster should be. He also installed its radio set. This clever young man, who resides at Harrison, N. Y., with his parents, is the radio expert of his home town. Even the school teachers come to him for wireless advice. He has been an amateur mechanic since he was four years old. The receiving set on his automobile works absolutely perfect.

Are You a Member of the N.O.D.C.? See page 20



You Can Receive Radio from an Ordinary Lamp Socket If You Use DIDARC

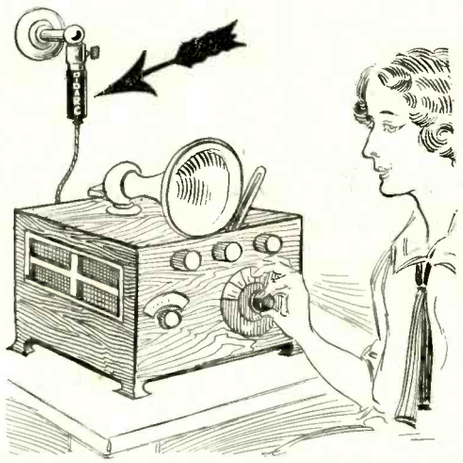
And you can use your set in any room in the house

YOU WILL NOT NEED AN AERIAL

Because the electric-light wires in your home pick up broadcast concerts. And the DIDARC is the simple way of connecting your receiving set with any electric-light socket.

YOU WILL SAVE MONEY

Because DIDARC also does away with switches and lightning arrester and you keep the money they cost.



YOU WILL HAVE A PROTECTIVE DEVICE

Because DIDARC safeguards your set and prevents shocks and short circuits.

IT WILL INCREASE SIGNAL STRENGTH

Because it will enable you to hear the broadcasting free from interference and static.

YOU WILL BE HAPPY

Because DIDARC does away with all manner of trouble that the radio fan must avoid.

DIDARC is the newest device in the great improvement that is taking place almost daily in radio.

It is the very thing that the American family needs to free it from lightning worries, and the objections of landlords and fire underwriters.

May Be Used With Crystal or Tube Set

On Alternating or Direct Current Electric Lighting

List Price $2.50

Manufactured by the makers of

The Grin

VARIABLE CONDENSER FOR

The ATLANTIC RADIO CORP.

Sole Owners and Distributors

1263 BEDFORD AVE., BROOKLYN, N. Y.

Go to Your Local Dealer. If He Cannot Supply You, Our Mail Order Department Will.
Jobbers and Manufacturers, Write for Our Proposition.

RADIO WORLD

A WEEKLY JOURNAL, PUBLISHED EVERY WEDNESDAY AND DATED SATURDAY BY RADIO WORLD COMPANY, FROM PUBLICATION OFFICE, 1493 BROADWAY, NEW YORK, N. Y.

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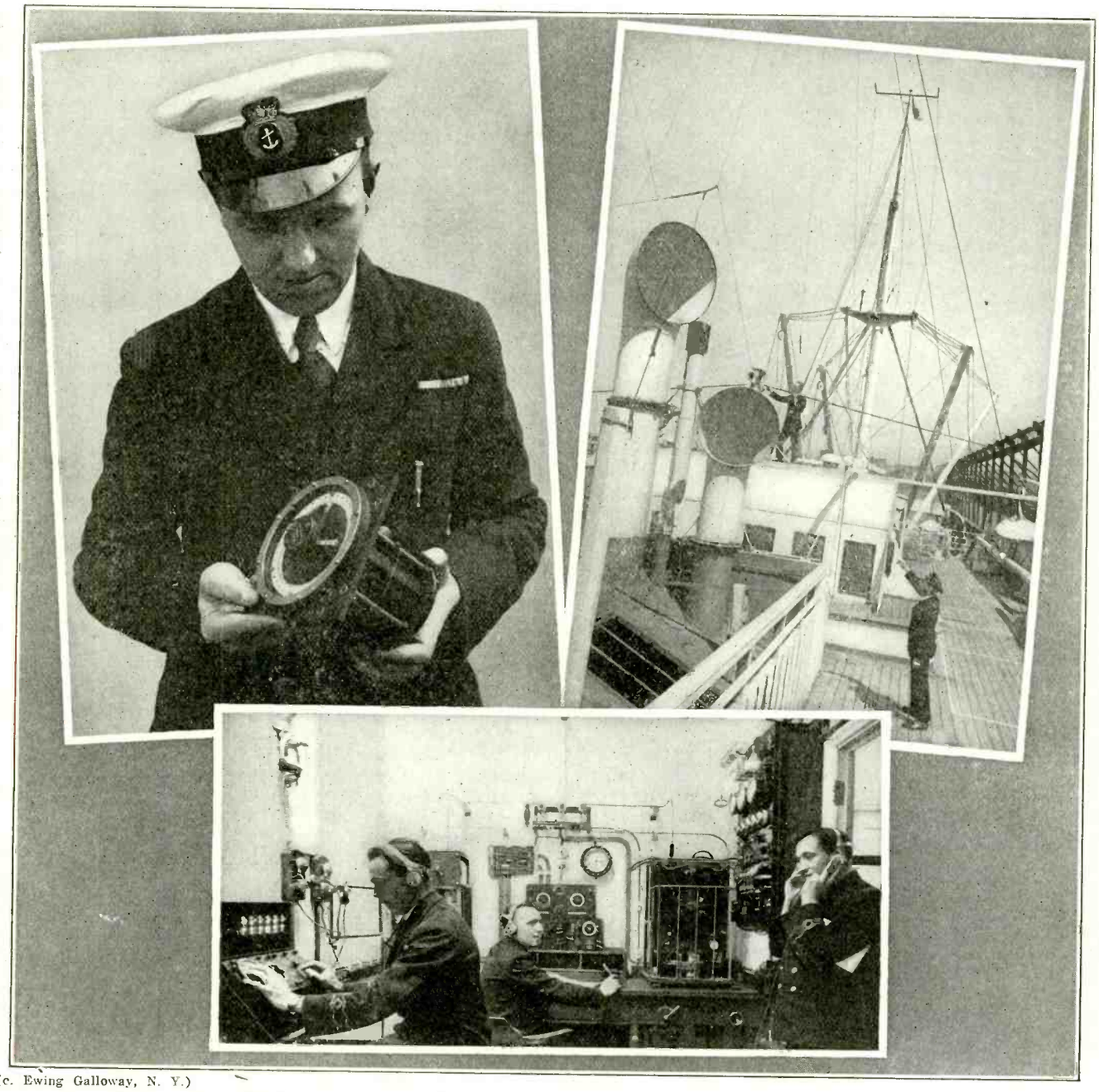
Perfect Radio Arrangement Guides Leviathans of the Deep



(c. Ewing Galloway, N. Y.)

Correctly adjusted radio-equipment is one of the most necessary essentials of every ocean liner. The photographs show the advancement made in radio on two of the largest passenger steamers plying the Atlantic. (Upper left) E. Brent, third radio operator of the White Star Company's "Majestic," the largest ship in the world. Mr. Brent is holding a goniometer, the heart of the Marconi Company's patents, which determines the exact location of a ship in a fog by getting the direction of shore messages. (Upper right.) The aerials of the "Lamport" and Holt liner "Vauban." (Lower center.) Wireless room on the "Majestic." At the left is the Marconi radio compass. Next is the large wave-transmitter with a 2,000-mile range; and next, at the right of the man at the key, is the short (800-mile) range. The large transmitter is a tube set, and the short one is a spark set. F. W. Garwood, chief ope rator (standing), is listening to telephone messages.

Radio Receiver for Short Waves

By George W. May, R. E.

AFTER receiving a large amount of literature published recently in regard to radio, I have come to the conclusion that amateurs experience difficulty in the operation and construction of a short-wave regenerative set. The trouble encountered can be divided into two classes, namely:

1.—*Inability to tune to a sufficiently short wave-length.*

2.—*Difficulty in controlling the regenerative effects so essential in receivers of this type.*

For receiving on short wave-lengths, that is, up to 600 meters, the circuit using plate variometer and grid variometer with a vario-coupler, is by far the most popular. This circuit has been in use for some time. A set of this type will be found in nearly every amateur station. To the layman, the different circuits used at the present time are more or less confusing and it is hard to pick out the one that is needed. For best results on all wave lengths, the honeycomb

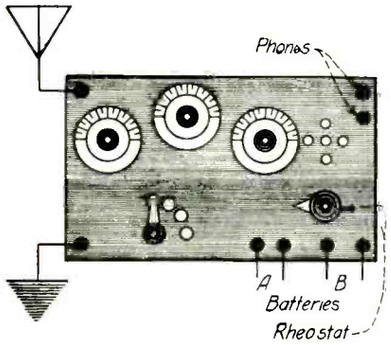


Figure 1. How the front panel should appear. Suggested by George W. May. Drawn by S. Newman.

coil set is hard to beat; but the set described here is better for the short-wave lengths. The honeycomb set will receive on the short waves but this set is a little better. For broadcasting, this circuit cannot be surpassed.

In regard to trouble No. 1, inability to tune seems to be the stumbling block. This is not the fault of the operator, but the fault of the improperly designed secondary circuit. Manufacturers incorporate too large a wave length in their receivers. The result is that the instrument will not tune to amateur wave-lengths. Most of the sets placed on the market today will just barely tune to 200 meters; only a few will tune to 159 meters. In the case of the second difficulty where the plate circuit fails to

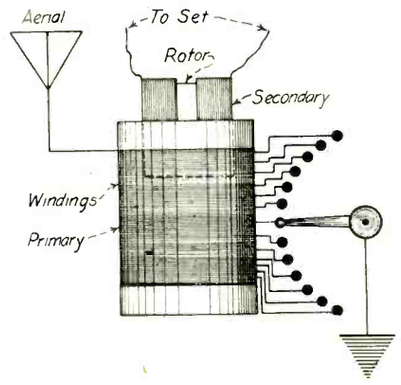


Figure 2. Detail of the method of wiring the variocoupler. Suggested by George W. May. Drawn by S. Newman.

regenerate properly, the trouble can generally be traced to improper connections or, perhaps, to incorrect plate-voltage. Trouble, in this respect, can be overcome by a little experimenting; for instance: by reversing the secondary connections, or even the B battery connections. It may be that the improper plate voltage is being supplied to the plate. These obstructions can best be overcome by experimenting, because various tubes have different characteristics, which require specific amounts of current for successful performance.

For the best results, the parts should be purchased, although they may be built at home with more or less success. Two variometers will be needed, as well as one variocoupler. Of course, a vacuum tube will have to be used with this circuit. A rheostat, storage battery and B battery must be used with it.

At a later date, a two-stage amplifier may be added that will greatly add to the pleasure of receiving the music. The set may be mounted on a bakelite panel with knobs on the outside for adjusting the instruments. The necessary binding posts may be added in this way. In order to see if the filament is lighted all right, it is necessary to have some sort of a window in the panel for the operator to look through. This may consist of a few small holes drilled in the front of the panel. It will also serve to sheath and ventilate the panel inside the cabinet, and let out the heat caused by the tube. Arrange the panel in such a way that the tube, socket, and rheostat are located in one end, and the variocoupler in the middle with the two variometers, one on each side. Before attaching any of the instruments, lay out the work very carefully being particularly careful to keep all the wires as short as possible.

Remember that every bit of wire added makes just that much more resistance to the current and, consequently, will cut down the signal strength.

Another advantage of careful planning is the fact that a lot of howling and squealing may be eliminated this way, especially if amplifiers are added to the set. The best size of wire to use is about No. 22 tinned copper wire. Have a good spool of this wire insulated.

Insulation for this may be bought in any radio store. It is known as "spaghetti." This, simply, is slipped over the wire. It makes a very nifty appearance if properly applied, and the amateur may make a very neat job if he uses two colors, one for the filament wires and the other for the rest of the circuit. By doing this he will also lessen the danger of getting the B battery through the filament. Of course, if this happens, the tube is burnt out almost instantly and the tube might as well be thrown away. The receiving set is capable of all sorts of refining. The best way to perfect one, is not to hurry.

If an amateur does not care to construct this piece of apparatus, it may be purchased for a few dollars; but for the benefit of those who prefer to make everything, the directions follow:

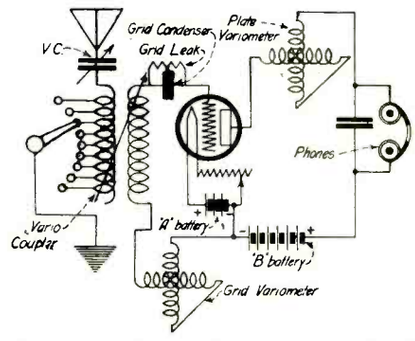
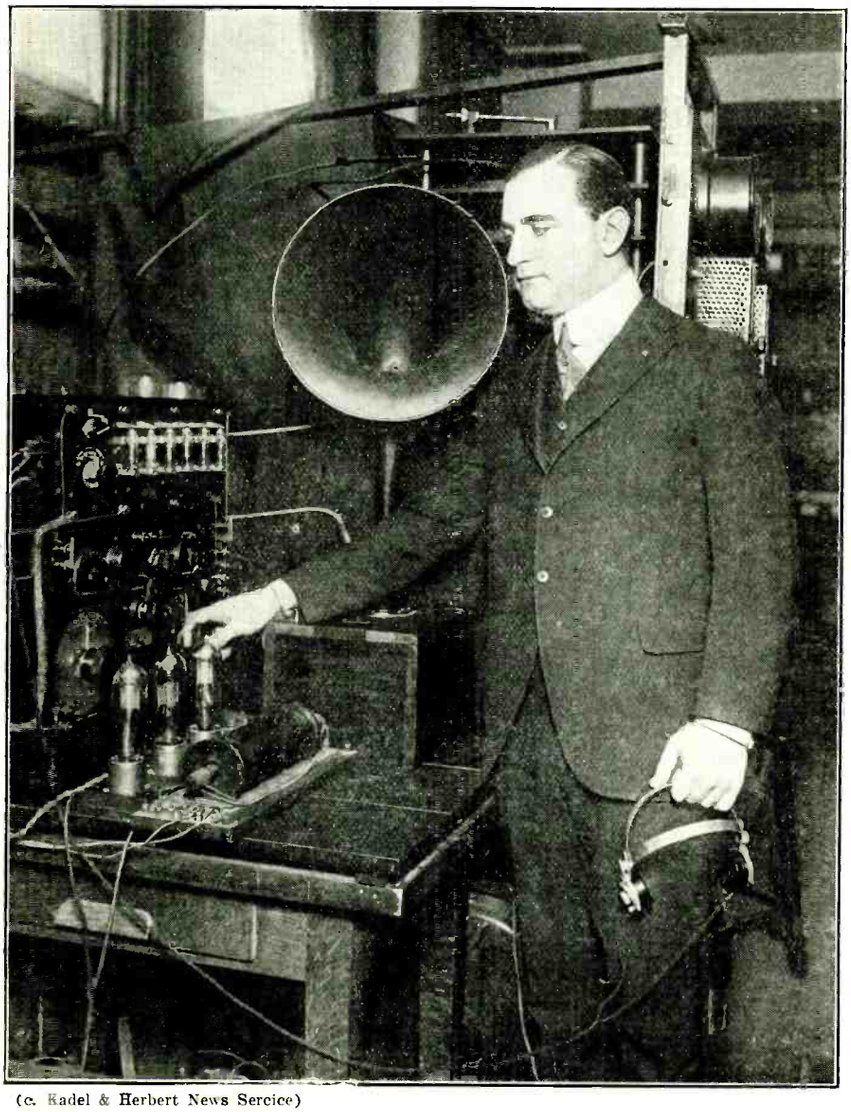


Figure 3. Schematic diagram of the wiring of the completed set. Suggested by George W. May. Drawn by S. Newman.

Secure a cardboard tube, 4 inches in diameter. Give it several coats of shellac. This improves the insulating qualities and prevents the tube from changing shape owing to atmospheric conditions. If this is not done, the tube is very apt to shrink so much that the wire will become loosened and, eventually fall off. This tube, when it is dry, may be wound with

Received Signals from Europe



(c. Kadel & Herbert News Sercice)

Professor Alfred N. Goldsmith, Radio Expert and Secretary of the Institute of Radio Engineers of New York, demonstrating some startling developments in the laboratories of City College of New York. Professor Goldsmith treated his interviewers to some rad o signals which he received from the Great Nauen Station, near Berlin, Germany, which filled the room with sound. Once in a while a little jazz music from the station at Elberon, New Jersey, was tuned in which was twice as loud as the original phonograph emitted it. Professor Goldsmith is tuning in on a Navy-type receiver with a loud-speaking device.

(*Continued from preceding page*)

No. 24 double cotton-covered wire. The wire will be tapped about every ten turns. This tapping process is very easy, as the wire is wound on the tube.

When the tenth tap is reached make a loop in the wire allowing it to remain about one inch long. By doing this, it will allow you plenty of room for soldering the wire to the multi-point switch. By taking the various taps off in this manner, all the way up the coil, you will have your primary. A small cardboard tube may be secured that will turn about the inside of the larger tube. This, of course, will have to be shellacked as was the larger tube, and wound with the same size wire—say about 40 or 50 turns. Leave necessary room for the shafts which will have to be pushed through the larger tube in such a way that the smaller tube will rotate about inside the larger tube. When finished, set the coil aside and proceed with the variometer.

The units for the variometer may be purchased complete or, simply, the parts may come wound with wire. After you have the variocoupler and variometers complete, secure your panel and rheostat, then mount according to the accompanying diagram.

Pertinent Advice on Electric Light Hook-ups

By Carl Hawes Butman

IF you do any experimenting in power-line broadcasting, as explained recently by Major-General George O. Squier, U. S. A.—don't try to connect up with the electric-light lines without using condensers. If you do, you will short-circuit the lights, blow out fuses, and, perhaps, ruin your instruments. Referring to his recent demonstration of wired-wireless broadcasting locally over a city's electric light system, General Squier pointed out the necessity of using condensers to avoid short-circuiting. He explained to the writer that an ordinary transmitter and receiver are used, connections being made by a suitable plug in a light socket, and may be connected to the power line in various ways; but the preferred method provides for the installation of condensers between the mains acting as by-passes for the high-frequency currents only, permitting the power current, direct or alternating—but of low frequency—to flow along. For radio, he says, the two mains are connected in parallel and used as one conductor, the ground being a return. Good results may be obtained by connecting the transmitter and receivers between the mains suitably protected by condensers to keep the large-power current from passing through the radio apparatus.

The advantage of using line radio for local broadcasting on light wires saves the erection of aerials, leaves the ether open for long-distance communication, eliminates interference, and permits an unlimited number of messages to be sent on different wavelengths.

As an advertising feature, it has been pointed out that agents of phonograph records might well give daily concerts for the benefit of possible purchasers who were listening-in through their lighting system. For that matter, any commodity could be advertised by this system which takes up no band in the ether. Although advertising is prohibited in regular broadcasting through aerials, by the recommendations of the Radio Committee, and will probably be barred by the bill soon to be introduced in the House of Representatives, there is no reason why it could not be employed by a local power company operating a line-radio broadcasting service for its subscribers.

How to Construct One- and Two-Slide Tuners

By George W. May, R. E.

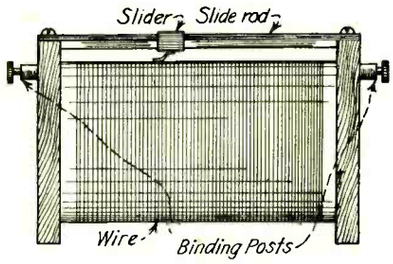


Figure 1.—How a one-slide tuning coil should appear. Notice the position of the slider and slide rod with binding posts. Suggested by George W. May. Drawn by S. Newman.

INQUIRIES are made frequently, especially by beginners, concerning the most efficient hook-ups for the different types of slide tuners with crystal detectors. There are amateurs who believe that these slide tuners were made only recently or in fact only since broadcasting came into use. Ten years ago, I was using my two-slide tuner with which wonderful results were obtained. There is no doubt that many new fans who try out the crystal set fail to bring in the music from various broadcasting stations simply because of improper tuning and assembly. Of course, there are many other causes for failure, such as poor crystals, loose connections, and, probably, poor aerial and ground.

If a good ground and aerial are to be had with a good slide-tuner, proper tuning would be the important factor provided a good piece of mineral is at hand. With all this in view, one should be able to hear at least from 20 to 50 miles, the latter distance responding under favorable weather and atmospheric conditions. I have heard the human voice at a distance of a hundred miles. This, under favorable conditions, was a surprise to me.

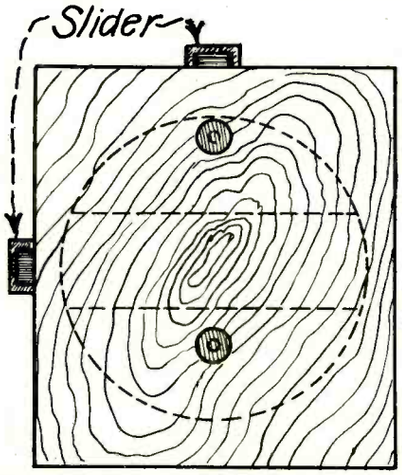


Figure 2.—Side view of the end section. Suggested by George W. May. Drawn by S. Newman.

The beginner who uses, or contemplates using, a crystal set will find that there are two types of slide tuners on the market: Single-slide and double-slide tuners. I will describe first the construction and data of the single-slide tuner. The method of winding the tuner is as follows: A cardboard tube, 4 inches in diameter and 8 inches long, is secured. Shellac the entire tube and allow to dry, which will only take a short time. Wind this tube over the entire length with No. 22 B & S double cotton-covered wire, making sure that the wire is placed on evenly with no breaks or kinks.

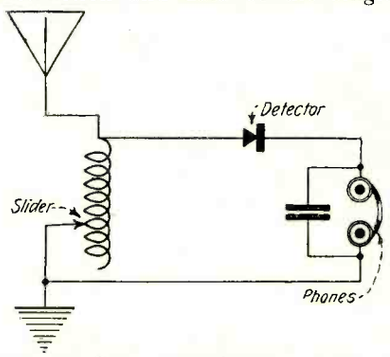


Figure 3.—Schematic diagram of a one-slide tuning coil. Suggested by George W. May. Drawn by S. Newman.

For the ends of the tube, use a seasoned piece of wood cut to the shape shown in the drawing. When this is done, shellac the tube again, covering all the wire with a thin coat. This will tend to hold the wire more firmly and give a neat appearance to the tuner. With the coil now wound and ends placed, all we have left is the sliders. Most radio stores handle sliders and slide rods; therefore, it is preferable to buy them—and they may be bought cheaper than they can be made. Usually the slide rods come either brass or aluminum; but I suggest brass. The thickness will be one-quarter inch. When purchasing, be sure and get sufficient to cover the entire length of the coil. Usually the slide rods come with the sliders; but, if not, simply see that the correct sliders fit the rod nicely. When the sliders and rods are available, mount the rod and slider in such a manner that the slide rod can be screwed down to the ends and the slide rods are able to slide along, touching each turn of the coil. When this has been done, mount two binding posts. Connect one end of the wire to a binding post and one end of the slider to the other, as shown in the schematic diagram, leaving one end of the coil free and one end of the slide-rod free.

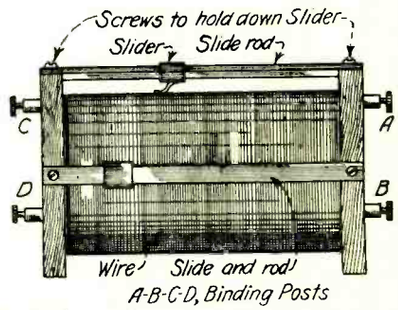


Figure 4.—A two-slide tuning coil. Particular attention should be given to the layout of both sliders, slide rods, and binding posts. Suggested by George W. May. Drawn by S. Newman.

Everything now seems to be finished. Only one small job is left undone: to scrape off the covering from the wire on a line where the slider runs over, thus enabling good contact between slider and copper turns of coil. When all is accomplished, the maker may use his own judgment in regard to the mounting. If the beginner connects up his tuner, according to the diagram shown, some remarkable results should be obtained. This depends on the erection of a good aerial and the seeking of a good ground.

Probably some beginners would like to cover the two-slide tuner which, of course, is a somewhat better instrument. It gives you a little more leeway in tuning; and if a two-slide tuner is made at the start, it will enable the beginner to get a good idea of exactly what is needed to get results and it will help him when he graduates into the tube class. A crystal set will also make him appreciate the

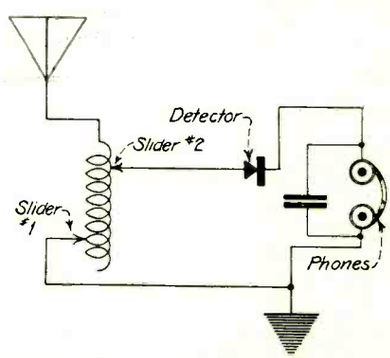
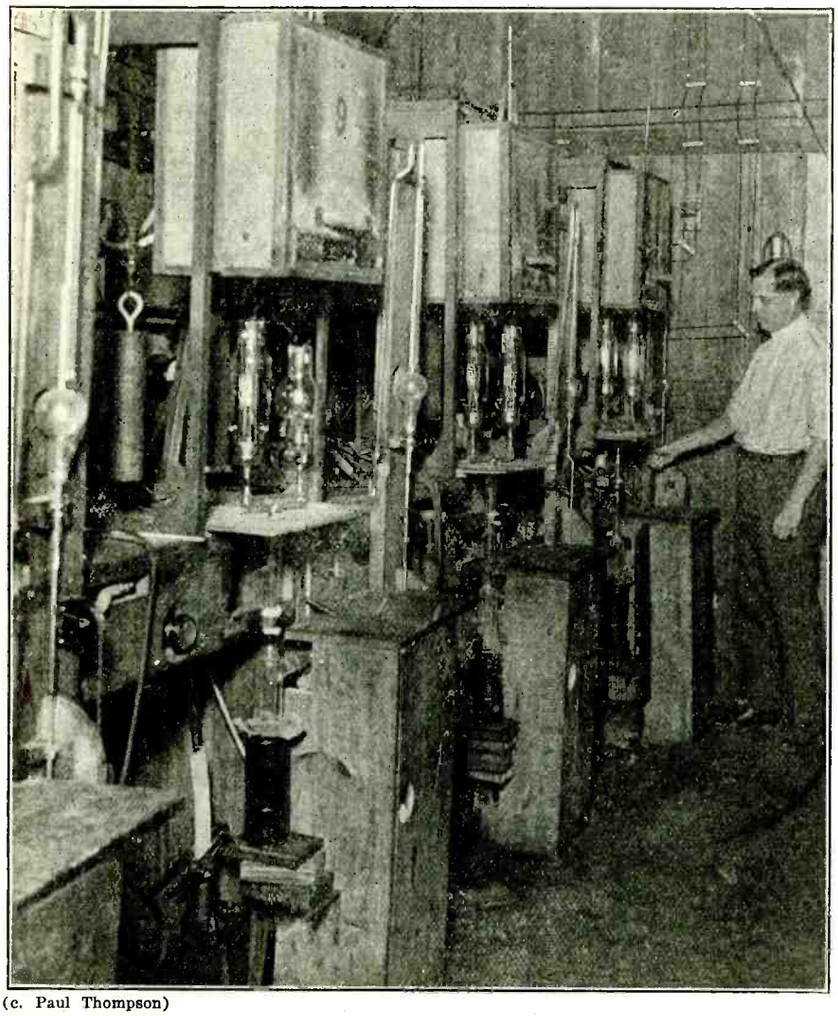


Figure 5.—Schematic diagram of the two-slide tuning coil. Suggested by George W. May. Drawn by S. Newman.

Where Vacuum Tubes Are Made



(c. Paul Thompson)

Radio has made such advance that, within a short period, it will be abreast with other manufactures. Every radiotelephone owner knows that one element of the receiver, in particular, makes radio possible. It amplifies the signal to such an extent that, without such an element, radiotelephony, probably, would be unheard of. This so-called element is the work of Dr. J. A. Fleming of Great Britain, and Dr. Lee DeForest, of the United States. It is known as the audion, or vacuum, tube. Such a tube requires skillful operation, and such skillful operation requires good workmanship. Radio, today, is undersupplied with such tubes, owing to the fact that only a certain number of manufacturers are allowed to make them. This limitation is due to patents; but, in view of all this, the electrical manufacturers are losing no time in turning them out in large quantities to supply the needs of the people. The photograph shows the workshop of a large factory where tubes are made.

(*Continued from preceding page*)

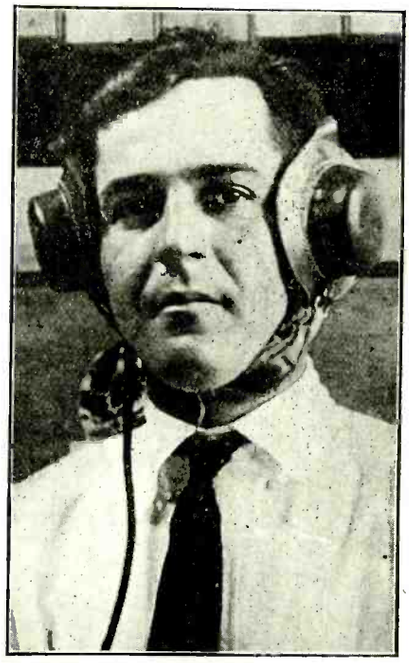
vacuum-tube set when he gets one, as the tuning coil may be used later as a loading coil.

The construction of the tube is the same as the single-slide tuner, with the exception that the cardboard tubing should be about fifteen inches long. The longer the tube the more wire it will hold, and the more wire the higher the wave length to which the set will tune. Use the same size wire covering the entire tube; and, of course, shellacking, both inside and outside the tube before starting to wind, complete the construction as in the previous tuner.

With this advancement made, we have left the assembly of the slide rods and sliders.

Purchase two sliders and slide rods long enough to cover the length of the tube. Four binding posts will have to be purchased, also. Connect each wire end to one of the binding posts and, also, each slider. In order that the sliders may make contact, the wire must be scraped clean of insulation where the sliders are to work. This can be done by using a safety-razor blade or by burning it off with a soldering iron. Sandpaper may be used until the wire becomes shiny and makes good contact.

Radiophone Headgear Has No Mouthpiece



(c. Underwood & Underwood)

This is the latest device in radiophone headgear. It is worn by the operator at the new aerial lighthouse at College Point, Long Island. N. Y., the first beacon of its kind in the world. Note the apparatus beneath the operator's throat. It takes the place of an oral transmitter, picking up the vibrations of the vocal cords through the muscles and membranes of the throat.

Useful Things to Remember

That burning the filament too brightly merely wastes the filament and shortens the life of the tube without adding to the efficiency of the set.

That the best type of vacuum-tube receiving set is the regenerative with the amplifiers.

That the filament lighting does not always mean that the set is operating properly.

That a variable helps fine tuning.

That the distance you can receive depends upon various climatic and other conditions.

That if the filament rheostat is turned on suddenly the filament may be paralyzed and must be left to recuperate before it will glow.

That if there are too many turns of inductance they may be taken off to secure tuning.

That each step of amplification requires another tube.

That a vacuum tube or regenerative set may be amplified to almost any extent.

That an ordinary phonograph-horn attached to a head telephone-receiver will increase the seconds somewhat and will act as a loud speaker. That the ultra-audion circuit has the plate circuit led back to the honeycomb coil and amounts to a regenerative receiver.

That the filament battery of a vacuum-tube set may be a dry battery, but that it is more expensive in the end than a storage battery.

Radiograms

TWENTY AERIALS CROWNED THE ROOF OF THE 71ST REGIMENT ARMORY BUILDING, where the first radio show of New York City was held. They were constructed by Thomas F. Higgins, master signal-electrician of the 101st Signal Battalion. There was no interference between one and another because the aerials pointed in the direction of the broadcasting station. This problem Sergeant Higgins solved.

* * *

BROADCASTING IN EUROPE HAS ITS LIMITATIONS, according to Owen D. Young, chairman of the Radio Corporation of America, because many countries are suspicious that their neighbors will use the radiophone for propaganda purposes.

* * *

INTERNATIONAL PEACE WILL BE BETTER MAINTAINED BY RADIO is the news from Cannes where the four-power wireless conference between England, France, Germany, and the United States was held. Amenities between nations could be better preserved if there were continual conversation between them, and the best way to accomplish this is by radio.

* * *

THE USE OF THE MOST POWERFUL RADIO PLANT IN THE MIDDLE WEST, that of the Crosley Manufacturing Co., Cincinnati, (WLW) has been offered to the city authorities, by Powel Crosley, jr., president of the company, for the handling of vital municipal business.

* * *

THE FIRST USE OF RADIO BY THE VATICAN was the recent transmission to the United States of a message from Pope Pius XI, through Monseigneur F. Borgongini Duca, Papal Pro-Secretary of Extraordinary Ecclesiastical Affairs, to James A. Flaherty, of Philadelphia, supreme knight of the Knights of Columbus. The radio carried the formal approbation of Pope Pius of the Knights of Columbus million-dollar American welfare campaign in Italy.

* * *

"LISTENING IN" IS TO BE THE NAME OF A RADIO MUSICAL COMEDY. The words will be broadcast by Ed. Wynn, the comedian, and the music will be tuned in by various composers. Mr. Wynn promises wave lengths of fun, an ec*static* chorus, and anticipates a run without interference after the piece opens ether in **Philadelphia or New York.**

* * *

FOR THE FIRST TIME, NAVIGATION ON THE GREAT LAKES HAS BEEN ROBBED OF ITS TERRORS. The first naval radio-compass station has been opened at White Fish Bay, Lake Superior, to direct passing vessels. Within two weeks, two more radio-compass stations will be opened: one at Grand Marais, sixty miles west of White Fish Bay, the other at Detour, at the mouth of St. Mary's River. This section is known as the "Graveyard of the Lakes."

* * *

CALIFORNIA LEADS ALL OTHER STATES IN BROADCASTING, Ohio holds second place, and Pennsylvania and New York are about tied for third, according to a bulletin on the geography of radio broadcasting issued by the National Geographic Society, Washington, D. C.

* * *

IN ORDER TO GIVE FIREMEN THE BENEFITS OF RADIO as it is broadcast from Newark and other stations, Thomas J. Drennan, fire commissioner of New York City, has given his sanction to the installation of receiving sets in the engine houses of the department. Mr. Drennan points out that it will furnish diversion and healthy recreation for the men, and break the monotony of their lives. The sets are to be installed at the expense of the men.

* * *

"RADIO INDICATES THAT WE MUST USE AN INTERNATIONAL LANGUAGE," says Professor A. Cristen, in an interview in the New York "World." "For hundreds of years people have wanted a universal language. They wanted it when it took three months to cross the Atlantic. They wanted it when there was no telephone or telegraph. How much more do they want it now that they have radio? Radio has clinched the matter." Professor Cristen is a celebrated linguist. In his opinion, the international language will be Esperanto.

* * *

"THE BLIND MAN NOW HAS THE ADVANTAGE OF CURRENT NEWS," says Charles E. Comstock, of the State Department of Public Welfare of Illinois. "Radio has made it possible for the sightless person to receive news daily without having it read to him." Mr. Comstock has been blind from infancy.

* * *

THE NINETEEN AMBULANCE DRIVERS OF BELLEVUE HOSPITAL, New York, now have a receiving station to entertain them during their idle hours.

* * *

CONEY ISLAND WILL HAVE A PERMANENT EXHIBITION this summer. The Radio Exhibitions, Inc., announce this as one of the attractions at the famous resort. One of the items of the daily program will be the "Trouble Counter" where amateurs may consult experts.

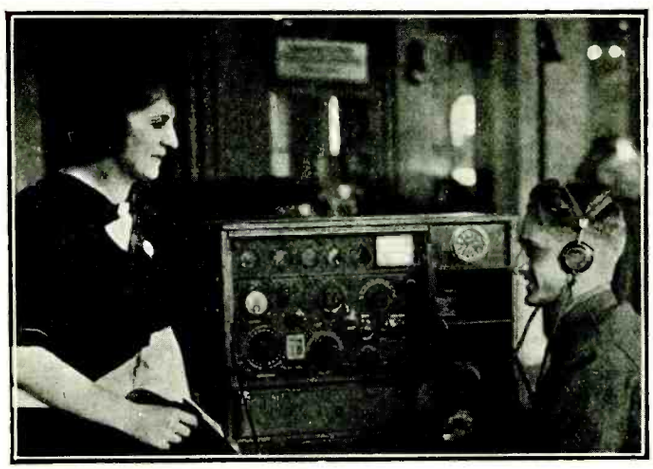
* * *

REMARKABLE PIONEER WORK IN RADIO IMPROVEMENT is being done by the United States Air Mail Service, despite the fact that Congress has been extremely slow in granting appropriations for that important service. The A. M. S., is laying the foundation for air transport that will revolutionize physical communication in this country.

* * *

THE WORK OF PREPARING AND INSTALLING RADIO FOR THE BLIND CITIZENS of the State of Michigan has been undertaken by Lieutenant Leon Seely of the Michigan Employment Institution for the Blind, at Saginaw.

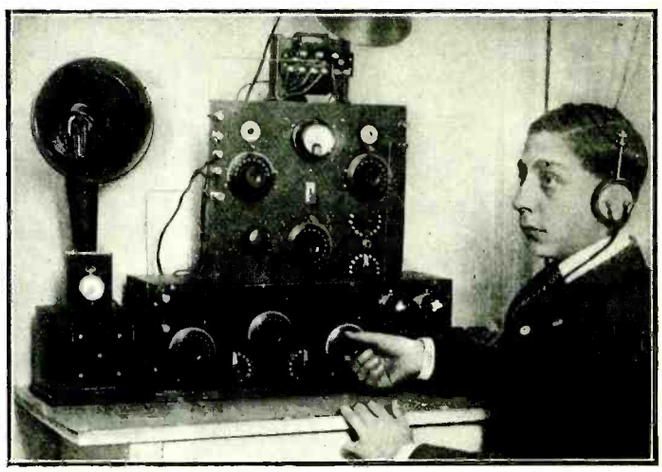
How the Army Does It



(c. Kadel & Herbert News Service)

Sergeant Harry Elliott, of the United States Signal Corps, explaining to Miss Eleanor Sebroff, amateur radio operator, the working of the Army's long-distance radio set.

A New York Boy's Set



(c. Kadel & Herbert News Service)

Robert Koerner, a youthful enthusiast, and his compact radio set. Many New York boys have similar sets, for receiving over the ether is highly popular with them.

Radio World's Hall of Fame

JOHN V. L. HOGAN

Mr. Hogan is one of the most experienced workers in the radio field from its early days; an organizer and past president of the Institute of Radio Engineers; patentee of many radio inventions, including the single-variable tuner, the balanced antenna for static reduction, the detector-heterodyne receiver, and others; a pioneer in radiotelephone broadcasting; author of numerous scientific and educational papers and articles; formerly chief research engineer of the National Electric Company, and manager of the International Radio Telegraph Company; now practicing in New York as consultant in engineering and patent matters, and specializing in radio.

How to Filter Atmospheric Conditions

By C. White

STATIC disturbances are common radio pests, especially at this time of the year and throughout the summer. In tropical countries, these disturbances reach such a magnitude at certain times that the operation of small radio-stations is practically impossible, while larger stations having a normal range of over a thousand miles are actually cut down below two hundred and, often less. Much money and time have been spent in scientific research to devise a means for completely and effectively eliminating static; but, as yet, no simple and practical scheme has been discovered.

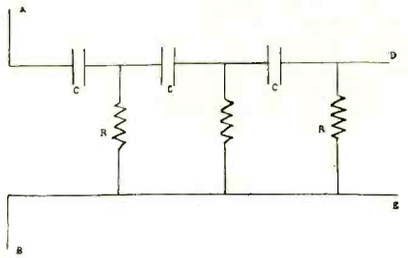


Figure 1.—An aperiodic filter. C, a capacity of .0005 microfarads. R, a resistance of 50,000 ohms. A, B, D, E, are terminals.

One might ask in regard to the actual nature of an atmospheric discharge, whether it is aperiodic or periodic. An aperiodic discharge is one in which the discharge current does not oscillate, while a periodic discharge is one of an oscillatory nature. Static is invariably of the latter type, the charges oscillate very rapidly between earth and cloud, with a frequency that is solely dependent on the relative inductance and capacity between these two. Hence the frequency of the discharge will vary according to the height of the cloud and the electrical constants of the path to ground.

Static can not be completely eliminated, but it certainly can be minimized by the use of a well-designed filter circuit. To the unsuspecting amateur, an electrical filter may mean very little, but to the man accomplished in the art of wired telegraphy and telephony, it is a very great help. An electrical filter-circuit does the same thing, theoretically, that a mechanical filter does with impure water. It weeds out the undesired and dangerous matter. The general purpose of filters, in amateur radio work, may be outlined in two parts; first, to prevent all signals except the desired one from being amplified and detected; and, second, to prevent stray currents due to static discharges from passing to an operator's phones. Filters aid very materially in accomplishing these two purposes, although by no means do they form a complete and thoroughly satisfactory solution to the problem.

A filter can be defined as an electrical circuit consisting of some combination of resistances, inductances, and capacities. Those filters composed of circuits containing only resistances and capacities, or resistances and inductances, are called aperiodic filters; that is, they are not tuned to any frequency; while those filters composed of inductances and capacities are periodic, or, in other words, tuned to some definite frequency. The complete design of an aperiodic circuit is an involved mathematical problem, requiring mathematics of a high degree; but the design of a periodic circuit is quite simple, requiring little or no figuring at all. Therefore, I shall show only a type of an aperiodic filter.

In Figure 1 is illustrated a common design of a small aperiodic filter-circuit for radio work. Such a filter can be made up of fixed condensers having a capacity of .0005 microfarads and resistances of 50,000 ohms apiece. Of course, the hitch in the actual construction of such an affair is the 50,000-ohm resistances, which may not be readily obtainable.

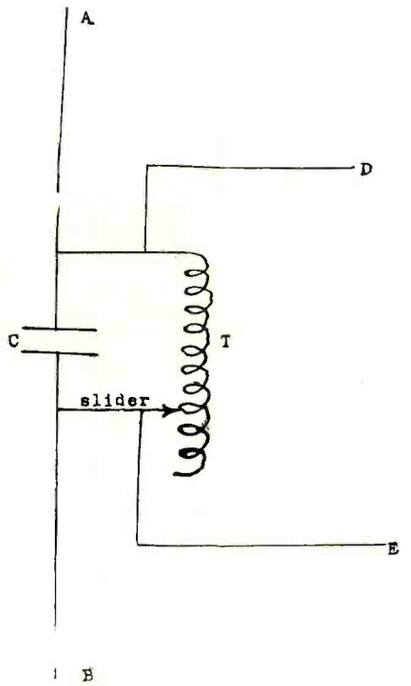


Figure 2.—A periodic filter. C, a capacity of .001 microfarads. T, a simple tuning coil. A, B, D, E, are terminals.

But for those who do not feel inclined to go to the trouble and expense to build a filter of the aperiodic style, a more simple and economic type is shown in Figure 2. The circuit there illustrated is one for a periodic, or tuned, filter. This type of filter can be inexpensively constructed with one fixed condenser of .001 microfarads and a simple slider tuning coil, with a total cost not exceeding $4. The virtue in such a circuit (Figure 2) lies in the fact that if it be tuned to the frequency of the incoming signal it will practically conduct

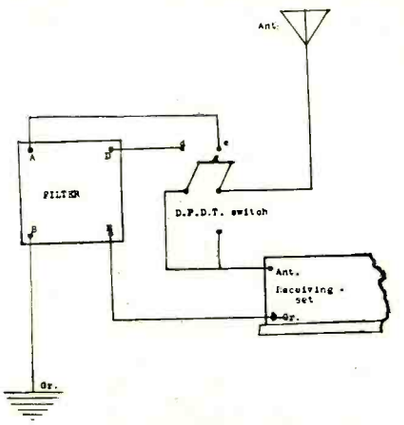


Figure 3.—Filter and receiving set connections.

none of the current of that frequency, while for currents of all other frequencies it will act as a short circuit to ground, thus forming a better path to ground for the static discharge than the receiving set. It is obvious that all of the static or stray current will not pass through the filter.

A filter should be shunted—that is, connected in parallel, across the receiving set, as shown in Figure 3. To adjust the filter, it is necessary to tune it, if it be of the periodic type (Figure 2). This is best accomplished by removing the filter from the receiving set and tuning the receiving set alone. Then the filter may be placed in the circuit and the slider on the tuning moved until the maximum signal is heard in the phones. Practically no further adjustment is necessary unless it is desired to receive a signal of a different wave length, then the operation will have to be repeated. A filter of this type will not satisfactorily function when receiving from spark stations; it is primarily intended only for C. W., where the carrier-wave frequency is fixed.

New York's Third Radio Show a Hit!

NEW YORK'S third big radio show is over.

The 71st Armory never held a more exciting affair.

The attendance, large at the opening, increased throughout the week.

Saturday night, the closing night, saw the largest crowd. The Radio Corps—all smartly uniformed young "fans"—did the policing and did it well.

Rudolph Knopp, of Cedar Grove, N. J., was awarded the first prize in gold for the best radio receiving set.

As usual there was immense interest displayed in the Army and Navy exhibits. The government appliances won great admiration.

Then there was the giant Naval compass loaned particularly for this occasion by Secretary Denby. Everyone wanted to see how it worked, and everyone was told by an efficient officer.

The singing of Miss Hope Hampton was greatly enjoyed. Hers is a voice that blends with radio as sunshine blends with smiles.

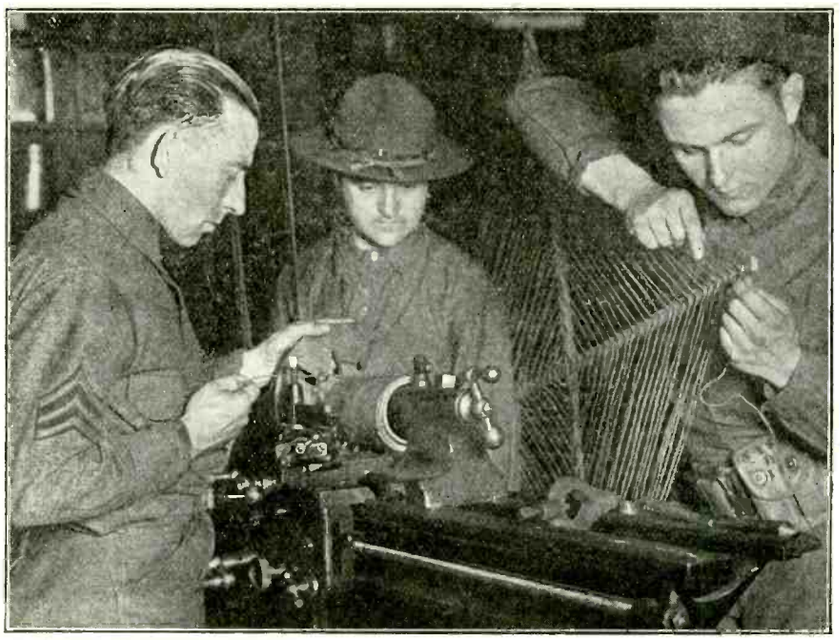
A. Falske, of 1515 Eastern Parkway, Brooklyn, won the second prize of $75 for the best receiving set. The third prize, $50, went to F. B. and Walter Ospman, of Ridgewood, N. J.

Elmer Tripp had a very busy booth. He answered questions that were hurled at him with remarkable alertness. His knowledge of radio is something remarkable.

Much credit goes to Mr. Buchaghani, the managing director, who made the show a success. His press work was handled with all the skill of his newspaper training.

There is to be another show at the 71st Regiment Armory some time early in the fall, it is said. The quickness with which radio equipment is changing and improving demands this.

There were a great many speakers—men who told about the wonders of radio—and none exaggerated the marvel of the age. These speakers had many listeners at all hours.



(c. Kadel & Herbert News Sercice)

One of the many new features exhibited at the New York Radio Show held in the 71st Armory. A member of the 101st Signal Battalion is describing a tuning coil. The corporal at the right is constructing a hook aerial.

Radio Club Notes

THE secretaries of the following radio organizations have filed the names of their clubs with RADIO WORLD. All other clubs are invited to send in their names and addresses, and the name of the officer to whom membership application should be made:

Glenwood Radio Club, 322 Warburton Ave., Yonkers, N. Y.

Polytechnic Radio Association, of the Baltimore Polytechnic Institute. Vincent E. Powers, Jr., president, 1715 Guildford Ave., Baltimore, Md.

Radio Club, Bay Ridge, N. Y. meets at the South Brooklyn Branch Public Library, Wednesday at 7:30 P.M. No qualifications necessary to become a member.

The past several meetings of the Radio Club of Brooklyn have been marked by large attendances. The meetings, held Thursday evenings, were taken up by the reading of papers by club members on current radio topics. "The Radio Log," issued monthly by the club, appeals for a general education of the public in radio.

The Eighth Ward Radio Club which was organized with only four charter members is, to-day, one of the most ambitious radio clubs in New York in point of membership and activity. The club has no permanent quarters as yet, but a neighborhood community house has promised to give it ample meeting space next fall. All communications, for the present, should be addressed to Martin Remneck, 147 Avenue B, New York City.

All of the policing and ushering at the Radio Show which closed at the 71st Regiment Armory, May 27, was done by the Radio Cadet Corps. The corps has completed plans whereby hikes and weekly camping trips will be a feature of its summer programs. In addition to recreation and drill, radio will be put to practical use out of doors.

Radio and the Woman

Latest Gossip About the Feminine Enthusiasts

AN assurance of safety to women is conveyed to us in the announcement that patrol automobiles of the New York Police Department are to be equipped with radiophone apparatus. The assurance also contains a warning note to the fair motorist who, too long and too often, presses that piece of steel so conveniently set 'neath her pointed shoe.

* * *

Miss Jeanette Vreeland is the first vocalist to give a song recital from an airplane. The recital was transmitted by a 50-watt set on a 507-meter wave length with a range of 500 miles.

* * *

Lourence Stephenson, radio fan, sends me this:

When theories new to us are brought,
We're prone to sneer and ruff our hair
And straightaway, without giving thought,
Exclaim, "Aw! Give that the air!"
But now that classic phrase has won
Distinction high and rare,
For man soon learned what could be done
When, for his own, he took the air.

He rules it now with ruthless hand,
The world is his and he is king;
He listens in at Hindustan,
Or hears a glorious artist sing.
If he is traveling o'er the land,
At stocks he still can have a fling:
Radio's magic at his demand,
Knowledge, power, and pleasure bring.
Politeness now we don't impair,
When we advise — "Go take the air!"

* * *

The Weather Man, not quite satisfied with the excellent service he has been rendering housewives, is now letting us know in advance just what day to arrange for the laundry maid.

* * *

Queen Victoria Eugenie, of Spain, has evinced considerable interest in wireless.

* * *

The Parasol—that utterly feminine accessory which has not been strongly in vogue for a number of years—will undoubtedly come into its own, now that it can be used as a radio-receiving apparatus.

* * *

Do you know that a Miss A. G. Parker was a real honest-to-goodness ship-operator on the steamer "Mohawk" of the American Line?

* * *

A hair-dressing parlor in New York now advertises "The Radio Wave."

* * *

Members of the League of American Penwomen "taxied" and "subwayed" to the National Arts Club in expectation of hearing the authoress of "The Man in the Moon" stories relate how she gathers her material and how she came to write the tales. Though disappointment followed hard on the heels of the announcement that so honored a radio guest was not to be among the speakers, a sympathetic understanding was expressed for the shyness which prevented her attendance.

* * *

Instead of asking the oft-repeated question, "What receiving set shall I buy?" Mrs. Agnes V. Miller, of Newark, simply turned to and made one. At a recent radio meeting at the National Arts Club, New York City, at which Mrs. Miller lectured, she referred to WJZ with such possessive affection and pride that a writer sitting beside me questioned: "Who is W. J. Z.? Must be a relation of hers?"

* * *

A southern maid, obviously affianced, writes to ask if her solitaire ring, when worn while she operates her transmitting set, is likely to distort radio waves. Now, don't you reckon that she's just gone and got electric currents all mentally confused with heart throbs?

* * *

Major-General George O. Squier's idea of making every lamp-socket a radiophone draws a complaining wail from a fair radio fan who bemoans the possible loss of keen pleasure derived from tuning in on a wave length. "How much more fun it is to twirl a dial," she says, "than to just plug in on a lamp socket!"

* * *

A humorous suspicion occupies the minds of certain manufacturers that members of the gentler sex are transmitting under operator licenses issued to husband or brother.

* * *

Word comes from abroad that women's interest in radio may prompt foreign costumers to decree hoop skirts as a fashionable mode of inductance.

* * *

A woman friend, the owner of a receiving set, who has hitherto dreaded the terrorizing effects of summer thunder storms, is taking comfort in the well-known fact—insurance companies' statements to the contrary—that there is not a single proven case of an antenna attracting lightning.

(c. Underwood & Underwood)

Radio enthusiasts, as well as the advanced amateur, have tuned their receivers, many times to 1,450 meters, to listen to the concerts, rendered by the Army radio station, located at Fort Wood, Bedloe's Island, N. Y. This station can be better identified by its call letters WVP. This photograph shows the interior of the station, where the artists appear to broadcast their musical selections. The phonotron can be seen, in which capacity every minute vibration is carried to the radio transmitter for transmission. Mrs. Morin Scott Hare is singing Rabey's "Tes Yeux," violin obbligato, by Mrs. Henry Murdock Ward, with James Caskey at the piano.

It had proved to be a tiresome, all-day trip and the railroad train was hot and stuffy. The mother, who had ineffectually struggled with her small son, who shifted and climbed about restlessly, cast a despairing look at the woman who occupied a seat across the aisle.

"He's so tired. I don't know what on earth to do to keep him still," the mother remarked, referring to the boy, "and it'll be another hour before we reach Newark!"

The other woman had noted the mother's desperate efforts to restrain the twisting child and now said impulsively: "Let me take him. I know a number of bedtime stories. Perhaps they will keep him quiet."

A minute later the child was in the woman's arms and was regarding her with the usual childlike wonder. Holding the chubby little figure close, she started in to do her best to interest her small audience in the stock of stories at her command. In the seat opposite, the tired mother relaxed.

Miles and time flew on swift wings until the mother again interrupted: "We're nearing my station," she said, "I'll take Johnny now. It was awfully good of you to amuse him."

The woman extended the child, from whose face had disappeared the petulant frown and whose blue eyes were content and shining. Her own face held a queer look.

"Not good of me at all," she said, "any indebtedness is really on my side. You see," she explained. "I'm one of the performers who broadcast bedtime stories by radio. I've so often wondered if children really like them; and until I related them to Johnny, I never could actually know how kiddies look when I talk through the disc to them. His joy has meant a great deal to me; his face is a memory I shall keep with me—always!"

* * *

Women will unquestionably be greatly benefitted by the series of instructive lectures which the radio department of Tufts College, Massachusetts, are to broadcast twice a week. The subjects of these lectures are to cover an almost boundless field of human knowledge. Of particular interest is the announcement that lectures bearing on topics which will interest the women at home, will be broadcasted afternoons and will be delivered in a way in which notes can be taken, if desired. This, in my opinion, is one of the most interesting things that is being done for women in wireless. It is bound to be of immense educational value to our sex.

The broadcasting will be sent out from the Amrad Transmitting Station at Medford Hillside, Mass.

(c. Underwood & Underwood)

Not only are women learning the art of radio communication, but are becoming so familiar with the various types of equipment, that the householder will be surprised to find her own sex demonstrating the mechanism of a radiophone receiver. The Misses Mary J. Grady and Alice Donovan, in the above photograph, are demonstrating a complete radiotelephone receiver. Miss Grady has control of the radio key by which messages may be transmitted, while Miss Donovan is in the position to transmit a wireless-telephone message. Of course, it must be understood, both cannot operate at the same time.

Slender, dark-eyed Edna Hirshfield, promising girl student among those taking the wireless course at the Radio Institute of America, spiritedly contradicts all masculine statements which infer that women in general appear dazed when technical terms are mentioned and stand in fearsome awe of the mechanics of radio.

"Before taking up this course, I never knew a thing about mechanics of any sort!" Miss Hirshfield exclaimed. "Nor are any members of my family mechanically inclined. My interest in radio dates from the time I first obtained a receiving set. The instrument simply fascinated me until I felt that nothing was more to be desired than a deeper knowledge of a subject that calls for more intelligence than merely tuning in on a wave length. I seem to be getting on very well in my studies here, and when I have obtained a first-class operator's license, I hope to make my living in this calling."

Then, because Miss Hirshfield is too shy and retiring to talk very much about herself, R. L. Duncan, director of the institute, laid emphasis on the splendid progress she has made, stating that her code speed for the length of time she has been at the institute exceeds that of the average pupil, and that the mechanics of radio are easily understood by her.

To master from fifteen to eighteen words a minute, after taking the course for only three months, is a pretty good stunt for even the average student who gives the majority of her time to it; but to have acquired this record when able to give her attention to wireless only when she can snatch time from her regular daily occupation of bookkeeper—and then only at the end of a day when physical strength and vitality is at a low ebb—is something of which anyone may be proud.

Yet Miss Hirshfield makes little comment on the success of her present efforts. She merely reiterates that tired nerves and the possibility of overtaxing a delicate physique are not written in on the vitalizing pages of radio, which reveals fresh, new lines of thought, upon which thousands of women are too busy expending their wits to dwell on imaginary things.

* * *

A certain mineralogist is working on a radio invention that will detect minerals underground.

* * *

Classified advertisements for radio salesmen are appearing in daily newspapers? Why not saleswomen?

* * *

A radiophone has filled the need of a temporarily vacant chruch pulpit in New England.

The Radio Primer

A. B. C. for the Beginner Who Must Have the Facts Put Plainly and Tersely, and all Terms Fully Explained

The Beginner's Catechism

By Edward Linwood

WHAT is meant by amplification?

Amplification means to magnify or enlarge. In radio, it refers to the magnification of the strength or loudness of the signals received and detected.

* * *

How are the detected signals amplified?

By the use of additional vacuum-tubes. Instead of inserting the head phones in the output, or plate circuit, of the detector tube, the currents in this circuit are passed into a special transformer, called an "amplifying transformer," which increases the potential or voltage. After passing through this transformer, the signals are lead to the grid of an amplifying tube. Being of greater potential when they enter the tube through the grid, these currents liberate a large plate-current. Thus, if the head phones instead of being inserted in the detector plate-circuit are inserted in the amplified plate-circuit the signals, as heard, will be many times louder—perhaps 100 times.

* * *

How many times can these detected signals be amplified?

Experimentally, without limit; but, practically, the strengthening of the signals is limited to two amplifying tubes.

* * *

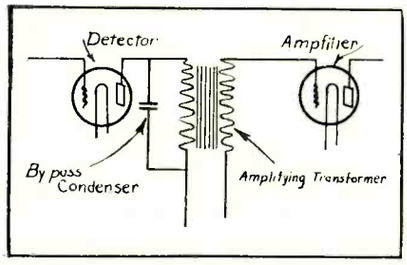
What limits the number of tubes?

The skill of the operator in most instances. It should be remembered that the amplifying tubes are not selective. They amplify any impulses that are fed to it. Static, strays, tube noises, magnetic-coupling noises, battery gassing—these are only a few of the sources which generate sound in a radio outfit. And the amplifier will take each and every one of these foreign sounds and give it the same magnification it gives the signals.

* * *

How much additional equipment is needed for each stage of amplication?

Amplifying transformer, tube, rheostat, high voltage B battery and telephone jack.



Schematic diagram showing how radio-frequency currents are shunted around primary windings of amplifying transformer.

* * *

Can amplifiers be used with regenerative circuits?

Yes, but it will be found advantageous to insert a small by-pass condenser around the primary winding of the first transformer.

* * *

What is the reason for this condenser?

The high-frequency resistance or impedance of the transformer winding is so great as to form a barrier against the passage of the retuned currents. A condenser allows the high frequency, or as they are more often called the "radio frequency" currents to pass around to the grid without encountering this barrier.

* * *

What is the voltage of the high-tension B Battery used in the plate circuits of amplifiers?

It is usually about 45 volts, or twice that of the detector tube battery, although under certain conditions this voltage is raised to 60 or even to 90.

The Radio Primer has been published regularly in RADIO WORLD since issue No 1, and will be a regular department in order to instruct and aid the many thousands of amateurs who are joining the ranks of radio enthusiasts every week.

Why is a different voltage required here?

Because it is necessary that the tube be adjusted so that the signals are strengthened without being distorted. Different makes of tubes have different characteristics; that is, they react differently to the same conditions of grid and plate voltages. To obtain perfect amplification, it is essential that the voltage of the plate be maintained normally at a given point so that, as signals arrive, they are magnified exactly proportional to their original intensity. This can be explained by the following example in which the values have been assumed without any relation to their correctness: (See schematic diagram.)

Suppose a tube were designed for a plate voltage of 45, and, when thus connected, magnified all incoming signals seven times. If a signal appeared on the grid having a potential strength of one volt, the resulting amplified signal would be the equivalent of seven volts. An incoming signal of three volts, potential, would be increased to twenty-one volts. Everything would be proportional and there would be no distortion.

But suppose, again, that the plate potential were increased to fifty which is five volts more than is necessary. When a signal strength of one volt appeared at the grid the seven volts would be at the terminals of the head phones in the plate circuit. So far so good. But along comes a signal with strength of three volts and then, due to the too large potential on the plate, the magnified potential is not seven times three or twenty-one as in the former case but only six times three or eighteen. The magnification has not been proportional and the result is distortion. This factor may not be so important in receiving spark-stations but in broadcast reception it is all important.

* * *

It is said that a pencil mark across the condenser terminals will make a good leak. Is this true?

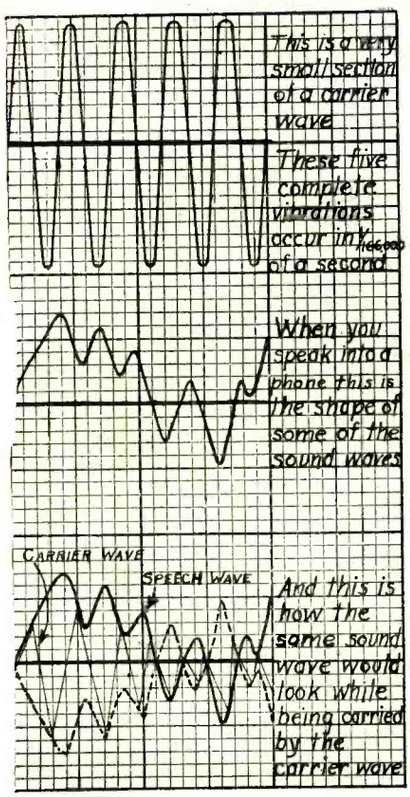
Yes, provided a good connection is made between the pencil mark and the terminals. Altogether too often the mark is carefully traced down the length of the condenser and left incomplete at the terminals. The path of a discharge across a pencil-line grid leak may be likened to a journey of a man across a river filled with broken ice cakes. If the cakes are not too far apart, he can leap from one to another; but, if the last cake is fifteen feet from the shore, it might as well be fifty feet. If a pencil line is used as a grid leak, be certain that the line hooks up well with the connections at the ends.

The Messenger Boys of Broadcasting

By E. L. Bragdon

CARRIER waves, stripped of all their technical verbiage, are the impersonal means which owners of broadcasting stations use to deliver their program messages. Like the telegraph messenger boy, carrier waves have no particular connection with, or interest in, the message they are bearing between the sender and receiver. They are brought in the limelight for a specific purpose and no one cares where they meander after the message they carry has been delivered.

When one person lifts the receiver from an ordinary telephone and talks with another person three thousand miles away, the copper wire forms



Schematic diagram showing carrier waves.

the path for the speech impulses. The carrier wave of radiotelephony corresponds to the carrier wire of wired telephoney.

Although carrier waves can be generated by several widely varying types of equipment, such as the high-frequency generator, the arc, and the quenched spark, only the vacuum tube is employed for this purpose by American broadcasting stations. For the sake of simplicity, this paper will be limited to the tube.

If a battery containing a sufficient number of cells to bring the voltage up to, say, 300 is connected in the plate circuit of a vacuum tube, and coupled in some one of many ways to the grid circuit of the same tube, the condenser and inductance action of the tube circuit will start the tube to vibrating. The number of the vibrations will depend on the value of the condensers and inductances in these circuits.

Once started, the vibrations of the tube will continue as long as the energy is supplied to the plate and instead of alternately increasing and decreasing as in the case of spark discharges the waves will be continuous and equal in magnitude. If the circuit is tuned for 360 meters, there will be 833,000 of these oscillations every second. This series of waves sent out from the transmitting station is the carrier wave.

Because the carrier wave is of such high frequency it can pass through the air without causing trouble. Its rate is about one hundred times too fast for the most sensitive human ear. But this fact, instead of being a detriment, acts as the savior of the situation.

Whatever is sent out from a broadcasting station, be it song, musical or plain speech, the vibrations are only what can be understood by the listener. So what should be more natural than to place the voice vibrations astride the fast-moving carrier wave and have it taken to the destination? At the latter place, if desired, the voice vibrations can be removed and the carrier wave allowed to pass on. That is exactly what happens.

Another picture of the combination of carrier and voice waves is seen in a monster Zeppelin. When viewed from the outside, there is no suggestion of network within. Yet the envelope which stretches, cigar shape, several hundred feet from stem to stern, is supported on the inside by a series if wire girders always pressing outward. In the same way, the carrier wave gets underneath the voice vibrations and supports them as they travel through the air to the various receiving stations.

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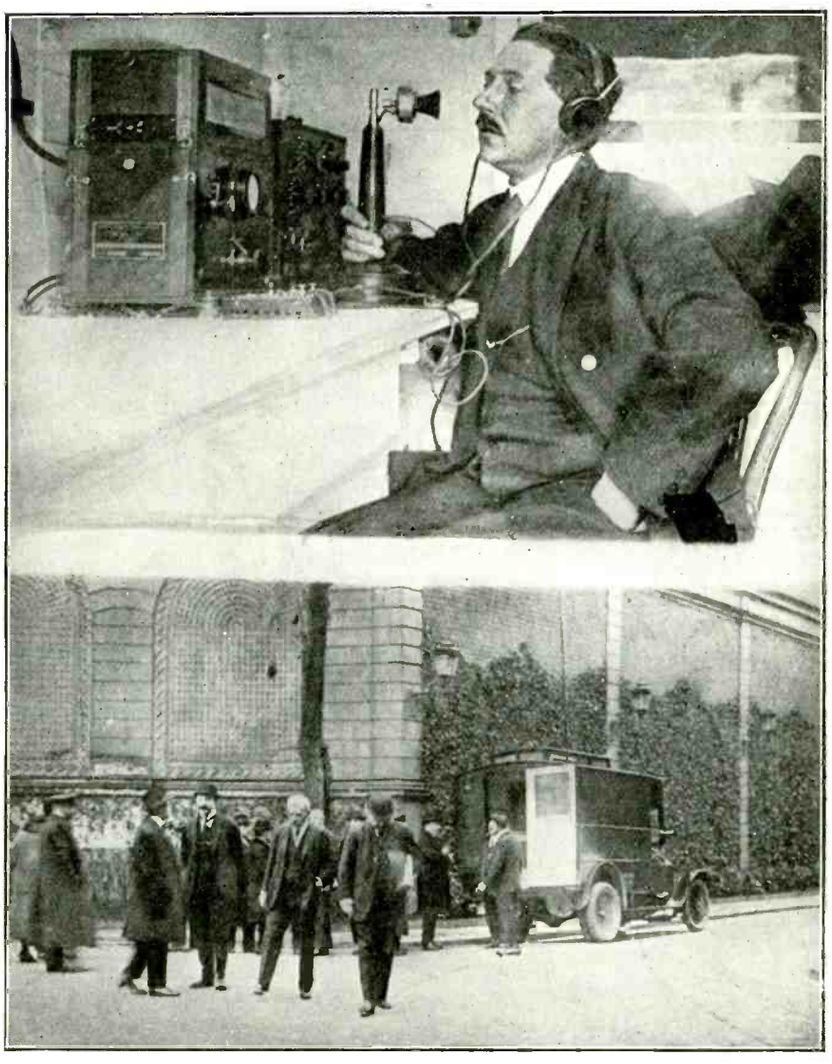
Entered as second-class matter, March 28, 1922, at the Post Office at New York, New York, under the act of March 3, 1879.

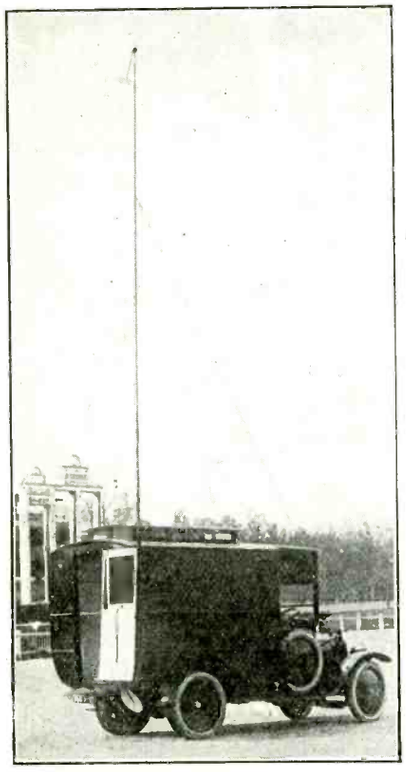
Invisible Net of Radio Bags France's Fleeing Crooks

THE world has heard of the radiotelephone being used in many homes where concerts, music, and speech were received through the ether—coming for many miles. If a receiving station were to be erected with ample instruments these signals could be received just as they were being transmitted, provided one tuned in on the proper wave-length. The police department of Paris, France, used this exact idea, but on principles whereby radio communication would benefit the department when quick action was needed. A radiotelephone transmitter was installed in a central location, possibly police headquarters, which worked on a set wave-length. The motor-cars representing the various units of the department were fitted out with antennas and receiving gear. With all this equipment on hand, it should indicate what quick action could be taken in case of disturbance, or riot, or gathering in a fleeing crook. Instantly, the moment the message is broadcast, every police car would have it, and the police could speed to their call and quell the disturbance.



(c. Kadel & Herbert News Service)

Paris has inaugurated its first wireless-police patrol. This special telephone truck, while en route to the scene of a crime, may keep in touch with the prefect of police, or even with an airplane tracking a criminal. Its worth was demonstrated in the presence of M. Leuillier, prefect of police, and M. Guichard, chief of the Paris police. The upper photograph shows the radio operator in his cabin in the radiotelephone truck. The lower, the truck and the non-conducting carpet on which it is run when a stop is made, so distant conversation may not be interrupted.



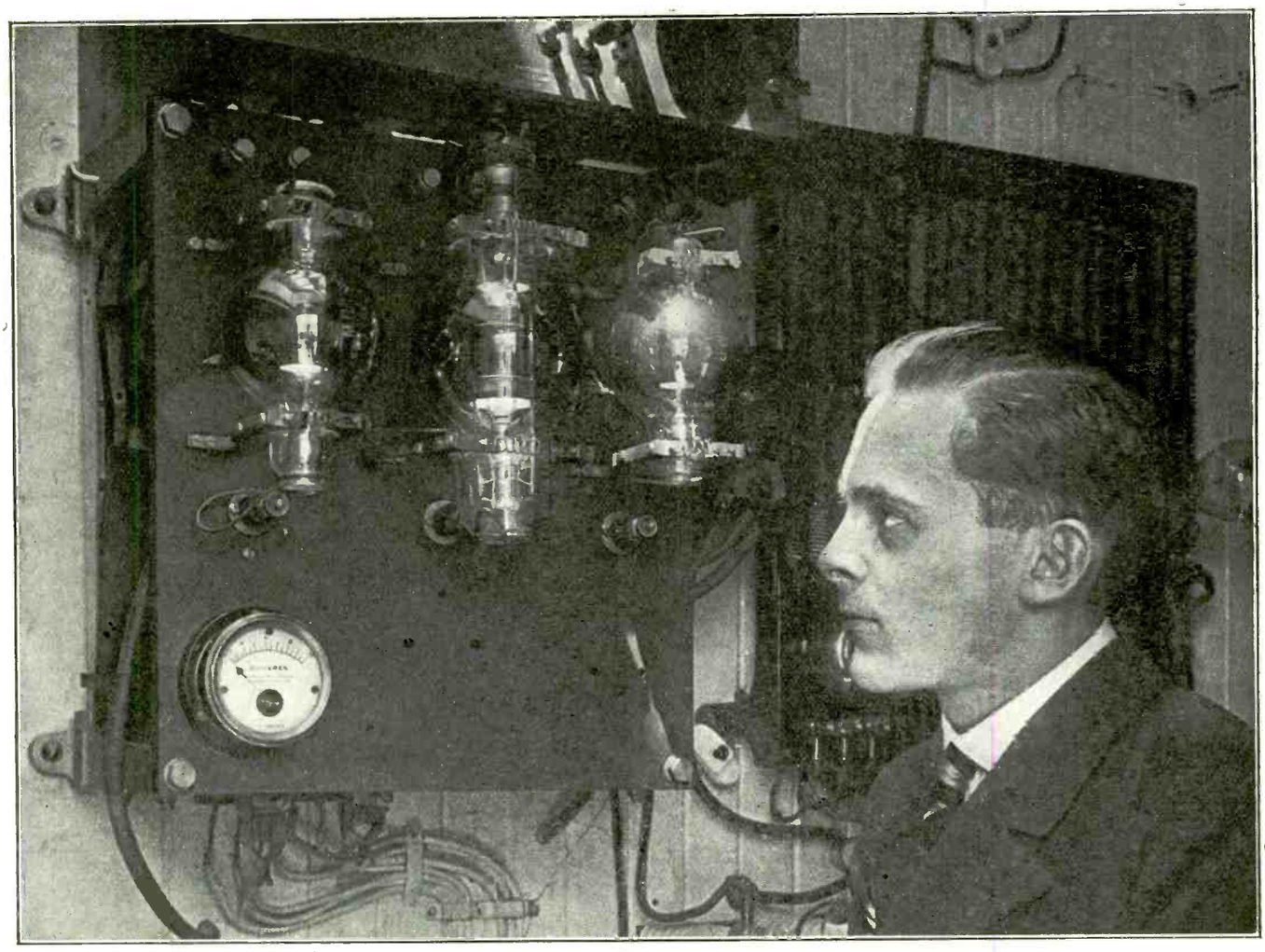
(c. Wide World Photos).

A motor-car of the Paris police, equipped with radiotelephone, constantly in touch with the office of the prefect of police.

Important to Vacuum Tube Users

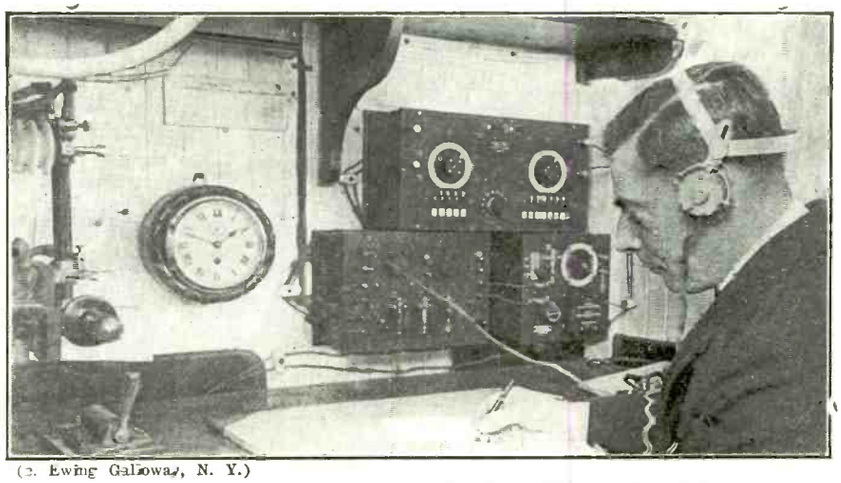
USERS of vacuum tubes are unaware that they must unintentionally cause as much interference as if they were operating transmitting stations. The cause of this trouble is due to the application of too high a plate, or B battery, and forcing the tube by an excess amount of filament of A battery. The tube when so operated acts as a transmitter, and, by means of oscillations which it sets up, will retransmit signals received on a given wave-length. The change in adjustment of the receiving set will change the wave length sent out, and much interference is caused to other listeners. "Heterodyning," as this is called, is becoming a serious matter and can be eliminated if vacuum tube users will watch the voltages carefully. This is an important factor with tubes.

Far-Flinging Sound Transmitters Keep Ships in Touch with Shore



(c. Ewing Galloway, N. Y.)

By this transmitting apparatus, part of the equipment of the Lamport & Holt liner "Vauban," the big steamer, when 1,500 miles at sea, is able to keep in communication with shore. She operates a modern valve, or tube, transmitter which requires only one ½ k. w., of current. Such an equipment enables ships crossing the Atlantic to communicate with either America or Europe continuously. The capacity of the instrument with so little current is accounted for by a very carefully adjusted aerial. The "Vauban" has one of the best wireless outfits on the seven seas. Her main receiving instrument registered distinctly messages from the Conte Radio Station in the Philippines, when 11,500 miles away—nearly half way round the world. The "Vauban" is also equipped with the latest-type Marconi direction finder which determines the direction of messages coming from shore stations and, thereby, ascertains the exact location of the ship when she is enveloped by fog. It will not be long before every deep-sea steamer will be as well-equipped with radio as is the "Vauban." No other element in science or invention has done so much to safeguard the lives of ocean travelers.



(c. Ewing Galloway, N. Y.)

F. W. Walsh, chief wireless operator of the liner "Vauban," and the apparatus whereby he receives messages. This is the very receiver through which came the message from the Philippine Island 11,500 miles away. It is one of the best adjusted receivers in maritime use. The Philippine message was picked up while the "Vauban" was en route from Buenos Aires to New York. While in the harbor of Buenos Aires, the "Vauban" caught messages sent out by the Leafield Radio of Oxford, England. The photograph shows only a little corner of a big liner, but, perhaps, the most important corner in the ship.

Radio Merchandising

Trade Notes

THE AIR-O-PHONE CORPORATION of 122 Fifth Avenue, New York City, manufacturers of the Air-ophone, has completed an amalgamation with the National Phonograph Company of Canton, Pa. Under the new arrangement, Air-o-phones will be manufactured and assembled at the plant of the National Phonograph Company, at Canton.

A move of this character was absolutely necessary owing to the large demand for Air-o-phones. Increased manufacturing facility was needed quickly and the new arrangement will permit the manufacture of sufficient Air-o-phones to take care of part of the present demand. The estimated production will be in the neighborhood of 300 machines weekly.

Lewis T. McFadden, president of the National Phonograph Company and Congressman from the Fourth Pennsylvania District, has been elected vice-president of the Air-o-phone Corporation.

* * *

THE WIRELESS APPLIANCE CORPORATION, 513 Sixth Avenue, New York City, announce their Pan-Audio Receiver, Type 102, and their Pan-Audio Amplifier Type CF-3. Connections can be made that enable the Pan-Audio to cover a wave-length range from 175 to 5,000 meters. A diagram showing the different connections accompanies each set. The Pan-Audio is a vacuum-tube set, the result of the combined study and work of the Wireless Appliance Corporation's radio experts, and is designed to meet the demands of the most exacting radio buyers.

The manufacturers claim for the Pan-Audio, high efficiency, neat appearance, high-grade workmanship and a remarkably low price considering the efficiency of the set.

* * *

Now comes the collapsible aerial that may be folded up and carried from place to place, to be erected on the roof, in the room, on the motor-car or motor-boat, or hung out the window. This aerial will prove popular with vacationists and campers who will be moving about and want to rig their aerial on short notice. The Collapsible Aerial is made by the Adjustable Radio Rigging Company, 330 West 42nd Street, New York City.

New Firms and Corporations

(The firms and corporations mentioned in these columns can be reached by communicating with the attorneys, whose addresses are given whenever possible).

Century Specialty Co., 1221 Pennsylvania Ave., N. W., Washington, D. C. George W. Adolph and David J. Meyers.

Radio Appliance Co., 6426 Hollywood Boulevard, Hollywood, Calif.

Perry-Calkins Co., 333 Ontario St., Racine, Wis.

R. R. Garrick, 126 North Redfield St., Philadelphia, Pa.

Radio Devices Co., Manhattan, $20,000; G. E. Bierce, C. A. Hollister, E. L. Neptune. (Attorney, W. J. Spalckhaven, 115 Broadway, N. Y.)

Hanover Radio Corp., Manhattan, $5,000; A. Bishop, M. De Lorme, R. L. Schweriner. (Attorneys, Newman & Butler, 116 Nassau St., N. Y.)

Great Eastern Radio Corp., Del., $2,000,000. Has designated as representative, H. R. Kohm, 25 Broadway, N. Y.

Hutchison Radio Co., contracting, $4,100,000; K. A. Graham, M. J. Bidwell, M. H. Roege, New York. (Delaware Registration Trust Co.)

Modern Radio Corp., Wilmington, Del., apparatus, $500,000. (Colonial Charter Co.)

Radio Finance Corp., Manhattan, $20,000; I. Esmonde, D. Bransilver, S. Wedeen. (Attorneys, Epstein Bros., 2 Rector St., N. Y.)

P. and E. Brewer Radio Co., Manhattan, $5,000; P. and E. Brewer, L. Iorio. (Attorney, H. C. Seward, 115 Sixth Ave., N. Y.)

Schiffl Radio and Electric Corp., Newark, $150,000; Paul Depatter, E. A. Roat, Robert Miers, Newark, N. J.

Concerto Lamp and Radio Corp., New York, phonographs, $250,000. (U. S. Corporation Co., 65 Cedar St., New York.)

American Radio Association, Manhattan, promote use of wireless, $10,000; W. Neale, A. G. Gennert, R. G. Albrecht. (Attorney, S. V. Ryan, Albany, N. Y.)

General Radio Products Co., Philadelphia, apparatus, $100,000. (Corporation Guarantee & Trust Co.)

Anderson Durand Radio Corp., Rochester, $100,000; M. H. Anderson, S. E. and J. E. Durant. (Attorney, D. C. Munson, Rochester, N. Y.)

H. A. H. Radio Manufacturing Co., Manhattan, $30,000; H. Harris, R. Arnold, K. Hellmuth. (Attorneys, Lind, Pfeifer & Crames, 46 Cedar St., New York.)

X-Rad Corp., Manhattan, make radio outfits, $20,000; E. M. Clarick, L. C. Smith, C. C. Lee. (Attorney, A. M. Grill, 34 Wall St., New York.)

Crescent Radio Mfg. Corp., Manhattan, $25,000; H. C. Broems, R. Davison, C. P. Cadman, (Attorneys, Lind & Pfeifer, 46 Cedar St., New York.)

Brooklyn Radio Co., Brooklyn, $10,000; W. Kirkpatrick, C. H. Young, F. Gubing. (Attorney, T. Downs, 2 Rector St., New York.)

American Bell Radio Corp., apparatus, $200,000; George H. Bell, Walter E. Carleton, Brooklyn; David J. Marks, New York.

Williams Radio Battery Co., Wilmington, Del., manufacture, $30,000. (Corporation Service Co.)

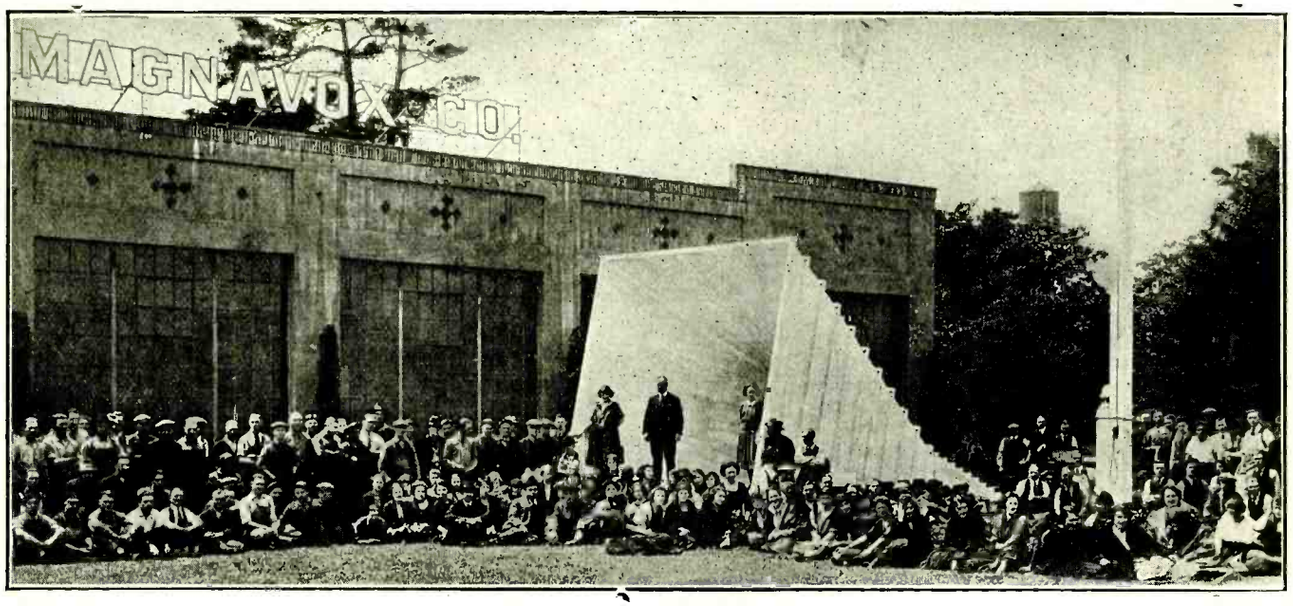
Radio Products Mfg. Co., Manhattan, $5,000; H. Techlauf, G. Bober, F. Czerwenka. (Attorney, R. L. Levenson, 799 Broadway, New York.)

The following firms are all in New York City:

Cassidy Bros., 59 St., & 2nd Ave.
Rialto Radio, 1487 Broadway.
Schullstum, 1 West 45 St.
Jones Electric Shop, 44 St., near 6th Ave.
Brackman Elec. Co., 657 West 181 St.
J. Kesner, 150 East 59 St.

(Continued on next page)

The World's Largest Radio Horn



IDORA Park, a public amusement resort in California, boasts possession of the world's largest horn. Measuring thirty-five feet in length, with an opening twelve feet square, this horn was recently installed for broadcasting music received by radio, and is in successful daily operation at the present time. Equipped with the Magnavox radio reproducer and, also, the Magnavox Power Amplifier, the broadcasting capacity of this gigantic instrument is sufficient to carry radio music throughout an area of approximately twenty-nine square miles. One thousand feet of clear air-plane spruce-lumber went into its construction, which incidentally presented a number of interesting problems to the Magnavox engineers by whom it was designed and built.

Of absorbing interest first of all on account of its sheer size and amplifying range, this gigantic instrument appeals to the imagination. A spectacular stunt on the part of an enterprising amusement resort, the basic idea is capable of really impressive development. It is a further indication of the far-reaching influence of radio on the world's work and play which warrants attention.

To the radio expert, however, the most interesting aspect of the situation is the fact that the Magnavox Company, through the use of its electro-dynamic reproducer, has produced such true tones as to eliminate distortion even when employing this very large horn.

(Continued from preceding page)

Friedman-Elec. Co., 1405 Third Ave.
Goldhouse Radio Phone Co., 49 St. & 7th Ave.
International Radio Exchange, 1983 Broadway.
S. & N. Radio Supply Co., 2106 Broadway.
John F. Driscoll, 467 Columbus Ave
R. Simpson, 35 West 116 St.
Radio-Phone Equipment Co., 436 Seventh Ave.
Ace Electric Co., 209 West 33th st.
Hart & Love, 780 Sixth Ave.
Columbus Circle Elec. Co., 875 Ninth Ave.
Griffin Radio Service, 51 East 42 St.
Hoyt Electric Co., 686 Lexington Ave.
A. & A. Electric Co, 39 St. & 7th Ave.
Triggers, 160 East 59 St.
Lexington Radio, 44 St. & Lexington Ave.
Hess & Hicks Elec. Co., 414 West 42 St.
Radio Battery Service Club, 81 W. Fordham Rd.
Fordham Radio Co., 140 E. Fordham Rd.
Frank Knott, 606 Bergen Ave.
Geils & Friedlander, 622 Melrose Ave.
Hawk, 558 Melrose Ave.
Phillip Glick, 433 West 125 St.
Grammercy Elec. Eng. Co., 52 West 30 St.
Brownell & Kraft, 506 Sixth Ave.
Joseph B. Josephson Co., 3154 Third Ave.
Benkwitt, 441 Willis Ave.
C. C. Bohn Elec. Co., 820 Sixth Ave.
Belmont, 906 Sixth Ave.
Bronx Elec. Supply Co., 612 Melrose Ave.
Manhattan Elec. Lamp Co., 800 Lexington Ave.
Stanley Ruth Co., 718 Madison Ave.
Knickerbocker Electrolier Co., 807 Sixth Ave.
Radio Sales Co., 23 East 14 St.
Morison Electric Supply Co., 15 East 40 St.
Koch & Schwarz, 602 Third Ave.
Silver Radio Supply Co., 2305 Broadway.
D. H Morris Radio Co., 1024 Lexington Ave.
Broadway Radio, 2525 Broadway.
Rush Radio & Elec. Appliance Co., 8 East Fordham Rd.
Electrical Engineering Corp., 716 Eighth Ave.
Eclipse Electric Co., 613 Ninth Ave.
E. J. Williams, 1674 Broadway.
E. J. Edwards, 1976 Broadway.
Kellohh & Bertine, Madison Ave. and 59 St.
Shuck Radio Co., 1274 First Ave.

Atlas Radio Sales Co., Manhattan, stock and bond merchants, $10,000; S. W. Weber, I. Sass, F. Miller. (Attorney, A. Goldfarb, 5 Columbus Circle, N. Y.)

Rocky Mountain Radio Products, Manhattan, $5,000; F. Reiss, H. Grayer, C. Heckelman. (Attorneys, Lewis & Schaap, 299 Broadway, N. Y.)

Radio Press of America, Manhattan, $50,000; B. B. Borg, A. Bullman, A. N. Birenbach. (Attorney, C. Y. Palitz, 111 Broadway, N. Y.)

United Radio Manufacturing Corp., Dover, Del., apparatus, $500,000. (U. S. Corporation Co.)

American Radio Exposition Co., $1,200,000; Walter Neale, Alfred G. Gennert, New York; Ralph C. Altorecht, Brooklyn. (U. S. Corporation Co.)

Radio Costume Co., Manhattan, $10,000; C. Fliashnick, M. Witkoff, D. Goldsher. (Attorneys, Fliashnick & Sustick, 874 Broadway, N. Y.)

Northern Radio Supply Co., Manhattan, realty, $10,000; E. A. London, I. Weissberger & Leichter, 93 Nassau St., N. Y.)

Franklin Radio Corp., Philadelphia, manufacture wireless telephone, $250,000. (U. S. Corproation Co.)

Lissen-in-Radio Co., Ridgefield, $25,000; Bertha Rappaport, Jennie A. Fisher, Pauline L. Rappaport, Ridgefield, N. J.

Radio Record, Manhattan, $150,000; A. Miller, E. M. Simpson. (Attorneys, Simpson & Simpson, 356 5th Ave., N. Y.)

Signal Radio and Electric Corp., Manhattan, $10,000; S. Eisenstadt, F. S. Vincent. (Attorney, I. Orleans, 130 West 42nd St., N. Y.)

Radio Manufacturing Co., Manhattan, make radio apparatus, $10,000; H. A. Weeks, J. D. Morrick, A. Loisi. (Attorney, G. J. Giudici, 61 Park Row, N. Y.)

Atlantic Radio Corp., Manhattan, $10,000; N. Piro, V. A. Mojo, L. J. Lafermine. (Attorneys, Kramer, Bourke & Galgano, 130 West 42nd St.,

Allied Radio Co., Manhattan, $100,000; M. Ettenberg, H. Shapiro, A. G. Heller. (Attorney, D. Marcus, 300 Madison Ave., N. Y.)

Radio Clearstone Corp., Bronx, $20,000; H. Meisinger, H. D. Daneny, F. Metz. (Attorney, B. J. Levy, 45 West 113th St., N. Y.)

Coming Events

MILO E. WESTBROOKE RADIO SHOW.—Leiter Building, Chicago, June 25 to July 1.

FIRST CENTRAL WEST RADIO SHOW.—Auditorium, Milwaukee, Wis. Week of June 21.

SPRINGFIELD RADIO EXPOSITION, Springfield, Mass. Under auspices of Springfield, Mass., "Daily Union." June 19, 20, 21, J. P. O'Connor, managing director.

CHICAGO RADIO SHOW, Coliseum, Chicago, Ill., October 14 to 22. U. J. Hermann, managing director, 549 McCormick Building.

KANSAS RADIO EXPOSITION will be held at the Kansas State Fair, Hutchinson, Kansas, September 16 to 22 inc. A. L. Sponsler, Secretary.

No Summer Slump

According to that journalistic barometer of trade and advertising, "Printers' Ink," there will be no slump in business this summer. We agree with "Printers' Ink." Reservations for advertising in RADIO WORLD for July and August prognosticate a fifty-per-cent. increase. In fact we are now figuring on increasing the number of pages of RADIO WORLD. We believe all business is on the up-grade and that improvement will be both sure and steady.

Capital Increases

The Liberty Radiofone Company of New York, has increased its capital from $500,000 to $20,000,000.

Provision has been made by the Western Electric Company so that all holders of its five-year seven-per-cent convertible gold bonds may exercise the right to convert them at face value into shares of the 7 per cent. cumulative preferred stock of the company at any time until and including October 1, 1924. The new securities have a par value of $100 each.

Fifty-two issues for $6.00. Sub-Department, Radio World, 1493 Broadway, N. Y. C.

Are You a Member of the N. O. D. C.?

If You Have Ever Experimented in Circuits, You Certainly Are

By Rutherford Hackett

WITH cryptic initials such as QRM, CW, MFD, and others too numerous to mention, actually crowding radio waves out of their proper place in the ether, the abbreviation at the head of this article will scarcely startle the reader, no matter how gentle he may be. But since this is not a fiction story, the meaning of the four letters is divulged immediately. It refers to that great and growing body which may be called the National Order of Diagram Chasers. Practically every one in the new audience of radio amateurs has been—perhaps, still is—a member of the order.

A person interested in radio cannot have read any of the radio publications without being impressed by the results some contributor has obtained with a fancy hook-up. To be sure the change in the hook-up referred only to the change of a condenser from one side of the vacuum tube to the other; but according to the story: "The new arrangement brought in three stations that I had never heard before."

After reading this statement, a member of the N. O. D. C. hies himself to his radio shack and after testing his apparatus to see that his favorite broadcasting station is coming in O. K., (more cryptics), he proceeds to cut connectors, shift variometers, twist condensers, and juggle joints until he has copied the hook-up lauded in the magazine. And then he tunes—and tunes—and tu—ah! there it is. A spark station with a peculiar tone. He had never heard that bird before. Wonder who it might be?

After listening there at the new shrine for a minute or two, he swings back to where the broadcasting station used to tune in. But no station there to-night. Finally after exploring awhile, he finds it; but try as he will, the words and music come in weaker than they should. He thinks that his batteries may be getting weak. Perhaps he has short circuited something while making the change over. He looks over the set, tests a joint or two, and tries again. No better this time. So, giving it up as a bad task, he manipulates the knobs again and succeeds in bringing in several new—to him—spark stations. Half an hour later, he may be seen changing his hook-up back to the "old reliable." The N. O. D. C., has lost another enthusiastic member.

It would be interesting to study a poll of radio amateurs who have been experimenting with various hook-ups, to see how many can truthfully say that they have ever improved on their original connections. Undoubtedly the percentage of optimistic ones would be small. There is a real reason for this; evidently a reason that few have considered.

Fundamentally, there are but few receiving circuits. Each circuit consists essenitally of a roll of inductance and a bunch of capacitance, attached at one end to a detector and a set of phones. But these fundamental circuits can be juggled around on paper a dozen different ways, seeming to supply in each new way, a new hook-up. As an example, consider the variocoupler and two variometer regenerative circuit, so widely used among 360-meter fans. The usual position in the diagram for the grid variometer is between the top lead of the variocoupler and the grid condenser. Supposing someone placed that grid variometer in the lower lead of the coupler. Would you change your hook-up and try it out? Perhaps not; but hundreds have. Unless the guessing is poor, they also changed it back because they certainly would get no better results.

The same thing has happened in other particulars of radio circuits. Sometimes the signals were bettered, but more often they were not improved and frequently they were poorer.

If an amateur makes his instruments from published diagrams and instructions, he generally gets his best results from the published hook-up because the instruments have been designed and assembled with a given purpose in mind. As a rule, the original builder has tried out the various possibilities in the way of diagrams and has selected for you the one that works the best. When you alter the diagram, you are merely duplicating the work he has done.

The fictitious personage mentioned at the beginning of this article, picked up several new spark stations but lost his broadcaster. He changed his set and changed his wavelength. His set was not made to work on both types of stations. When he endeavored to straddle the situation he lost out in efficiency.

Some members of the N. O. D. C., may come back with the statement that experimenting with circuits may result in a sensational discovery. It might. But it would be an accident, and it is doubtful if the D. C., would recognize the discovery when it popped before him. He would try to better what he had discovered and lose the secret of the sensation. Major Armstrong *discovered* the regenerative circuit you are now using, but he didn't do it by chasing diagrams. He did it by *making* diagrams after studying what he already knew about his apparatus.

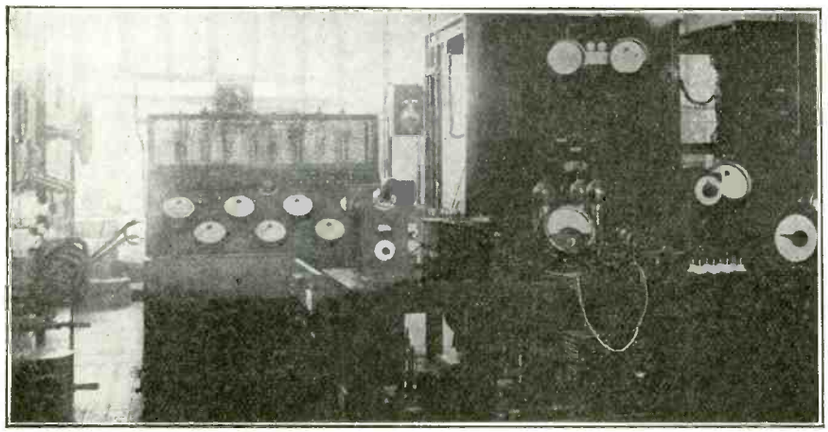
Use the hook-up you have. Study it from all angles. Study every inch of the wiring and all the connections. Find the reason for everything. And refuse to change the connections until you are convinced that something is wrong with it as it stands.

Ten P. M., in Thousands of Homes

(c. Fotograms, N. Y.)

Many radio fans say that they derive the greatest pleasure and suspense waiting for ten o'clock to roll around every night, for precisely at that hour the time tick is sent out from Washington, D. C. It is gauged to the most ultimate fraction of a second. Thousands of people throughout the country now set their time pieces by radio. Richard Barthelmess, the moving-picture actor, posed for this photograph.

Germany's First Broadcasting Station



(c. Kadel & Herbert News Service)

This is the first broadcasting station in Germany. It is located in Berlin. The equipment is all first class and of latest design.

Radio Should Pay for Broadcasting

An Important Letter to Radio World from E. C. Mills, Chairman Executive Board of the Music Publishers' Protective Association

Editor, RADIO WORLD: I have been much interested in the article of your issue of May 20th, by Mr. Everett Ewing, in which there are propounded a number of questions as to the effect that radio may have on various productions and activities.

Mr. Ewing asks the question, "Will Radio Increase Author's Royalties?" Answering the question, he is of the opinion that the so-called "plug," or advertising that a musical composition will receive from being broadcast by radio will result in such materially increased sales of the composition as to remove any apprehension on the part of the author and composer that radio broadcasting will have an adverse effect upon royalties.

Radio is, of course, the most amazing development of the times. To the layman it is a mystery, all the more intriguing and fascinating because although he cannot understand how or why it is that a receiving set gathers from the thin air and makes audible sounds which the ear does not hear, except through the medium of a receiving set, it does do this to his delight and entertainment.

Radio unquestionably is destined to become an enormously important factor in everyday life, and it is entirely within the bounds of reason and possibilities to assume that it may become just one more factor interfering with the development of personal and individual musical talent and ambition. In other words, it is becoming constantly more and more noticeable as phonographs and player pianos increase in number that the sales of sheet music decrease. There are not so many students of the piano as there used to be. I am informed that there are nowhere near so many music teachers with as large classes as there used to be.

Apparently the rank and file of the people and the great majority of young men and women are losing their incentive to undertake the work and study incident to the mastery of a musical instrument.

If this be true, we must anticipate a constantly decreased sale of sheet music; and if proper and just encouragement, is to be given authors, composers, and publishers, it follows that they must look to some other source for their livelihood.

What could be fairer than that radio now in process of building itself into a gigantic industry, enormously profitable to the manufacturer of the apparatus, should contribute a fair sum for the element which makes broadcasting interesting and entertaining. It is to be doubted that were it not for the musical entertainment being broadcast, any such almost universal interest in radio could have been aroused and developed. It is quite the custom to think of the royalties received by authors, composers, and publishers as huge; but you probably have as wide an acquaintance among these men as anyone in New York, and know that, on the average, their incomes are not swollen; that, in fact, their earnings comparatively are very modest.

In my opinion, it is not debatable but that broadcasting institutes a public performance for purposes of profit. If this be true, an infringement of copyright occurs every time a copyrighted composition is so broadcast without license from the proprietor of the copyright.

Unquestionably the purpose of broadcasting music and entertainments is to increase the sale of receiving sets. It is from this source that the profit flows, and it seems to me obvious that it is the plain obligation of the broadcasting companies to secure licenses permitting the public broadcasting of copyrighted musical compositions, and that they pay for such licenses such reasonable fee as may be demanded by the copyright proprietors.

The matter is now up to the broadcasting companies. It is hoped, of course, that an arrangement satisfactory to all concerned may be reached without litigation.

Proprietors of copyrighted music, so far as I have had opportunity to discuss the matter with them, are entirely sympathetic to radio, anxious to see it developed to the highest possible point of perfection, and desirous of seeing it fulfil its manifest destiny.—E. C. Mills, chairman, executive board, Music Publishers' Protective Association, 56 West 45th St., New York, N. Y.

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 field. Readers of RADIO WORLD will find that it pays to read these columns every week. Advertisers will get a ten-day service here—that is, copy received for this department will appear in RADIO WORLD on the news-stands ten days after copy reaching 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 advs., if copy is received at this office before 4 P. M. on any second Tuesday preceding date of publication. RADIO WORLD CO., 1493 Broadway, New York City. (Phone, Bryant 4796.)

Enclose Self-addressed Envelope and receive free bulletin of various designs from which you may build your own Receiver from our blueprints. The blueprints show full constructional details, wiring diagram, bill of material and necessary data and we guarantee the performance of the model. Price of blueprints varies as to subject desired. Ask for bulletin No. 349. Experimenters Information Service, 220 West 42nd St., New York City.

We Manufacture All Radio Parts in large quantities. Logan Machine Co., 222 South Clinton St., Chicago, Ill.

LOFT FOR RENT—124 East 14th Street. Immediate possession. For terms, apply L. B. Schindler Co., 148 Duane St., N. Y. C.

PATENTS—Electrical cases our specialty. Prewar charges. B. P. Fishburne, Registered Patent Lawyer, 386 McGill Bldg., Washington, D. C.

Big Money and Fast Sales—Every owner buys Gold Initials for his auto. You charge $1.50; make $1.35. Ten orders daily easy. Write for particulars and free samples. American Monogram Co., Dept. 198 East Orange, N. J.

Crystal Set That Gets Radio Concerts. Build it right boys. Plans and full instructions for building at low cost, high grade fine adjustable Crystal Receiving Set, fifty cents postpaid. Dept. R. D. Shaw Mfg. Co., Galesburg, Kans.

SAVE MONEY—Supersensitive galena quarter pound, 55c., half pound, $1.00. Big sample, 30c. Streiff, 73 Flatbush Ave., Brooklyn, N. Y.

INSULATORS FOR AERIALS—Support your antennae properly. Prevent current leaks. Our antennae insulators are of hard glazed porcelain, the ideal insulating material. Made to withstand a pull of 2,200 pounds. Light, strong, inexpensive. Write for samples and full information. **THE FEDERAL PORCELAIN CO.**, Carey, Ohio.

Cornetists, Trombonists, Saxaphonists, Clarinetists, send for "Free Pointers." Mention instrument. Virtuoso School, Buffalo, N. Y.

RADIO DEALERS AND AMATEURS
DON'T BUY until you have investigated our line of Radio Instruments BECAUSE radio apparatus requires scientific knowledge and mechanical skill in the design and manufacture. Our experts have embodied these in our Special Broadcasting Receiving Sets. Audio, Radio-Frequency and Power Amplifiers, Loud Speakers and complete line of parts manufactured by us. LEE RADIO CORPORATION, HADDONFIELD, NEW JERSEY.

GOOD TERRITORY STILL OPEN FOR LIVE DEALERS TO HANDLE OUR COMPLETE LINE OF RADIO INSTRUMENTS
Special Broadcasting Receiving Sets, Crystal and Audion, Radio, Audio Frequency and Power Amplifiers, Loud Speakers and complete line of parts. Complete details on request. LEE RADIO CORPORATION, HADDONFIELD, NEW JERSEY.

Now in Stock.—Clapp Eastham HR Regenerative Receivers. Murdock Phones—3,000-ohms. Magnavox and other parts. Mail orders given quick attention. Sever-Beacham Radio Co., Santa Fe, N. M.

Exchange jolly interesting letters through our Club! Stamp appreciated. Betty Lee, 4254 Broadway, New York City.

$133-$192 month. Become Government Railway Mail Clerks. Men over 17. Common education sufficient. Steady. List positions free. Write immediately. Franklin Institute, Dept. F-152, Rochester, N. Y.

VARIABLE CONDENSERS, 23 plate, .0005 M. F. Panel type, accurately made and adjusted, big value, $3.00, postpaid. Zeunert Co., 1752 N. Park Ave., Chicago, Ill.

B. & B. Radio-Phonograph Attachments are selling like wild-fire. Handsomely Gold Plated, $4.00, sent by mail. Dealers and Salesmen wanted. Fits any machine. B. & B. Mfg. Co., 11024 E. Jefferson, Detroit, Mich.

Immediate Shipments.—Yes! That's what I'm offering on a limited number of Grebe CR 5's, Clapp Eastham and Westinghouse RC Receivers, Everready B Batteries, Frost fones, Detector and Amplifier Bulbs. Order at advertised prices. Twelve hour service or your money returned. Geo. H. Rozum, Mitchell, S. D.

Smashed Wire Prices.—Copper aerial wire No. 14, 37c. lb. Magnet wire, S.C.C., No. 20, 97c.; No. 22, 98c.; No. 24, 99c. D.C.C. No. 20, 99c.; No. 22, $1.00; No. 24, $1.05 per lb. All sizes and insulations carried. Dealers write. Wolverine Wire & Mfg. Co., Shelby, Michigan.

For Sale.—One Penn C Type B Regenerative Cabinet, shielded Bakelite Panel, Chelsea Dials, Dark Oak finish. Set in Fine working condition and appearance. Also Pair Murdock Phones. Price for both, $50.00, cash. Address, H. J. Van Buren, 813 Butler Ave., New Castle, Penna.

PARAGON GREBE KENNEDY
We have for immediate delivery a few Paragon RA-10, $75.00; Paragon RA Special, $50.00; Grebe CR-5, $80.00; Grebe RORK, $55.00; Grebe RORD, $75.00; Also Kennedy Intermediate and Short Wave receivers and amplifiers. These prices F. O. B. Red Bank, N. J. & V. Gregory, 41 Broad Street, Red Bank, N. J.

For Sale.—New Grebe CR-8 set, never set up. Cost $80.00. First P. O. for $65.00. One pair Western Elec. Head Phones cost $15.00, first P. O. for $11.00. Phones never out original box. D. G. Fox, 20 Fernwood Ave., Bradford, Mass.

The New Mystery Marvel

RADIO

Can Make You Money

A Battery is to Radio, what the record is to the phonograph; the blades to a safety razor.

It costs you nothing to learn how you may participate in the future profits of the

ACME BATTERY & RADIO CORPORATION

a growing concern, whose earning power is limited solely by its working capital.

Write at once for "Sparks" devoted to the outlook for this corporation. There is no obligation on your part.

INDUSTRIAL EXPANSION SERVICE
No. 1674 Broadway, New York City

Coe College Receives Radio Without a Ground

COE COLLEGE, IOWA, experiments have devised a new method of receiving without a ground which those inclined to experimental work should try out. Phone and C. W. (continuous wave) stations were found to come in more consistently and louder on the single-coil tickler-circuit, when the ground was disconnected and the ends of the loop antenna were connected to antenna and ground posts, leaving the regular antenna connected. Apparently this connection works one way only; that is to say, one end of the loop connects the antenna post only. The result of this connection will have a surprising effect. It will increase the intensity of the carrier wave to an almost unbelievable degree.

IS YOUR HOOK-UP RIGHT?

Fifty (50) complete Vacuum Tube Hook-ups on Blue Prints with complete explanation. Includes: The V.T. as a detector and one step amplifier; regenerative circuit; V.T. to receive undamped and spark signals; one step radio frequency amplifier and detector; three stage audio-frequency amplifier; short wave regenerative circuits; Armstrong circuits; V.T. Radio telephone; radio-frequency amplifier and crystal detector; etc., etc. Send 50c. to-day in coin or money order and it will be mailed prepaid.

WESTBOARD RADIO ENGINEERS
309 Canal St., New York City

RADIO WILL MAKE YOU MONEY

Well known established concern manufacturing WIRELESS specialties offers investors an opportunity to participate in big profits to be made in the WIRELESS INDUSTRY EXPANDING BUSINESS. Not a promotion.

ALL CAPITAL STOCK—
No preferred shares or bonds
Price Advancing Rapidly

Factory, offices and demonstrating rooms. Testimonials open for inspection. Strictest investigation invited. Call or write for information.

G. BOISSONNAULT CO.
26 Cortlandt St., New York.

NATIONALLY KNOWN G - W SLIDERS

Advertised and used all the way from Honolulu to New York. Preferred because it makes perfect electrical contacts, wears better, works easier. Yet it costs no more than inferior sliders.

Price—3/16" 25c., ¼" 30c.

Ask for G-W Slider Rods
Dealers and Distributors Wanted

GEHMAN & WEINERT
42 Walnut St. Newark, N. J.

DEALERS

WE CAN SUPPLY
Turney Receiving Sets
Corona Receiving Sets
R. C. WESTINGHOUSE RECEIVING SETS
HIGH GRADE HEAD PHONES
DETECTOR TUBES
All Other Radio Supplies

CANADIAN-PACIFIC RADIO CORP.

N. Y. Office: 342 Madison Avenue
Suite 708. Phone Murray Hill 2185

NEW DISCOVERY

RUSONITE (patent pending)
The new radio chemical crystal rectifier, sensitive over entire surface.
Eliminates buzzer tests and all detector troubles.
Loudness 50% greater than any crystal

Mounted Piece, 75c postpaid
Dealers write for proposition
RADIO CHEMICAL CO.
1361 40th Street, Brooklyn, N. Y.

Copies of Radio World No. 1.
If you did not get a copy of Radio World No. 1, send us $6.00 and we will send you this paper for one year, and start it with our first issue, which will be mailed you as soon as possible after receipt of order. (Adv.)

Dont's for Dealers

DON'T make any rash statements concerning the possible receiving range of crystal outfits.

Don't be too free with advice to customers unless you are sure that you can answer their questions without approaching uncertain ground.

Don't forget the importance of a receiving station in your shop. Let your customers "listen in" with the outfits they purchase.

If you expect to stay in business, make sure that the apparatus you stock is reliable.

Don't recommend bed-spring aerials with crystal receivers.

Don't forget that money spent on the development of goodwill at this time will pay a big dividend in the future.—"The Mail," New York.

What It Leads To

AS WILLIE timidly puffs his cigarette, he reads an adventure story of marvelous heroism—how the castaway became n king in the South Sea Islands.

When William puffs his first black cigar, the book by his side, is Sappho, or "Her Burning Passion."

"Bill" enjoys his old brier pipe, lets H. W. Wells plant his adventure, love, romance, and history.

When "Doc" advises less red meat and a consideration of vitamines—than we are maturing, getting "real" sense. What does Bill read? He does not read, he rests his eyes, he luxuriates in the twilight, enjoying the big armchair with his kiddies on his knees, while his good wife "tunes in" for—it's radio now.

Still After Mr. Garrick

Editor, RADIO WORLD: Replying to the letter of Ralph R. Garrick, published in your issue of April 22, we would like to say that we are two amateurs in the sense that we have receiving sets—they are not Westinghouse sets but our own make tube-sets. We are also studying up on code.

In reply to his statement that they should shut down all broadcasting stations, we think that even though he is an amateur with three years' experience and can copy "8" and "9," that he does not realize what he is saying when he declares that broadcasting will ruin wireless; for as any real amateur will tell you, it is helping it.

We have read every issue of the RADIO WORLD and think it the best yet.—A. C. Dreeke & H. Hempstead.

New Broadcasting Licenses

47 Issued Between May 1 and 20 Bring Total to 257 for Year

WBA American Telephone & Telegraph Co., New York.

WBAV The Erner & Hopkins Co., Columbus, Ohio.

WGM Georgia Railway & Power Co., Atlanta, Ga. (Atlanta Constitution.)

WBAQ Myron L. Harmon, Y. M. C. A., South Bend, Indiana.

WGI Iowa State College, Ames, Iowa.

WBAW Marietta College, Marietta, Ohio.

WBAC Republican Publishing Co., Hamilton, Ohio.

KNI T. W. Smith, Eureka, California.

WBAX John H. Stenger, Wilkes-Barre, Pa.

WCX Detroit Free Press, Detroit, Mich.

WCAE Kaufman & Baer Co., Pittsburgh, WPa.

WCAB Newburgh News Print & Pub. Co., Newburgh, N. Y.

WBAZ Times-Despatch Pub. Co., Richmond, Va.

KLX Tribune Pub. Co., Oakland, Calif.

KOJ University of Nevada, Reno, Nev.

KZV Wenatchee Battery & Motor Co., Wenatchee, Wash.

WBAP The Star-Telegram, Wortham-Carter Pub. Co., Ft. Worth, Texas.

KYI Bakersfield Californian, Bakersfield, Cal.

WCAG Daily States Pub. Co., New Orleans, La.

KNX Electric Lighting Supply Co., Los Angeles, Cal.

WCAC John Fink, Jewelry Co., Fort Smith, Ark.

WCAD St. Lawrence University, Canton, N. Y. (Only weather.)

KQI University of California, Berkeley, Cal.

WCAZ—Robert E. Compton & Co., Quincy Whig Journal, Quincy, Ill.

KDZV—Cope & Cornwell Co., Salt Lake City, Utah.

WCAV—J. C. Dice Electric Co., Little Rock, Ark.

WDAD—William Louis Harrison, Central Kansas Radio Supply, Linsborn, Kansas.

KDYC—Herald Publishing Co., Klamath Falls, Ore.

WDAI—Hughes Electrical Corp., Syracuse, N. Y.

WDAC—Illinois Watch Co., Springfield, Ill. (Weather only).

WDAF—Kansas City Star, Kansas City, Mo.

WCAY—Kesselmen O'Dricall Co., Milwaukee, Wisc.

WDAG—J. Laurence Martin, Amarillo, Texas.

WDAK—Mine & Smelter Supply Co., El Paso, Texas.

WAAD—Ohio Mechanics Institute, Cincinnati, Ohio.

WCAW—Quincy Herald and Quincy Electric & Supply Co., Quincy, Ill.

KDYW—Smith-Hughes & Co., Phoenix, Ariz.

WDAB—M. C. Summer & Son, Portsmouth, Ohio.

WKB—Sweeney School Co., Kansas City Mo.

WDAE—Tampa Daily Times, Tampa, Fla.

KDYS—The Tribune, Inc., Great Falls, Mont.

WCAX—University of Vermont, Burlington, Vt.

WDAA—Ward-Belmont School, Nashville, Tenn.

KDYY—Rocky Mt. Radio Corp., Denver, Colo.

WDAJ—Atlanta & West Point R. R. Co., College Park, Ga.

RKM for This Week

ROY K. MOULTON, humorist of "The Evening Mail," New York, has a broadcasting station of his own. The best part of it is the program arranged by this happy gloom destroyer. Here is what Mr. Moulton will hurl at his phonotron this week:

7.10—Croton bugs at play.

7.28—"My Impressions of America," by Michael J. Gump, the well-known subway guard and traveler.

7.37—Special performance by Conan Doyle's spooks, including slate writing, cigarette smoking, bell ringing and other wonderful feats.

8.03—Ouija board demonstration by Rajah, the celebrated Jersey City mystic. (Noiseless.)

8.18—Motorcycle race on Velodrome at Jersey City (also noiseless).

8.42½—Battleship *Wyoming* posing for photograph under Brooklyn Bridge.

9.01—Street Cleaners' Band recital (without instruments).

9.13—Lecture. "If They Got It, I Get It." by Izzy Einstein.

9.32—Mayor Hylan dodging ticker tape and cheers during police parade.

10.00—Correct time from Steeplechase Park, Coney Island.

10.27—Topics of the Day and E. Sopp's Fables.

10.36—Nightshirt Tales for Children, by Gimbel Brothers.

10.47—Trick bicycle riding by Joe Jackson.

10.51—Baseball game by the Hippodrome elephants.

11.00—Good-night.

Development of New Apparatus

PROBABLY the real replacement business in the radio industry will come in the near future. Developments of new apparatus are taking place continually, and so fast is the industry moving that it is predicted that, three months hence, all the present receiving sets will be as out-of-date as a last summer's straw hat, says "Automobile Topics." This will mean the replacing of present sets with new, and will create a "used set problem" eventually. However, so great is the present demand that used sets easily are disposed of, at almost new prices. To-day the crystal set is considered as a "feeder" to the sale of the bulb set, and it is probable that for some time the present sets, when they become obsolete, will act in the same capacity for the new apparatus.

Tufts Seeks to Serve by Radio

IN discussing the new method of teaching, a number of the Tufts faculty admitted that it was frankly an experiment. "Whether we shall meet any demand on the part of the public by giving these lectures remains to be seen," he said. "A very large part of the radio broadcasting now is being done purely as a public service. Tufts College seeks to serve the public in every possible way and several members of the College faculty have volunteered to undertake this work without remuneration. The possibilities are manifold, and it is only a matter of a short time, in my opinion, when information of all kinds will be transmitted by radio."

To many anxious inquirers

RADIO WORLD has no free list. One copy is sent as a voucher to each advertiser or advertising agent represented in current issues. All other copies are paid for on subscription or through the news trade.

Answers to Readers

I have a receiving set of the regenerative type, and hear WVP loud and clear. I understand that WVP operates on a wave length of 1,450 meters. Can you explain why it is that I hear him so clear on this wave without loading up?—Buddie Oetjen, Queens, L. I.

What you hear is WVP on one of his harmonic waves. In the daytime, some of the waves are absorbed by the air, which is ionized by the action of the sun's rays. At night, naturally this atmospheric action is absent, permitting the waves to travel further.

* * *

I have an antenna about 100 feet long, and am not using a lightning switch. Will I be fined if my set is inspected?—St. Louis, Mo.

Better install a 100-ampere lightning switch, and comply with the law. Read the article in RADIO WORLD No. 8, dated May 2, concerning fire underwriter laws on radio installation.

* * *

Where is station WRW situated? His signals are very strong down here—in fact, as good as WJZ.—Paul Hoffman, Lynbrook, N. Y.

Station WRW is located in Tarrytown, N. Y.

* * *

Trying to make a regenerative set, I put tickler in main inductance, and am puzzled as to how last two sections of 20 turns, are connected.—Morris Siegel, St. Louis, Mo.

Make the large group of turns the primary, in series with a variable condenser, aerial and ground. The two small sections are your secondary and should have a variometer in series to form the secondary circuit which connects to grid and filament of tube.

* * *

Are all sets made, either crystal or tube, regenerative?—Howard Marks, Phoenix, Ariz.

Not by any means. A regenerative set has some means for transferring a small amount of the energy flowing in the plate circuit of the detector tube and back again to the secondary tuning circuit whence it is again impressed upon the grid. This renders a set over 100 per cent. more sensitive.

* * *

Could I use No. 28 double cotton-covered wire if the coil is wound with No. 24?—Benjamin Miller, New Caanan, Conn.

What do you want to use this wire for? No. 28 is too small for the aerial or ground leads, although it could be used for connections.

* * *

What will be the wave-length range of a tuning coil about 4 inches in diameter and 15 inches long? How far can I hear with this set?—Reader.

The tuning coil will tune up to about 650 meters. No absolute figures can be given regarding distance.

The radio religious service will never be popular, because the women can't see each other's hats.—Washington, D. C., "Post."

Receiving on Steam Radiators and Pipe L

THE latest scheme for receiv messages involves the use steam radiator, or a hot-wate for that matter, according t reaching the radio section of States Army. This system, been evolved and tested out by a former electrical engine nal Corps, has evidently a as the inventor is reported his circuits and patents t tion for a large sum of

Many curious forms ratus have already been usual aerials, some of able success by we Among the unusual types o ployed are: the "tree antenna," deni ted some time ago by Major-Gener Squier, the bed-spring antenna used by several experimenters, a trough of water and a cake of ice employed in Signal Corps experiments a year ago, and smaller and more handy devices such as umbrella and fish poles. But the latest device for this purpose, should interest many fans as it is so readily available and should prove useful, if practical.

"Antenna Still a Mystery"

Editor, RADIO WORLD: In your issue dated May 27th the contributor of the article, "Antenna Is Still a Mystery," states that "the T aerial is not particularly good for receiving." As a professional radio operator of several years experience, I wish to protest against so unqualified a pan. Fully ninety per cent. of the vessels equipped with radio, in the British mercantile marine, which it is my privilege to serve, carry aerials of the T type and, in your own merchant fleet, I have not observed any preponderance of the inverted L aerial. Listen! On a loose-coupled, two-circuit, molybdenite crystal receiver, with a twin-T antenna, 250 feet long and 100 feet downleads, I have taken time signals from Eiffel Tower, Paris, at 2,800 nautical miles; have copied Poldhu's press at 2,530 miles; Arlington time and weather signals at 2,490 miles; and have read Cape Race, Newfoundland, while off the Azores. These are a few typical results achieved on the maligned T aerial; and if such can be done with telegraphy, I know of no reason why that type antenna cannot be employed equally advantageously for telephony signals.—C. J. Kariff Enfield, chief radio officer, Steamship "Ningchow," New York.

THE FIRST RADIO APPEAL TO FIND A MISSING MAN has been sent out by the Knights of Columbus. Jim (or Jacques) Monserrat, formerly a United States sailor, also a radio operator, has been missing from his home in Washington, D. C., since June 1921.

Union College Claims First Broadcasting

RADIO broadcasting was introduced to the people of Eastern New York State by the Union College Radio Club on the night of October 14, 1920, when phonograph music was sent through the air to people within a 100-mile radius of Schenectady, N. Y., home of the college. For the next two months this station, conducted entirely by college students, was the first one in the United States to regularly broadcast musical programs. This is the statement of Lewis B. Sebring, Jr., a student in the college, in his correspondence in the New York "Tribune." Soon after the start of the first commercial broadcasting station the Union radio operators added to their weekly concerts complete Sunday night church services, with college professors giving the sermons.

Although radio work is entirely outside the regular curriculum followed at Union College, it has grown in importance until at present it is considered one of the foremost activities at the institution. Since they sent out the first program in 1920 the students have succeeded in reaching, via the radiophone route, practically every State in the Union east of the Mississippi River and north of the Carolinas, to say nothing of many provinces in Canada, and ships far out on the Atlantic.

The old license 2XQ, which became familiar to hundreds in the vicinity of Schenectady, has been supplanted by license WRL, under which the college is now broadcasting regular Sunday night educational programs. The weekly programs are now such as might be expected from an educational institution.

Smile Sparks from Antenna

I KIN remember when the music in the heir was broadcast from the woodshed. —CINCINNATI, O. "ENQUIRER."

"Listening in" with the radio is bound to bring ears back into style.—YOUNGSTOWN, O., "TELEGRAM."

"I do not like the radio," said Ezra Arthur Hines; "'Tis much more fun to listen in upon the party lines."—PORTLAND "EXPRESS."

The pleasure of receiving the box score by radio will be doubled if they have someone cuss the umpire between plays.—NEW CASTLE "HERALD."

With the radiophone in receptive mood, all the family quarrels may be enjoyed by the neighbors without putting ears to the walls or opening the windows.—"TOPICS OF THE DAY" FILMS.

Now that they make love by radio, there's some fast sparking.—COLUMBUS, O., "CITIZEN."

The only objection some people find in the wireless telephone is that it furnishes a reason for staying at home.—SOUTH BEND, IND., "TRIBUNE."

Spiffins is the most henpecked man in the world. His wife makes him put on evening clothes to stay at home and listen to a radio concert.—MONTREAL, "HERALD."

If these wireless telephones keep on, a man's wife can talk to him no matter where he goes.—GREENVILLE "PIEDMONT."

When Shakespeare wrote, "Thou wilt not trust the air with secrets," the radio had not been invented.—BIRMINGHAM "AGE-HERALD."

What are the wild waves saying? Get a radio and find out.—INDIANAPOLIS "STAR."

Perhaps the St. Louis man named his baby "Radio" because you can hear it so far away.—COLUMBUS, O., "CITIZEN."

Radio World, 1 yr. $6. (52 numbers.)

Subscribe for RADIO WORLD. Out every seven days. RADIO WORLD is published on Wednesday, from 1493 Broadway, New York City.

Broadcast Bill's Radiolays

(Copyright, 1922, Westinghouse Electric & Manufacturing Co.)

MY wife says she can't figger out, what's got into me—in the evenin's now I stay at home as quiet as can be. I used ter like ter hang around an' swap yarns at the store with Abe an' Jim an' Peter Deets, an' half a dozen more. But times have changed, in evenin's now when all the milkin's done, the horses bedded down for night, I'm ready fer some fun. I get my rubber ear muffs out an' clamp 'em on my dome, there ain't a man in Brussels Sprouts could budge me from my home. My Aeriola's workin' fine, and gosh I like to lissen; at that it makes me cussin' mad to think what I'd been missin' before I got this set of mine with all its knobs and dials; it's changed the outlook of my life, and filled me full of smiles. No more

a fit of lonesomeness or aching heart I'll have—no, I ain't advertisin' some new liniment or salve—it's been a ray of sunshine in my home, take my advice an' buy yourself a wireless set, you'll find it worth the price. Now Willie—that's my oldest boy—has been laid up with mumps; he got so discontented, spirits way down in the dumps, that I suggested to his ma, to cheer him up a bit, I'd get the set connected in his room so he could sit right there in bed an' lissen to the whole dern universe. It wa'n't a bad idee; anyway, I've seen much worse. We didn't have no trouble keepin' him up there in bed; I caught myself a wishin' too that I was there, instead. So. if your folks are sick in bed or feelin' sort er blue, just get a set, connect her up, that's all you haf to do; old Mother Nature does the rest, an' there's no doubt that radio's the thing you'll never be without.

The Wireless Widow

I'VE been a widow all my life;
That is, since I have been a wife,
Communing with myself, the time,
In solitary pantomime.

Golf claimed him almost every day,
And, as he niblicked on his way,
I followed in his gallery
Or, on the club house porch, drank tea.

At night, Bridge took him from my side;
I couldn't play it—though I tried;
But sat at home with ill-content,
The while he gambled with the rent.

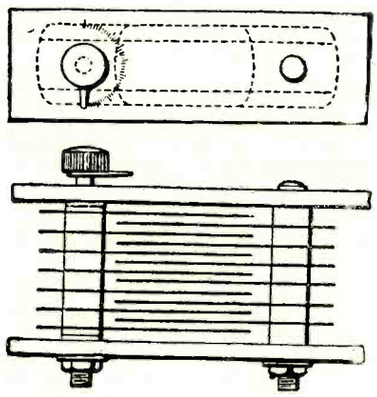
He gave up both. Said he: "I'm through,
I'll stay at home alone with you."
But Radio's got him. Fickle men!
And I'm a Widow once again.

George Mitchell in "Judge."

Old Safety-Razor Blades Will Make a Condenser

A USE has been found for discarded safety-razor blades—a problem that has been puzzling self-shavers since safety razors came into popularity. And although an American invention, a Frenchman has given to the used blade its new lease of life. He finds that a most efficient and inexpensive condenser for a radio set may be constructed from these articles, as shown in the accompanying diagram from *La Science et la Vie*, Paris. This magazine says: "It is very difficult to determine in advance the capacity of a condenser, especially when used in small radio receiving sets. While it is easy to obtain precise regulation of the self-induction placed in the circuit in a similar way, by means of a runner of some sort which varies the number of coils on the spool that come into play, it is a little more difficult to construct a condenser the capacity of which can be regulated at will.

"It is well known that a condenser is made of plates of a conducting metal alternating with insulating plates or dielectrics, and that the capacity of the apparatus is a function of the surfaces that face each other as well as of the thickness of the dielectric. The razor blades, then, will form the conducting plates and the air will serve as a dielectric.



Schematic diagram showing how condenser is made.

"To construct this instrument, mount between two plates of fiber a number of blades varying with the maximum capacity to be obtained. Mount them immovably on a conducting axle rivetted to the frame. A second set of blades must be mounted on another axle in such a way that they will pass freely between those which are fixed, taking care that the thickness of the layer of air forming the dielectric shall be as thin as possible.

"The apparatus is complete when a corrugated button is mounted on the end of the axle carrying the movable blades, so that these can be turned to vary the capacity of the condenser at will. A pointer fixed under the button and a graduated circle on the frame will make it easy to regulate once for all the position in which the blades are to be turned, in accordance with the sending station which it is desired to hear."

If the old-fashioned lady who wore a coil of wire around her waist and called it a bustle, or around her head and called it a rat, should attend a radio concert would she be a broadcasting or a receiving station?—Marysville, Mo., "Tribune."

DICTOGRAPH

RADIO STORES CORP.

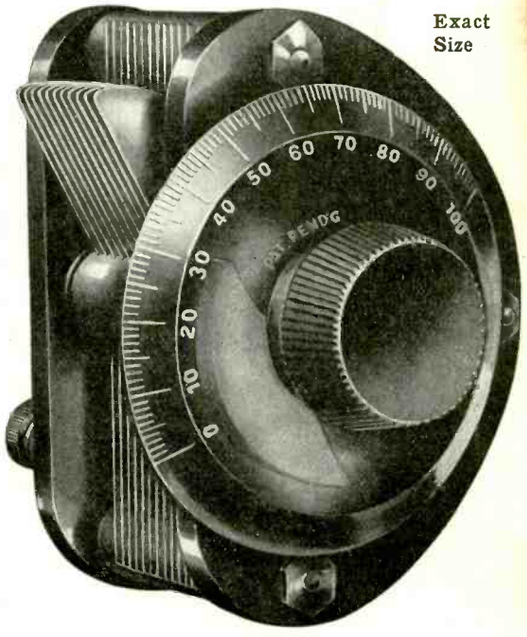
RS

Being Shipped By Us NOW ON QUANTITY ORDERS

Let The Radio Stores Corp. keep you supplied to meet the growing demand for this popular Head Set.

WIRE YOUR ORDERS TO-DAY
Maximum Discounts

We Make IMMEDIATE SHIPMENTS



Exact Size

The Radio Stores VARIABLE CONDENSER

Type VC-1
PAT. PENDING

(Manufactured by Radio Stores Corporation)

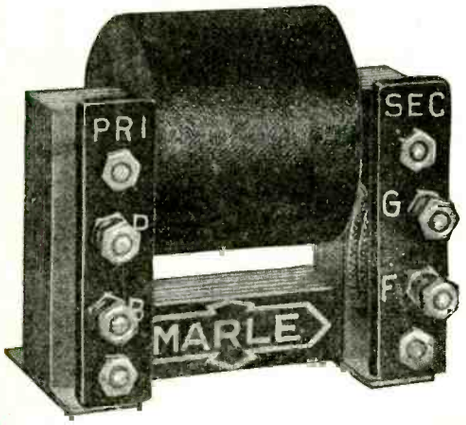
A Step Forward! UNEQUALLED!!

A FEW DISTINCTIVE AND EXCLUSIVE FEATURES:

Concealed Counter Weight Under Dial
Brass Studs Through Aluminum Plates and Die Cast
Shaft Held in True Center Through Brass Bushings
Binding Posts Mounted on Separate Metal Straps
In No Instance Is Insulating Material Tapped—Metal Inserts Throughout.
Precision Workmanship—Best Engineering Design

LIST—23 Plate $4.25 43 Plate $4.75

Complete with Knob, Dial and Counter Weight.
Each packed in individual carton.



AUDIO FREQUENCY AMPLIFYING TRANSFORMER

$3.75

IMMEDIATE SHIPMENTS

Superior transformer designed to meet the impedance of the standard receiving tubes.
DC Resistance of Primary Coil, 1,068 Ohms. Secondary Coil, 4,005 Ohms.
Effective Frequency range 70/3,500 cycles.
Highly efficient with 2 and 3 steps of amplification.
No distortion or howling as usually experienced. No soldering acids or pastes used, which prevents short-circuiting of layers due to "acid eating."
Coil is impregnated and moisture proof. Separate terminal boards for both Primary and Secondary circuits, which prevent current leakage.
Used in large quantities by biggest reputable manufacturers of complete radio apparatus, which alone establishes the necessary prestige for its extraordinary qualifications and gives it the best recommendation.

IMMEDIATE SHIPMENTS

The Radio Stores TORPEDO PLUG

All conductive parts are of heavy, machined brass, carefully insulated throughout.
The screw binding post terminals give positive and permanent contact.
Strong, light handle and insulating cover.
Maximum rigidity, durability and service to user.
Each packed in attractive carton.

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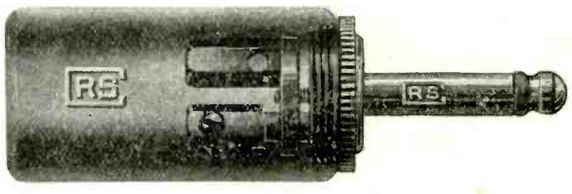

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