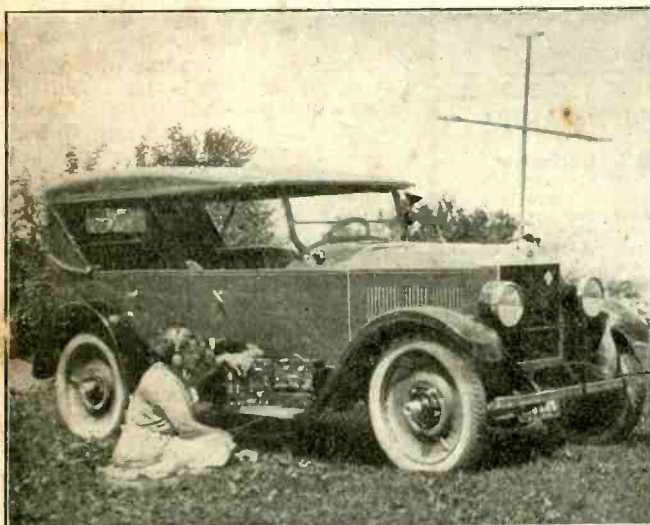


RADIO WORLD

Entered as second-class matter, March 28, 1922, at the post office at New York, New York, under the act of March 3, 1879

I L L U S T R A T E D

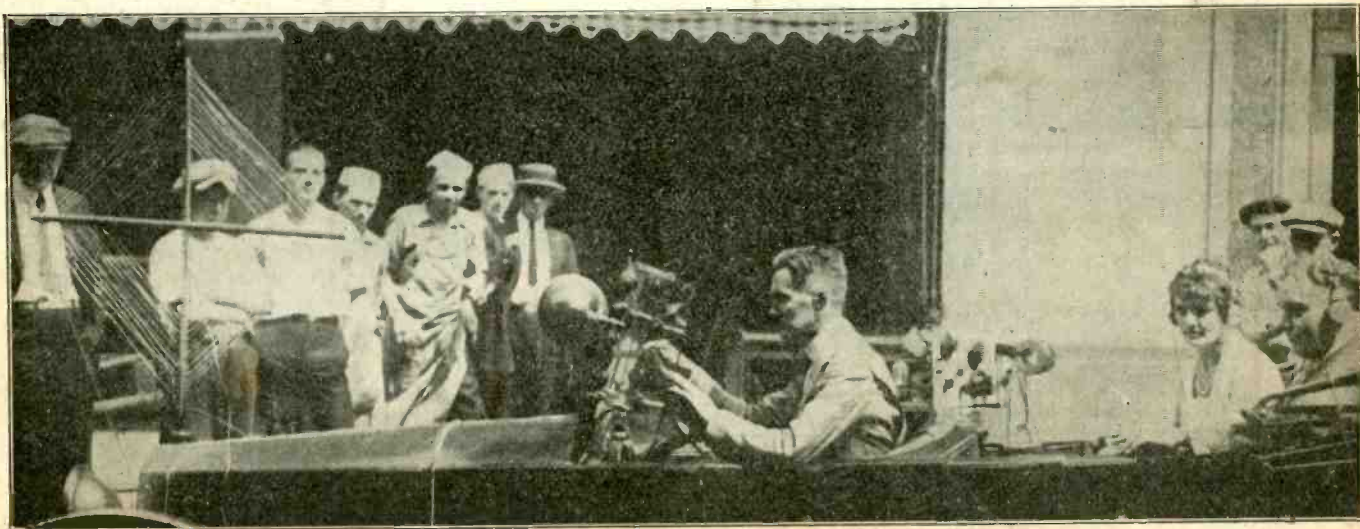
The Radio Summer of 1922 See Inside



It brought cheer to the motorist, and kept the camper in touch with home.
(C. Kadel & Herbert.)

And this motorist, journeying across continent, heard Newark while driving through Chicago.

(C. International News Reel.)



HOW TO MAKE A PRACTICAL WAVE-METER

See Page 4

New ABC Tuner—Ideal for Popular Broadcast Reception

After careful study of the demands of radio enthusiasts, Professor Morecroft, of Columbia University, has designed the ABC Tuner No. 5750, to fit into the ABC Standardized Radio Units System.

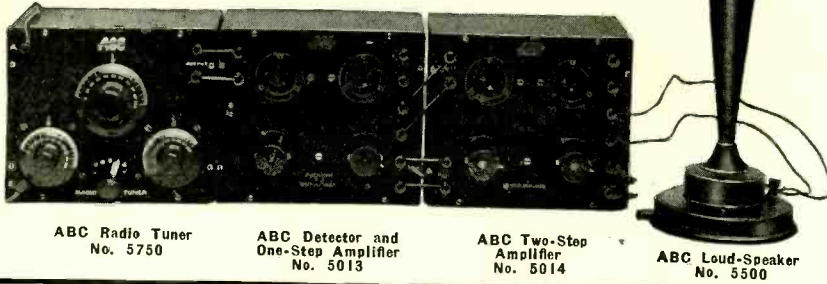
ABC Tuner No. 5750 has for its principle feature a very efficient vario-coupler of radically new design, together with two ABC 21-plate condensers.

The perfect hookup of ABC Units is illustrated below. With ABC Units the user builds his station to any desired capacity at minimum expense.

Write for latest ABC Catalog and name of nearest dealer.

Jewett Manufacturing Corp.

342 Madison Ave. (Dept. G. 9), New York



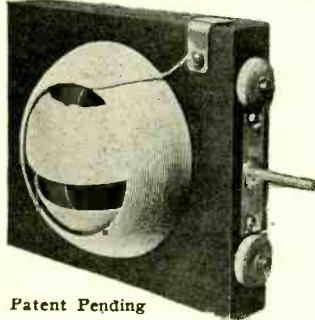
ABC Radio Tuner No. 5750

ABC Detector and One-Step Amplifier No. 5013

ABC Two-Step Amplifier No. 5014

ABC Loud-Speaker No. 5500

RADIOMART VARIOMETERS ARE SELLING FAST!



Patent Pending

The Design Is As Efficient As It Is Exclusive

Such is the VERDICT of all radio men. There is a minimum clearance between stator and rotor; our process makes the coils as strong as metal; with no dielectric losses; nickel plated brass bearings. A three-inch dial will cover the two mounting screws.

RADIOMART variometers are best for 3 circuit and single circuit receivers. Wave length, 150-600 meters. They are the neatest and best shaped variometers made anywhere. Satisfaction guaranteed.

Price, \$5.00 prepaid. Cash or C. O. D.

Our Literature is Free!

More Dealers Wanted!

RADIOMART CO.

1230 American Ave.
Long Beach, Calif.

"TUNING IN"

TO THE RIGHT TUNE IS VERY SIMPLE WHEN YOUR CONNECTIONS ARE SOLDERED WITH THE NEW

"POST SOLDERING IRON"

(The Iron with the Platinum Heating Unit). Removable Soldering Tip



1/2 Actual Size
LIST \$6.00

Designed especially to cover every requirement for delicate work. The smallest practical, efficient instrument on the market. Attaches to any socket. Universal current. Fully guaranteed. From your jobber or write

POST ELECTRIC COMPANY

30 EAST 42ND STREET

NEW YORK

A Fitting Birthday Present for Those Interested in Radio

Are you cudgeling your brain in an effort to think of an appropriate present for a relative or friend? If that relative or friend is interested in radio, WHY NOT SEND HIM OR HER RADIO WORLD FOR THE COMING twelve months? Send us \$6.00 for each subscription you want, and we will place the names on our subscription list for one year, postpaid, and we will also send special cards to the addresses you send us announcing that the subscriptions were sent with your compliments.

Address Subscription Department, Radio World, 1493 Broadway, New York City, N. Y.

The Radio "Colyum"

STORY from the West tells of a boy who used his mother's clothesline for a counterpoise. When mother got a shock, boy got a spanking for putting up telephone wire instead of regulation rope. As Clare Briggs would remark: "That's when a feller needs a friend."

When Man bought the Radio and added a Loud Speaker, his Wife quickly got a divorce. She couldn't stand the competition.—"The Globe."

We were "C-Qing" for something to print when along comes California "Radio" with the following:

THE CQ HOUND

Listen, old-timers, and your fones will re-sound

With the terrible squeal of the CQ hound, Whose sending won't stop for fire or flood, Though every old-timer thirsts for his blood.

It's always, "Hello, and how am I now?" and "QSU now, for it's time to chow."

He is always on deck, though "QTC NIL," His message read, "Is this you or Bill?" Oh! For his presence and a huge retty-snitch,

A double-barreled shotgun, a barrel of hot pitch.

That never again could we hear that sound, The eternal squeal of the CQ hound.

Culture, spelled with a 360-meter wave length, is the sugar-coating by which radio will be prescribed in liberal doses.

Making love by radio causes some fast sparking.

Mazie couldn't imagine why Harold was so deeply engrossed that night. Finally, after much persuading, Harold confessed: "I have just been wondering if I can get the thirteen messages off my hook to-night."

Come, for the night is falling,
And my set is tuned so fine

It will pick up a peal of thunder
Or the red ant's plaintive whine.

Come! And sit close beside me.
My head-phone's built for two.

It will be a night of rare delight—
With the world's wild sounds—and you!

Minnesota couple married by radio already want a divorce. Old Doc Static will be blamed again.

"Just as her jewelled hand grasped the knob of the variometer—crack! Harold Armitage had pulled the trigger of his pistol!"—From one of the latest fiction bromides.

And printed here to prove that its getting into our best sellers.

Our Own Broadcasting Station

OUCH for week beginning September 11
7:00—Fishing stories by the president of the Anglers' League. Limited to five minutes.

7:06—Unanswerable question No. 4-11-44: "Why Doesn't the Post Office Department Supply Good Pens?"

7:30—That Early Morning Lullaby: "Oh, Listen to the Milkman's Silent Tread!"

7:42—Our idea of nothing to do: Sharp-ening the fire axes in hotel hallways.

8:00—Jaspers we'd like to exterminate: 1—Those who are always exclaiming: "Ain't it the cat's meow!"

8:16—Reading: "A Million Ways to Make a Million." From the library of a bootlegger.

8:30—Dr. de Forest's photofilm exhaling the latest echoes of the Soup Eaters' Alliance.

8:57—Life's greatest lament: Getting seasick at the three-mile limit.

9:00—Correct time from the Alarm Clock Trust.
ROBERT MACKAY.

RADIO WORLD

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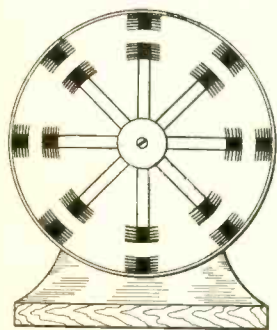
Vol. 1, No. 24

September 9, 1922

15c. per copy, \$6.00 a year

Radio Ideas for the Amateur to Test Out

By Carl Masson



ROTARY-QUENCHED SPARK GAP
FIGURE 1

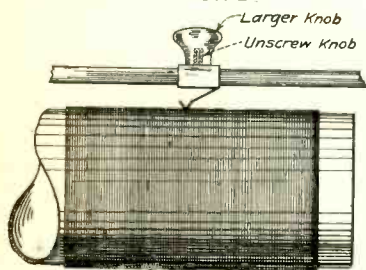
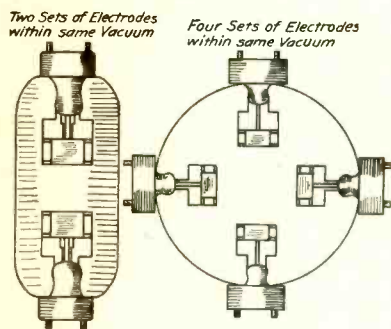


FIGURE 3



"AMPLITUBES"
FIGURE 5

THOUGH radio manufacturers have reached a high degree of efficiency in designing their instruments and outfits, there always will be many opportunities for improvement. Offering this as an excuse, the author presents the following original ideas:

The other night, I was running the rotary (ash sifter) when I noticed a photograph of a quenched spark-gap in a nearby catalogue. I immediately wondered why the two could not be combined. A pencil and paper, plus the author, resulted in Figure 1, illustrating this article. By mounting a series of small metal-discs on each of the electrodes, we have a double effect, producing clearer signals.

Now that I have given "ye olde-

time" transmitters a kink, let me turn to the receiving end of the game. Starting with the beginner, here is a novel idea for a crystal detector:

The cup in which the mineral is contained is a very coarse means of contact, considering that the detector is about the most flexible part of an outfit. What would happen if we used the same means of taking from the mineral what we put into it? That is, employ two cat's whiskers as shown in Figure 2. By means of this little change we can reach the sensitive veins of the mineral. Because of the patience it requires to adjust this type of detector, I would recommend that when once a sensitive position is secured, the cat's whiskers and mineral should be "sealed in" with beeswax or battery wax. Thus we have a detector that is quite efficient.

Because of the thousands of radio beginners, our manufacturers are finding a new demand for tuning coils. Having one of these coils in my circuit, and finding the sliders rather uncomfortable to adjust, I thought it indeed queer that—though tuning coils have been produced for over ten years—our manufacturers have invariably insisted on placing tiny, "pinch-penny" knobs on the sliders. Having some old lever-switch knobs in the house, I unscrewed those already on the sliders and made the change to the larger ones. See Figure 3. This makes the coil easier to adjust.

In the newly designed outfits, I have noticed it has become quite customary to provide control entirely by dials. However, very few attempts have been made to control a lever switch by means of a dial. An exceedingly simple idea of the author's is to fasten the switch lever to the back of a numbered dial, and space the taps in conjunction with the reading. See Fig. 4.

Speaking of the high costs of vacuum tubes, here is an idea *de luxe* for use in audion amplifiers of two stages or more. It is claimed by manufacturers that the most expensive work in the process of manufacturing vacuum tubes is securing the vacuum. Is there any reason why several filaments cannot be contained in the same vacuum? By mounting each filament at 90 or 180 degrees to the others, it will be possible for each set of elec-

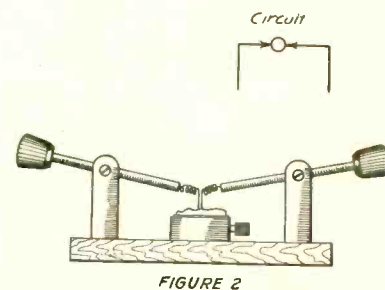
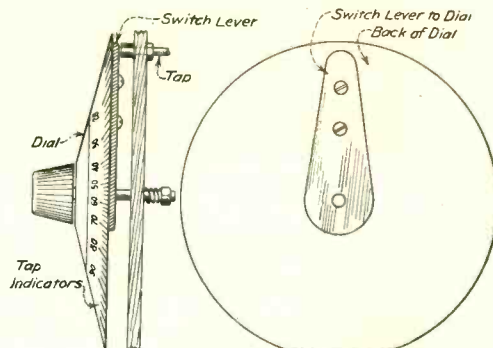
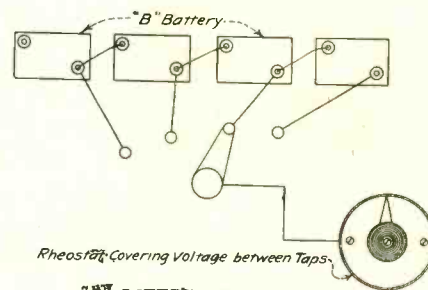


FIGURE 2



DIAL - SWITCH
FIGURE 4



"B" BATTERY CONTROL
FIGURE 6

trodes to function properly without interference. The accompanying illustration shows this idea. The two-filament amplitube should prove of value.

Now, in regard to B batteries, here is another tip which will put more flexibility into vacuum-tube reception. Of course, it is understood that in connecting a rheostat in direct circuit with B batteries, considerable current is unnecessarily wasted. Therefore, the tapped method is more favorable though no maximum of adjustment is obtainable. But suppose that after we had done our best with the taps, we connected into the circuit a rheostat of sufficient resistance to reduce the voltage of the entire battery the amount of the voltage of the difference between taps? In this way we can use any fraction of the entire battery. See Figure 6.

How to Make a Practical Wave-Meter

By Frederick J. Rumford, E. E., R. E.

THE wave-meter is one of the most essential pieces of apparatus in radio science; but it is seldom found in the average amateur's equipment. One of the chief reasons for this omission is its high cost. Its uses are various, but its most essential purpose is for the calibrations of transmitting outfits and to determine the resonance, or wave-length, of a definite value.

A great many problems of the radio experimenter would be easily and immediately solved if he would buy or construct himself a wave-meter with a suitable range, as he could determine to his own satisfaction whether or not he had his apparatus, or antenna, working in accordance with the government's radio restrictions.

The amateur or experimenter will find that it is not such a difficult job as he probably thinks to build or design a wave-meter suitable for his immediate needs; but unless he can borrow for comparison a calibrated instrument, this wave-meter will be of no value to its builder. It is advisable for the amateur to calculate his own curve; but it will not be found that the curve calibrated in Figure 4 is accurate as there will be a variance in the curve with the different condensers that the amateur may wish to use.

The wave-meter described below has certain advantages in its favor—namely: simplicity, compactness and efficiency. The parts necessary for its making may be found in the workshop or laboratory of the average amateur. Particular care should be taken in selecting a condenser which should have a maximum capacity of .0005 microfarads. Such a condenser may be purchased at a small cost; but the amateur should be certain to purchase a standard condenser made by a reliable firm.

Figure 1 represents the top of the wave-meter assembled, showing the position and the location of the different parts with correct dimensions.

Figure 2 shows the front view with the coil located on the left-hand side of case. This figure also shows correct dimensions and locations.

Figure 3 shows general hook-up of the completed instrument.

Figure 4 is the calibrated curve.

Figure 5 shows the means of hooking in the audion.

Figure 6 shows the uni-polar connections.

Figure 7 shows the method of connecting a two-volt lamp in the meter circuit.

The panel should be $6\frac{1}{2}$ inches in length, $5\frac{1}{2}$ inches in width, and $\frac{1}{4}$ -inch thick. It is advisable to use bake-

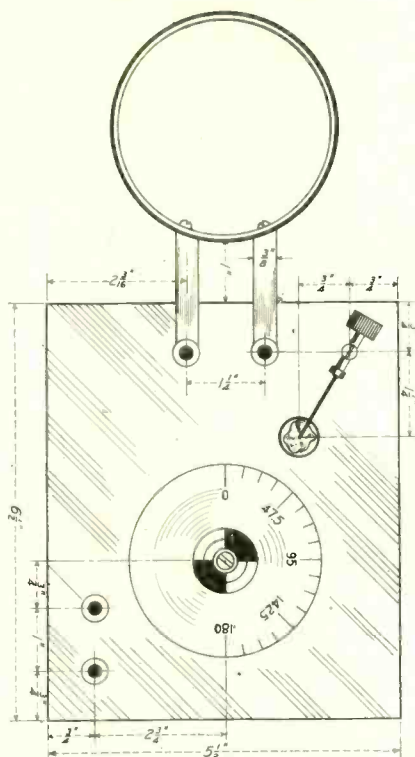


Figure 1 represents the top of the wave meter, assembled, showing the position of the coil and parts with correct dimensions. Suggested by Frederick J. Rumford. Drawn by S. Newman.

lite in the making of this panel, because it is one of the materials that does not absorb moisture. The panel should then be drilled and rubbed to a smooth finish.

Four binding-posts of the ordinary receiving variety should be purchased, which are to be mounted in the holes drilled for them. It will then be necessary to obtain a galena crystal-detector. This detector should be disassembled from its base and mounted on the panel according to Figure 1. It is, however, not absolutely neces-

sary to have the galena detector, as, in fact, most any good rectifying detector will serve the purpose.

You are now ready to mount the condenser. As stated, the make of condenser is left to the amateur's judgment. He should attach to the condenser shaft a bakelite dial and knob, the dial to be 3 inches in diameter and with a graduation from 0 to 180 degrees engraved upon it. It would be advisable also to attach a long shaft, or handle, to the knob of the dial with a bakelite covering to act as an anti-capacity handle.

After the panel is assembled and proper connections made, according to Figure 3, it should be placed upon a suitable oak cabinet of a sufficient size to allow for mounting. This cabinet makes a much better appearance if it is stained, after being assembled, with some good mahogany stain. You may make a cover with hinges to close over the panel top or place a handle on the cover for convenience in carrying.

To make the inductance leads, take two strips of brass each three inches long by $\frac{3}{8}$ of an inch wide, and $\frac{1}{16}$ or $\frac{1}{32}$ of an inch thick. Bend them into shape so they will fit the contour of the coil. If brass is not easily obtained, copper or any conductive metal can be used. In the bending of these strips, one should bear in mind to have the bend so that it will place the coil just one inch from the edge of the panel. These strips should be drilled in both ends so they will fit over the binding posts and, also, be attached to the coil with small machine-screws and nuts. After this is done, it is advisable to have the strips nickel plated. As will readily be seen, the inductance of the leads can be overlooked as they are so short.

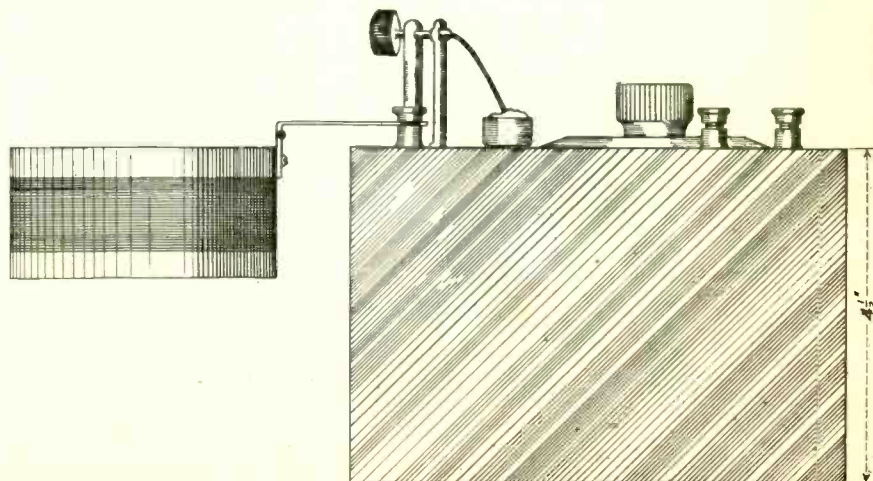


Figure 2 shows the front view with the coil located on the left of the case. This figure gives also the correct dimensions and locations. Suggested by Frederick J. Rumford. Drawn by S. Newman.

(Continued from preceding page)

The inductance coil will be wound upon a bakelite tube, 3½ inches in diameter, 1¾ inches over all in length. Bakelite is the best material to use. This tube should have two holes drilled in it to allow for the attaching of the strips, the holes being drilled as in Figure 1.

About 23 feet of No. 20 D. C. C. magnet wire is needed, this wire to be secured firmly to the tube leaving a couple of inches of wire left over, which will be fastened, or soldered, to one of the strip nuts making a connection. The winding should be started in about ½ inch and should be wound on the tube until there are 23 turns, which will occupy, approximately, 1 inch of winding. It should then be fastened as described above.

The amateur is especially cautioned not to use shellac, or varnish, on the winding on the coil as it would increase the capacity and throw it out of calibration. It is advisable not to wind this coil so that it will vary from an inductance of 65,000 centimeters. Provided you are not familiar with the use of the wave-meter, I will endeavor to explain briefly how to determine whether or not the wave-meter is at its point of resonance with the radio circuit you are measuring.

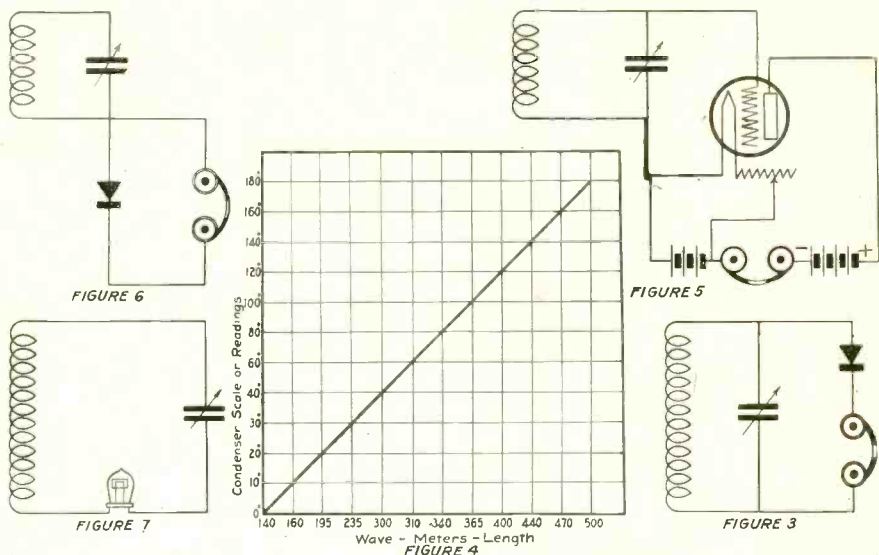
In Figure 3, the galena detector is connected in series with the receivers and is then connected in shunt with the variable condenser and inductance coil. The wave-meter should be placed near the transmitting circuit in operation and the capacity of the condenser is varied until the maximum sound is heard in the receivers; and, in turn, if the wave radiated by the transmitter is sharp and defined, close adjustment of the condenser is necessary to obtain a reading.

After the point of resonance is determined, the wave-length of the circuit will be obtained by referring to the chart, or curve, that the amateur has calibrated or calculated. It will not be necessary to have the detector and receiver connected across the condenser. They may be connected unilaterally, as will be seen by Figure 6. Connected like this, the detector and the receivers will not be apt to effect the constants of the wave-meter.

If the amateur, however, desires a more visible indication, a two-volt straight filament battery lamp should be connected in series with the inductance coil or variable condenser, as will be seen in Figure 7. This method is generally used when it is desirable to obtain spark-gap readings.

If, also, the amateur desires loud signals, he can connect his wave-meter as shown in Figure 5, the audion; that is, connecting one side of the condenser to the grid of a sensitive vacuum-tube.

A millimeter is frequently used as an indicating instrument, which should be connected in series with the con-



Figures 3, 4, 5, 6, and 7 are in this group. Figure 4 shows the plotted curve. The other schematic diagrams are various methods indicating how the wave meter may be connected. Suggested by Frederick J. Rumford. Drawn by S. Newman.

denser and inductance coil of your wave-meter.

When operating the wave-meter you should not fail to take into consideration the fact that if the meter is placed too near the circuit you are measuring, it will require readjustment, due to the fact that the oscillations from the transmitter are of too great a strength. This only will apply to very sensitive detectors, such as the galena or silicon. This, also, applies to the small battery lamp indicator. Also, if the wave-meter is placed too near the spark gap, the oscillations have such a strength

that they will burn out the filament of the small battery lamp, or may puncture the insulation on the inductance coil.

It is advisable to take several trial readings, and the coil should be placed so that it will be properly acted upon by the magnetic field of the radio-frequency circuit.

When a crystal detector is connected unilaterally to the wave-meter for determining the point of resonance, the wave-meter must be then placed nearer than it would be if it was connected in the regular manner—as shown in Figure 3.

The inductance coil of the wave meter is preferably placed nearer to the ground lead of an open oscillatory circuit when one is taking measurements of the natural period of the antenna. It is a fact that greater radiation will take place from an open oscillatory circuit of a radio transmitter than from a closed circuit of a radio transmitter. The wave-meter must be then placed at a greater distance than when making measurements of the closed circuit.

The different hook-ups I have explained need not necessarily be resorted to; but, however, in hooking up an instrument, if it is in your mind to place the wiring so it will be easily accessible, you may change over without much trouble to any of these various hook-ups.

If the experimenter desires, he may make up any number of these inductance coils, having a curve chart calibrated for each and every one of the different coils. The drawings and hook-ups are self-explanatory.

There are several other uses of the wave-meter, but this article covers in general the essential uses, and if the experimenter cares to follow closely the directions given for the construction, use, and operation of the wave-meter, it should prove to be not only a great help when completed but an interesting subject of experimentation.

Radio Electrical Units

RADIO waves are expressed in meters. A meter equals 3,291 feet. Prefixes are used in electrical terms because many electrical quantities are either very small or very large. Thus a microfarad is 1-1,000,000 of a farad, and megaohm is 1,000,000 ohms. Prefixes are: Milli (m), 1-1,000; centi (c), 1-100; deci (d), 1-10; deka (dk), 10; hekto (h), 100; kilo (k), 1,000.

There are four international units. The ohm, ampere, centimeter, and second.

The ohm is the unit of resistance and is that resistance offered by a column of mercury of uniform cross-section, 106.3 centimeters long and 14.4521 grams mass and at the temperature of melting ice.

The ampere is the unit of current and is that current which will pass through a silver nitrate solution and deposit silver at the rate of .0001118 grams per second. A gram is about one-twenty-eighth of an ounce.

A volt is the unit of electromotive force. It is the E. M. F., which will force one ampere of current through a resistance of one ohm.

A coulomb is the unit of quantity and is that quantity of electrical charge which may be stored or transferred by an ampere of current flowing one second.

A henry is the unit of inductance. The E. M. F. induced is one volt when the current varies at the rate of one ampere per second.

The watt is the unit of power. One ampere of current passing through a resistance of one ohm expends one watt of energy.

Class B Stations to Be Licensed

Department of Commerce Will Enable 400-Meter Wave Lengths to Hear without Interference

By Carl Hawes Butman

WASHINGTON, D. C.—The licensing of class B radiotelephone broadcasting-stations by the Department of Commerce under new regulations will enable those who desire, to listen in to the best stations on a special 400-meter wave without interference from some of the lesser lights in radio broadcasting.

But what stations will be selected? As the new regulations require a minimum of 500 watts in the antenna, with dependable and nonfluctuating power, special modulation, a studio, and a supervised program, using "canned" music only in an emergency or during intermission, it is not believed many of the 487 broadcasting stations can now meet the requirements. This will insure only the best and most dependable entertainment on this special wavelength, the bulk of stations continuing on 360 meters. Of course, the object is an effort on the part of the Department of Commerce to permit A-1 superbroadcasting stations to send without interference from the many stations using 360 meters, so that those fans who desire may receive high-class entertainment.

It looks as if stations maintained by Westinghouse, General Electric, American Telegraph and Telephone Company, and the Detroit newspapers would be among the first to qualify, but even they may have to make improvements and add to their equipment, while others will undoubtedly qualify, eventually as many as fifty stations may be licensed in class B.

Upon application through the nine district inspectors the department will license B stations as fast as they qualify, but probably not more than one in each city, or section, at first. In the event that two or more stations qualify in a single district, or neighborhood, where interference would occur, a schedule will be arranged dividing the time between them.

The B stations will have to toe the

mark in station efficiency and keep up to scratch on programs, the chief radio inspector states, or they will lose their special wave length and revert to 360 meters with the general broadcasting stations.

Public opinion will undoubtedly soon come to the aid of the inspectors and the department in case large numbers of broadcasters desire class-B stations, and public opinion will be the last court, basing its recommendations on the most interesting and instructive programs. Under the present law any station may qualify, but when requests get too thick, both in the general and class B field, the radio fans who listen in may have to aid officials in making selections.

As the general public is interested in broadcasting and the stations themselves will want to know the specifications for class B, the amended regulations are herewith given:

Amendments to Regulations

To Radio Inspectors and Others Concerned: Regulation 57, page 55, amended August 8, 1922, to read:

CLASS 2.—Limited commercial stations are not open to public service and are licensed for a specific commercial service or services defined in the license. Stations of this class must not transmit to or accept public messages from other stations. No rates are authorized. Licenses of this class are required for all transmitting radio stations used for broadcasting news, concerts, lectures and such matter. A wave length of 360 meters is authorized for such service, and a wave length of 485 meters is authorized for broadcasting crop reports and weather forecasts, provided the use of such wave lengths does not interfere with ship-to-shore or ship-to-ship service.

Class B Radiotelephone Broadcasting Stations

A new class of radiotelephone broadcasting station-license is hereby established to be known as Class B.

A license will not be issued for a station in this class which does not comply in every respect with the specifications hereunder.

Specifications covering the requirements governing the construction, licensing, operating and service of Class B radio-telephone broadcasting stations:

Station

WAVE LENGTH.—The wave length of 400 meters only will be assigned for the use of stations of this class which must be reasonably free from harmonics.

POWER.—The power supply must be dependable and nonfluctuating. The minimum required will be 500 watts in the antenna and the maximum shall not exceed 11,000 watts in the antenna.

MODULATION.—The system must be so arranged as to cause the generated radio frequency current to vary accurately according to the sound impressed upon the microphone system.

SPARE PARTS.—Sufficient tubes and other material must be readily available to insure continuity and reliability of the announced schedule of service.

ANTENNA.—The antenna must be so constructed as to prevent swinging.

SIGNALING SYSTEM.—Some dependable system must be provided for communication between the operating room and the studio.

STUDIO.—The radio equipment in the studio must be limited to that essential for use in the room. The room shall be so arranged as to avoid sound reverberation and to exclude external and unnecessary noises.

Service

PROGRAMS.—The programs must be carefully supervised and maintained to insure satisfactory service to the public.

MUSIC.—Mechanically operated musical instruments may be used only in an emergency and during intermission periods in regular program.

DIVISION OF TIME.—Where two or more stations of Class B are licensed in the same city or locality a division of time will be required if necessary.

Forfeiture of 400-Meters Privilege

Licenses issued for the use of the 400 meters wave length shall specifically provide that any failure to maintain the standards prescribed for such stations may result in the cancellation of the license and requiring the station to use the 360 meters wave length.

(Signed) D. B. CARSON,
Commissioner of Navigation.

Approved.

(Signed) HERBERT HOOVER,
Secretary of Commerce.

These regulations are pertinent to all amateurs and should be carefully preserved by them.

In RADIO WORLD, No. 25, on Sale September 13

FREDERICK J. RUMFORD, E.E., R.E.

Contributes an Important Article on ARMSTRONG SUPER-REGENERATION.
Fully Illustrated. If you are interested in the Armstrong Circuit, Don't Miss It!

Jack Frost Begins to Shoo Static Off the Antenna



Cartoon by Walter Kinstler. Reproduced from "The Radio Globe," August 26, 1922.

Plans for New York's Big Broadcaster

THE specifications for New York City's big broadcasting station in the Municipal Building and its complete transmitting and receiving outfit have been made public by Grover A. Whalen, Commissioner of Plants and Structure. Bids for the work and material are now being considered. The new station, which will be one of the largest and best-equipped in America, is described as follows:

(a) "The radio telephone broadcasting of speech and music from a studio at the broadcasting station (Municipal Building).

(b) "The radio telephone broadcasting of speech and music from points distant from the broadcasting station and involving the employment of wire lines between the point of input and the station.

(c) "The radio telephone receiving and high power telephone projecting of speech and music in open places and auditoriums.

(d) "The high power telephone projecting of speech and music from wire lines between the point of input and high power telephone equipment in open places and auditoriums.

(e) "The high power telephone projecting of speech and music from a

local microphone transmitter in open places and auditoriums.

(f) "The radio telephone receiving of speech in public offices."

The antenna is to be of the flat-top type of not less than four seven-strand No. 16 wires. It will be supported at the north end by a 100-foot tower and at the south end by the tower of the Municipal Building. The effective length of antenna is to be not less than 100 feet. It will be 460 feet above street level.

The following equipment will be installed:

One 500-watt radiotelephone broadcaster complete with receiving set.

Four receiving sets with loop antenna and loud speaker.

One high-power loud speaking telephone equipment with radio receiver, amplifiers for both distant and close talking and power units for both alternating and direct current.

One speech amplifying equipment, loud speaking telephone with battery power unit.

One speech input equipment, loud speaking telephone, with battery power unit; three speech input equipments.

The transmitter is to have a continuous wave-length adjustment from 300

to 600 meters, and is to be capable of modification, using the initial apparatus down to 275 meters. The vacuum tubes will be four 250-watt tubes and one 50-watt tube. The power for the transmitter will be obtained from a three-unit motor-generator set so designed as to reduce to a minimum commutation ripples.

The high-power loud-speaking telephone equipment, shall be adapted to the following purposes, namely: Local radio telephone receiving and high-power telephone projecting in open public places where an audience of approximately 100,000 persons may be assembled, or in large auditoriums; to high-power telephone projecting from wire lines in similar situations, and to high-power telephone projecting from local microphone transmitters, also in similar situations.

The speech input equipment for substations of the broadcasting station, to be installed by the city from time to time as the necessities for radiotelephone service may require.

Voice and instrumental music shall be broadcast under the same conditions for receiving to a level suitable for transmission over a Commercial telephone line.

A Peep Inside a Broadcasting Station

By Harold Day

EVERYONE who has listened to a program broadcast by radio has visualized the interior of the station sending forth the songs and speeches. One imagines, perhaps, a room full of apparatus—black panels, polished dials, delicate measuring-instruments, and the glow of vacuum tubes as the setting for the evening's prima donna. Were one to enter an actual "studio," however, he would find nothing in its soft carpet and attractive furnishings to suggest radio, except a small panel on the wall carrying a few signal lamps and push buttons, and, on a pedestal, a graceful metal object—the broadcasting microphone.

A well-designed studio begins with a room the walls of which are sound-proof and which will accommodate comfortably a chorus or an orchestra of twenty persons. Usually the walls

are draped with some heavy fabric, to prevent echoes, and for the same reason its grand piano, phonograph and tables are kept covered when not in use.

Since soloists are accustomed to standing on the hard floor of the stage, a low wooden platform is provided to make them feel at ease and to discourage them from moving about the room while singing. This is a common tendency among artists of strong dramatic instinct, but it is undesirable because it carries them away from the microphone that is to pick up their voices.

This platform is only one of the many little details provided for the comfort of the artists in a well-run station, say engineers of Western Electric Company. The studio itself is best located where it is easily reached from the street. On their arrival,

the performers are greeted in an anteroom by a courteous attendant and made to feel at home while they wait their turn to "go on." Shortly before each program, the studio manager explains the few simple points to be observed—such as remaining from four to eight feet from the transmitter, enunciating clearly, and maintaining perfect quiet while the microphone is "on the air."

At length—the moment to begin! In the studio a lamp flashes, telling the manager that the electrical equipment is ready. With a last glance to be sure that everyone is in place, he throws a switch which connects the microphone through the set to the antenna, and in a strong, clear voice announces, "This is station PDQ broadcasting. We will have a solo by Miss B., entitled ——" and so on. The pianist begins the accompaniment, and the "show" is on.

The curtain has now risen on an invisible audience of thousands; but with the exception of a bright blue pilot-light on the wall, nothing has changed in the studio. It is hard for performers to realize that they are not merely rehearsing, and sometimes to the chagrin of the manager, they interrupt themselves with a question about their singing or some other incongruous remark. One Western Electric engineer relates with glee how, one day, listening at the company's radio station to a tenor solo at another local station, he heard the singer ask at the conclusion, "How do you shut this —— thing off, anyhow?"

Such situations the studio manager must handle "on the minute," diplomatically, for he is dealing with all sorts of temperament from the high-strung artist to the busy man of politics or affairs.

Rehearsals are held frequently during which the electrical equipment is connected to a dummy antenna. This permits various groupings of performers to be tried without disturbing other stations. During these tests and during the performance itself, the station operator must give close attention to instruments which show the performance of the microphone, the power which its circuit delivers to the transmitting apparatus, and the power radiated into space. The quality of the transmitted speech is observed by listening in with a receiving set. These precautions coupled with an experienced station-operator and first-class radio equipment are desirable to make sure that you, as a radio amateur, will hear a program that will repay you for listening in.

De Forest and His "Radio Bottle"



(C. Paul Thompson, N. Y.)

In his left hand, Lee de Forest is holding his newly developed oscillating audion, or "radio bottle," by which speech is carried on a small aerial, a low wave length, and one-third of a kilowatt of power from the de Forest station in New Jersey to stations in the Middle West. It is a device by which he expects to revolutionize radiotelephony. The instrument in his right hand is the small-type audion.

How to Make a Honeycomb Coil With a Two-Stage Amplifier

By Fred. Chas. Ehlert

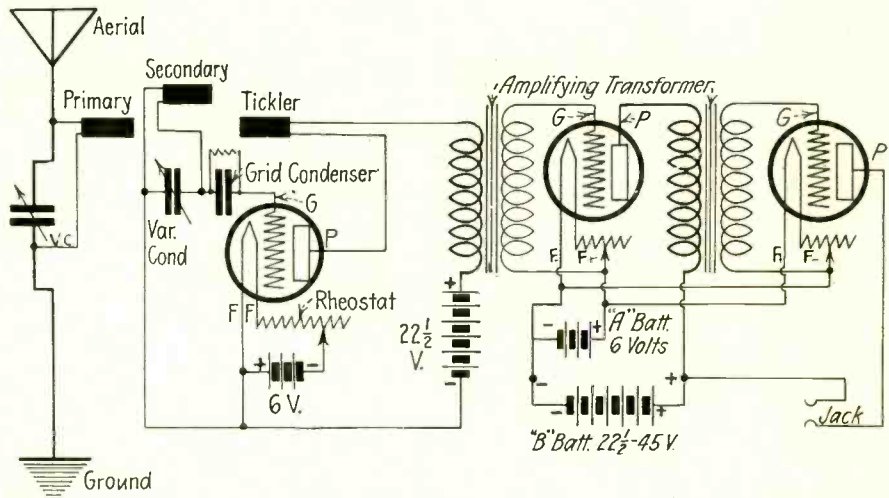
THE most important contribution to radio since the perfection of the vacuum tube is the Armstrong feed-back circuit. Were it not for Major Edwin H. Armstrong, radio enthusiasts would not be receiving the wonderful musical programs and other forms of entertainment that are now broadcast daily by hundreds of stations throughout the United States. Certainly an arc transmitter could be used; but the results that would be obtained from this machine would be so inextricably mixed up with hisses, clicks and howls that nobody would have the patience to listen to it.

Today, the finest receivers manufactured carry the Armstrong feed-back circuit and even the modern multiplex form of radiotelegraphy and telephony must pay tribute to Major Armstrong. The feed-back circuit is one of the most important, if not the most important, invention in radio. It is an invention of employing, in connection with an audion- or vacuum-tube, a coupling which enables a local battery to contribute its energy to the amplification of a signal received in a radio station.

One method of employing the feed-back circuit is shown in the accompanying schematic diagram utilizing honeycombs or duo-lateral coils as a means of inductance. A two-stage amplifier is also connected with the circuit. This makes a satisfactory circuit of a detector and a two-stage amplifier using honeycomb coils.

In this hook-up, three coils are used. One coil is used in the plate circuit of the detector. It is called the tickler coil. The other two are the primary coil and the secondary coil, respectively. A variable condenser having 43 plates of .001 microfarad capacity is placed in parallel, or shunt, to the primary circuit. Another variable condenser having 23 plates of .0005 microfarad capacity is placed in parallel, or shunt, to the secondary circuit. This will enable the operator to secure for himself selective tuning which sometimes is hard to find with the cheaper grade of sets.

It will be seen that the detector tube and amplifier tubes have their own A batteries and B batteries. The detector has a plate (B) battery voltage from 15 to 22 volts (variable), while the amplifiers have between 22 and 45 volts plate voltage. Separate A batteries are used to keep the strain off the tubes and give longer life to the



Schematic diagram utilizing honeycomb, or duo-lateral, coils as a means of inductance. In this hook-up, a two-stage amplifier is also connected with the circuit. This is worth testing out and should give the most satisfactory results. Suggested by Fred. Chas. Ehlert. Drawn by S. Newman.

storage battery. It also helps in giving clearer and louder signals.

Parts for this receiver may be purchased at most any radio shop and may be assembled quickly. Care must be exercised that the proper connections are made. Have all joints soldered,

keeping the leads and wires as short as possible. Satisfactory results should be obtained if this type set is employed. It can be made to use most any wave desired by merely shifting coils, which come in various sizes according to the desired wave lengths.

Table of Sparking Distances

In Air for Various Voltages Between Needle Points

Volts	Distance		Volts	Distance	
	Inches	Centimeter		Inches	Centimeter
5000	.225	.57	60000	4.65	11.8
10000	.470	1.19	70000	5.85	14.9
15000	.725	1.84	80000	7.10	18.0
20000	1.000	2.54	90000	8.35	21.2
25000	1.300	3.30	100000	9.60	24.4
30000	1.625	4.10	110000	10.75	27.3
35000	2.000	5.10	120000	11.85	30.1
40000	2.450	6.20	130000	12.95	32.9
45000	2.95	7.50	140000	13.95	35.4
50000	3.55	9.00	150000	15.00	38.1

State Matters by Radio

Elaborate Service for Secretary of State Hughes on South American Trip.

ELABORATE arrangements were made by the Naval Communications Service for radio communication with Secretary of State Hughes during his voyage to and from South America. All naval radio stations along the coast and in the West Indies were notified to be on the alert. Messages to the vessels will be sent at certain hours through the Navy's high-power radio stations at Sayville, L. I.; Cayey, Porto Rico, and Balboa, Canal Zone.

All these stations were heard throughout the entire voyage from New York to Rio

de Janeiro, but to make the reception of important messages more certain they were first transmitted by Sayville, then copied and repeated by Cayey and then also copied and repeated by Balboa. In addition, the battleships "Maryland" and "Nevada" which accompanied the Shipping Board vessels, will also copy the messages and will relay them if necessary.

Messages sent from the ships were routed through the radio receiving stations at Bar Harbor, Maine, and at San Juan, Porto Rico.

American press messages were received direct aboard the ships each day of the trip and special arrangements were made with the Navy for handling interesting bits of information as to events aboard ship for the newspaper correspondents aboard.

The Radio Primer

A Weekly A. B. C. of Radio for the Beginner, in which Elementary Facts and Principles Are Fully and Tersely Explained and all Words and Terms Used by Amateurs and Experts Defined

The Beginner's Catechism

By Edward Linwood

WHY and where should we employ a variable condenser?

The short-wave condenser is used to establish resonance with wave lengths below the fundamental wave-length of the antenna. The variation of this condenser necessarily gives a small range of wave lengths, for it is not possible to reduce the fundamental wave-length of antenna by quite one-half with a series condenser. As an illustration: If the fundamental wave-length of an aerial is 600 meters, about the lowest wave-length that can be obtained then for practical working is about 350 meters. On the other hand, an antenna may be loaded by inductance to many times its natural wave-length. An aerial, the fundamental of which is 300 meters, may be loaded to 20,000 meters and will give good results from high-power stations provided a multi-stage tube set is employed. The condenser is always inserted in the primary lead in series with either the aerial or ground.

* * *

Why do they use taps on a variocoupler and not sliding contacts?

The use of sliding contacts on tuning coils for inductance variation is not recommended because with continued use, the turns will be cut through, adjacent wires pushed together into direct contact and will result in a short circuit. Unless a variable condenser is placed in shunt with the primary coil, or in series with the antenna, a switch must be provided that will permit the antenna inductance to be varied by a turn at one time. Such a variation may be secured by a combination of units-and-tens switch. This is sometimes referred to as taps. Most vario-couplers to-day are made with the tap arrangement.

* * *

What is a potentiometer and what is it used for?

A potentiometer is an apparatus for measuring electric pressures. As a word, however, it never should have been used to define the variable resistance of a wireless set, since electric pressures, which are set up by the crystal, are not *measured* but simply *varied* to meet the needs of the detector. However, as the word is used

by all radiomen, right or wrong, we must accept it. The potentiometer is used in connection with a crystal set for applying, or superimposing, upon the crystal a battery current. Generally used with carborundum for louder signals.

* * *

Can an aerial be placed anywhere about a house, or is there a certain rule for its erection?

There are three things, practically, which tend to make a good aerial. These are: first, to have the wires as high as possible; second, to have the ends well insulated; third, to have as long a stretch of wire as possible. Always choose, if possible, two places as high as possible and as far apart as you can find, one of which is near the location of your set. Remember that there should be no trees or other obstruction to interfere with the aerial wires.

* * *

What is ground connection?

There is one thing that must be remembered always: Good ground must be used to place your radio station in first-class condition. To ground a set is to connect it with a sheet of metal buried in the ground; or with some metal object such as a gas pipe, a water pipe or any other metal connected directly with the ground.

* * *

What is the use of the variometer?

This instrument affords a means of obtaining a continuous variation of inductance and is, therefore, useful in radio circuits. The principal advantage that the variometer has over the ordinary variable-inductance is its absence of sliding contacts or complicated switch mechanisms.

An Easy Way to Memorize the Continental Code

MERELY to memorize the system of dots and dashes that make up the Continental Code, without much practical experience, is useless. David P. Gibbons, in "Radio," San Francisco, realizing this has worked out a scheme which, coming from a practical radio man, may prove helpful to the amateur.

The manner of using it will be apparent after a brief study, Mr. Gibbons writes. For example, take the letter L. The word used is "linoleum," in which the letter itself occurs twice. The first syllable (lin) has a short accent, the second (ol) a long accent, and the two final syllables (e, um) short accents, hereby reproducing the dot-dash-dot-dot, which form the Morse character representing the letter.

Again take the letter Q. Here three words are used to obtain the proper accents and at the same time include the letter itself. The first two words (quite, queer) — of one syllable each — are long, the third syllable (in-) is short, and the final syllable (-deed) is long, thus giving the dash-dash-dot-dot-dash, which represents Q in the code.

Similarly the connection between the other letters and the corresponding words will be seen on inspection, and the correct combination of SOUNDS for any given letter be more readily impressed on the memory.

A Away — — — —
 B By Billiken's — — — —
 C Crowded Cloister — — — —
 D Dangerous — — — —
 E Eggs — — — —
 F Fifi Foolish — — — —
 G Good Gracious — — — —
 H Hilly Billy — — — —
 I Izzie — — — —
 J Jerome Jay Jones — — — —
 K Kokomo — — — —
 L Linoleum — — — —
 M Mile-long — — — —
 N Nailer — — — —
 O Ozone blows — — — —
 P Persuades Peter — — — —
 Q Quite Queer indeed — — — —
 R Reported — — — —
 S Sensitive — — — —
 T Tube — — — —
 U Undertaker — — — —
 V Visible glow — — — —
 W With White Wire — — — —
 X Hoax silly jokes — — — —
 Y Yearly told yarns — — — —
 Z Zero weather — — — —

If the student finds any particular difficulty in memorizing the various words selected he might connect them together to form sentences like the following: Away by Billiken's crowded cloister the dangerous eggs made Fifi foolish. "Good gracious!" said the hilly-billy to Izzie, "look at Jerome Jay Jones laying linoleum with a mile-long nailer, while the ozone blows and persuades Peter he is quite queer indeed, as it is reported that a sensitive tube will undertake to make a visible glow with white wire, but such hoax, silly jokes and yearly told yarns are a sign of zero weather."

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.

Radio World's Hall of Fame



(C. Underwood & Underwood, N. Y.)

Dr. F. W. DUNMORE

F. W. Dunmore, radio professor, is one of the leading radio experts and experimenters of the United States. He is a member of the Bureau of Standards. Dr. Dunmore designed many radio devices now used throughout the world, including most everything from amateur sets to intricate and powerful receiving sets used in both branches of the National Service. One of Dr. Dunmore's recent developments was the radio suitcase which created a sensation when he demonstrated it before the Institute of Radio Engineers. Dr. Dunmore is the author of important articles on radio communication which are released through the Bureau of Standards. In cooperation with Dr. Kolster, also of the Bureau of Standards, he developed a number of devices to perfect the radio compass.

Perfect Short-Wave Radio-Frequency Amplification

By George W. May, R. E.

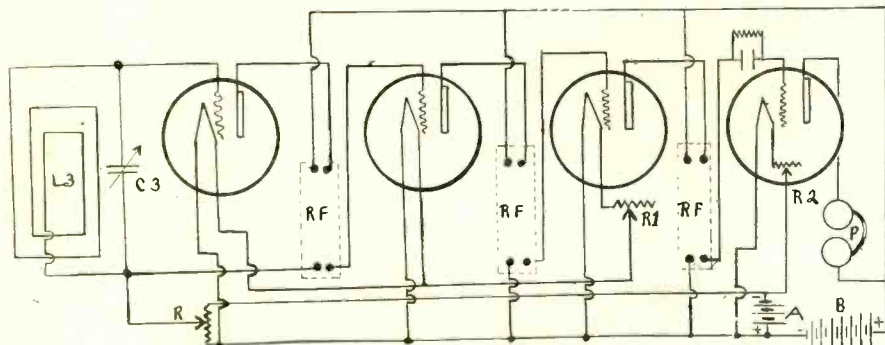


Figure 1—Schematic diagram of a three-stage radio-frequency set with detector. A loop aerial is illustrated with proper connections for batteries. Drawn by G. W. May.

I HAVE received a number of inquiries from readers of RADIO WORLD who are seeking further information regarding radio-frequency receivers for short wave-lengths. There is no doubt that radio-frequency amplification is the coming form of radiophone receiving. There is, also, no question regarding the increasing interest in the use of radio frequency. Here are four major questions which I will answer in this article:

What is radio frequency?

Has it any advantage over audio frequency?

How many methods are there for amplifying signals?

What is audio frequency?

These are important questions that seem to faze thousands of amateurs who are dabbling with radio-frequency receivers. Radio frequency acts in a way entirely different to audio frequency and it is therefore desirable to understand the function of each. There are practically two distinct methods of increasing, or amplifying, the strength of incoming signals in a radio-receiving set. The first method of audio frequency is a set employing one or more

tubes, whereby the incoming oscillations are first detected by the detector tube, then being submitted for amplification to the next tube, known as amplifiers. Each additional tube placed in the circuit is called a stage of amplification. If two tubes are used, it is

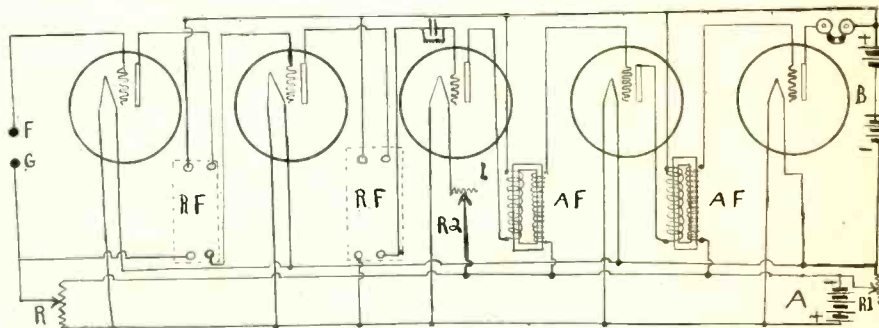


Figure 2—Schematic diagram showing two steps of radio frequency with detector and two stages of audio frequency for amplification. Drawn by G. W. May.

called a detector and a two-stage amplifier.

The next method is radio frequency which tends to build up the original signal frequency, or, in other words, to build up the weak impulses in the antenna circuit until the signal is of

sufficient strength for the detector to function. It is, also, a device for reproducing and magnifying a radio speech or signal wave.

Audio frequency should be used where loudness of signals is desired, while radio-frequency amplifier should be used where distance, or range, is wanted. The objection to radio-frequency amplification at this time lies in the fact that it is still in a state of experimentation so far as short waves are concerned. This is due to two facts: First, the amplification of radio-frequency amplification is extremely critical, particularly on short waves. Where we are dealing with current frequencies in the neighborhood of one million cycles per second. The second objection is this: On these short waves we are not really obtaining radio-frequency amplification, but regeneration due to the capacity effect of the vacu-

um tube itself feeding back into the coils of the so-called radio-frequency transformer. Another thing that has to be overcome in this type before it is successful is the development of a transformer that will function properly on short waves where the frequency is extremely high. The three circuits published herewith may be used with DX radio-frequency transformers. Care must be taken to select the right circuit.

In any case, the operation of radio-frequency is critical. This means that the utmost care must be taken in order to adjust the set for correct results. It is imperative, also, that all radio-frequency apparatus be carefully shielded; otherwise capacity body effects will prevent any suitable adjustment being obtained.

The successive stages of amplifiers may be coupled by transformers, by resistance, or by reactance coils, which are frequently known as choke coils.

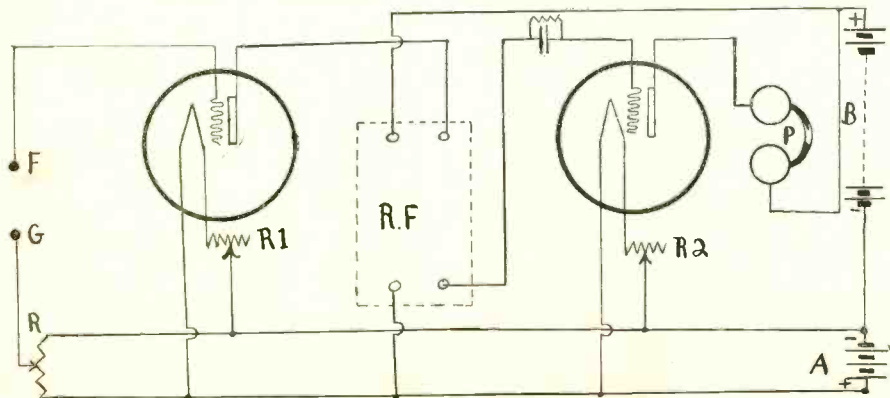


Figure 3—Single, or one step, of radio frequency with detector. The connections F-G are connections for the use with loop or outside aerial. Drawn by G. W. May.

How to Eliminate Tube Noises

YOU have undoubtedly heard the phrase "tube noises." This can be caused by a poor tube or by a tube that does not sit tightly in its socket or makes an imperfect connection on the base of the socket. This should be watched for very carefully. In fact, it may very often occur that an improvement in the reception can be obtained by switching the amplifier tubes around.

For detector purposes a soft tube is invariably recommended. In this case a great deal of attention must be paid to the amount of current in the plate circuit, as a soft tube is what is known as a "critical tube." This means that each tube will vary, and consequently require a different amount of voltage on the plate circuit, so that it is very necessary to have a B battery for the detector tube that is variable and will permit you to take off any amount of voltage. In no case should this voltage be more than a standard $22\frac{1}{2}$ volt.

While a soft tube cannot be used as an amplifier, a hard tube can be used temporarily as a detector.

This Typewriter Sends Radio Messages from Airplanes



(C. International.)

This is the teletype by which typewritten messages are sent from airplanes by radio to land stations. A most successful test was recently made by the Bureau of Standards, Washington, D. C. The teletype resembles in general the commercial typewriter, in that a keyboard having the alphabet and other conventional symbols is so arranged that it may be operated by hand. Each key is connected to the radio installation in the plane and when a letter is struck on the keyboard a radio impulse is sent out from the antenna of the plane and is received at a ground station.

(Continued from preceding page)

When transformers are employed only a slight stepping up of voltage is generally feasible on account of capacitance effects. Hence, transformers do not offer such advantages over resistance or reactance as they do in audio-frequency amplifiers. The inability to step up voltage between stages, together with the partial short-circuiting by capacitance, makes the amplification per tube less than in audio-frequency amplifiers; so more stages are needed in radio-frequency amplifiers to give the same over all amplification. The

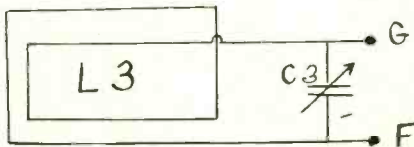


Figure 5—Loop aerial used with the D X radio-frequency transformers. Drawn by G. W. May.

effect of tube capacitance may be practically neutralized by employing transformers or coupling reactances that are tuned to the frequency of the incoming oscillations. The tuning may be made very broad, so as to amplify over a considerable range in frequency without the necessity for adjustment or it may be sharply tuned so as to increase selectivity.

Radio-frequency amplifiers, particularly those for very high frequencies, generally exhibit marked regenerative properties, due to inherent capacitance coupling between stages. Unless care is taken to minimize these coupling capacitances by separating the circuits and surrounding them with metal shields, the regenerative effect will produce a strong continuous oscillation that will interfere with the amplification.

In Figure 1 a drawing is shown of a three-stage radio-frequency amplifier with detector, showing also B-battery voltage adjustment on detector.

Figure 2 is a two-step radio detector and a two-step audio amplifier.

Figure 3 is a single-step radio frequency amplifier with detector.

Figures 4 and 5 illustrate the type of aeriels used and shows how they should be connected. The outside aerial is shown, also the loop; but among all amateurs, the loop aeriels are given preference as they eliminate much of the interference from other stations as well as the amateur's bugaboo—static noises.

In experimenting with either of these circuits it will be necessary to make all high-frequency leads as short as possible. The binding posts arranged for most direct connections when the transformers are mounted in the amplifier L and LI are honeycomb coils or other suitable inductances, CI .0005 or .001 mfd. variable condenser, C2, .001 mfd., variable condenser, C3, .0005 variable condenser. L3, a loop aerial of 6 turns on 6-foot loop for 360 meter work. A is battery of 6 volts. B is a battery of 60 to 80 volts. RF is the radio-frequency transformers. The one potentiometer may be used to control the grid bias of the several tubes in a multistage amplifier. A filament rheostat in the positive lead is recommended. The diagrams show the proper hoop-ups for one- two- and three-stage amplifiers. These diagrams are also intended to show the actual physical positions of the various elements which should be followed. The arrangement of the tubes, transformers rheostats and wires should conform as closely as possible to that shown in the diagram.

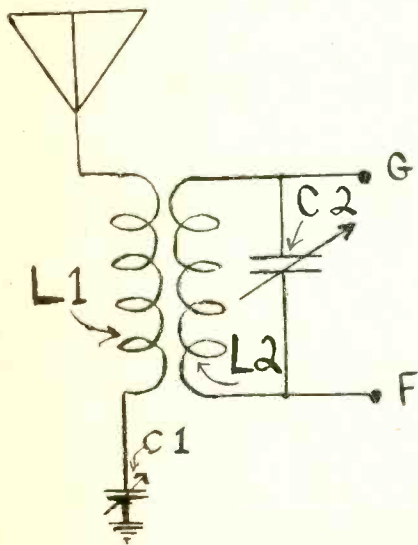


Figure 4—The outside aerial with vario-coupler and condensers which can be connected to either of the sets described. Drawn by G. W. May.

Radiograms

Latest Important News of Radio Garnered from the World Over, and Reduced to Short Wave-Lengths for the Busy Reader.

Radio is to be utilized in France to prevent waste. The price list on provisions in the Paris market is now broadcast from Eiffel Tower. This information is for farmers, orchardists, and stock raisers so they will know what supplies to send to the city.

* * *

Radio promises to play an important part in the political campaign in New York State this fall. Both Republican State Chairman Glynn and Democratic State Chairman Pells have been besieged by agents for radio companies who would contract to carry the voices of the candidates to every radio-equipped home in the State.

* * *

The radio craze has hit Rio Janiero hard! A powerful broadcasting station has been erected on the summit of Mount Corcovado, overlooking the city. The Government buildings and many commercial and private houses are being fitted with receiving sets.

* * *

The electric-light socket aerial has appeared in France and is becoming popular. A French engineer has just turned out one of these devices which, reports state, requires no indicator, lamps, accumulator, or batteries. The French Government has given a large order for these instruments to be distributed among farmers.

* * *

These nights on crowded Broadway, New York, are enlivened by a young man in a large red touring car equipped with loop aerial, receiving set, and loud-speaker. He dashes to and fro along the Great White Way, and—well, you ought to hear the music! The writer of this page can truthfully say that he heard a concert coming through this set, the other night, and that for clearness and tone the reception was truly marvelous.

* * *

The British annual colonial report for Gambia notes the completion of wireless telegraph and telephone stations in that colony at Bathurst and at McCarthy Island, distant 176 miles. These stations are intended for internal communication, as the colony has no organized telegraphic system.

* * *

German manufacturers of radio apparatus are not in a position to make extensive deliveries of their product, according to Vice-Consul Nathaniel B. Davis, Berlin, in a report to the Department of Commerce. This is due to the fact that up to the present time the demand has not been sufficiently great to warrant the manufacture of radio instruments in large quantities.

* * *

The Detroit Radio Association, comprising delegates representing various amateur radio associations in Detroit and its environs, has been organized with the purpose of harmonizing programs and broadcasting hours to minimize as much as possible the wave interference. The membership of about 150 includes representatives of the West Side Radio Association, the Highland Park Radio Association, the City of the Straits Radio Association, and similar bodies. Theodore Schmalzriedt, 9110 West Fort street, is secretary.

* * *

Broadcasting is being used, indirectly, to help more than 13,000,000 foreign-born residents of the United States to improve their health. This service is rendered through the co-

operation of the United States Public Health Service and the Foreign Language Information Service, 119 West Forty-first Street, New York. The Service broadcasts its health talks three times each week, but the benefits of these lectures can only be enjoyed by persons who understand the English language. Wishing to broaden the scope of their usefulness and instruct the many millions in America who can be reached most effectively through their native European tongues, the Public Health Service arranged to give copies of these radiograms to the Foreign Language Information Service for their dissemination to the foreign language press of America.

* * *

In recognition of his completion of his year's radio work in Berlin, leading German radio engineers gave a dinner, on August 26, in honor of Dr. Lee de Forest. On this occasion, Dr. de Forest gave a demonstration of his new motion-picture talking film—the "phonofilm." A feature was a song-record by Mary Mayo de Forest, wife of the inventor, whose soprano voice, Dr. de Forest says, has been of great aid in the perfecting of his invention.

* * *

Taking advantage of the great popularity of radio, the natural research branch of the Department of the Interior of Canada is educating the Canadian people to the extent and value of their natural resources by broadcasting this information through the courtesy of the radio branch of the naval service.

* * *

Joseph Reitz, Jr., a thirteen-year-old boy of Dubois, Pennsylvania, has been confined to his bed by an attack of heart trouble for many months. He has long been interested in radio and, in spite of his handicap of health, has finished a complete radio set all by himself. Last week, according to his report, the dream of his life came true when lying prone in his bed he whiled away the wakeful hours with the receivers of his home-made set to his ears as he listened in and heard music and other broadcast matter perfectly.

* * *

A horse has responded to radio! Charles E. Dean, of Dean Farms, near Chicago, is out with the astonishing announcement that his 2:08 pacer, "Radio," has been trained to follow dictation of the invisible waves and, driverless, races around the track, obedient to the magic flash from a wireless apparatus some distance from the track.

* * *

According to population, Cincinnati is the greatest radio center in the Middle West. This is the boast of radio manufacturers and dealers of that city. They claim that the expected slump in summer business failed to materialize; that retail stores were quite as busy as during the spring months.

* * *

WBAY, Walker Street station of the American Telephone and Telegraph Company, will send out miscellaneous musical programs every day from 11 to 12 a. m. and from 4.30 to 5.30 p. m.

* * *

The first radio news service is now operating. WBAY is sending out its "Radio Digest" every week day between 4:30 and 5:30 p. m. Under the editorship of George F. Thompson, formerly of the "Daily News," a complete digest of the day's events is broadcast.

The Radio Amateur

DOWN in the lower wave-lengths, considerably under the 360-meter waves used by the regular broadcasting stations, can be heard almost anywhere and at any time, a continual succession of code messages and, often, snatches of radio-telephone conversation, says William H. Easton in "Judge." These are the radio "amateurs" talking with each other.

The amateurs form a most remarkable free-masonry, with a secret language, an elaborate ritual, and a fund of knowledge

beyond the reach of ordinary mortals. There are about 20,000 of them at present—rich and poor, young and old, expert and tyro. They live in a world of their own, a world peopled with friendly voices.

The initiation into this order is no easy matter. The government has, very properly refused to permit the indiscriminate use of the ether, so before one can send out either telegraph or telephone messages by radio, he must have a license. To obtain a license the applicant must appear before the United States Radio Inspector of his district and pass an examination covering the

radio communication laws of the United States and the construction and operation of radio apparatus.

In addition to this, he must prove his ability to receive code messages at the rate of at least ten words a minute. If it is impractical for him to go to the inspector's office, he can secure a "second-grade" license by mail, with the understanding that he will come in for examinations within two years. Radio inspectors are located at Boston, New York, Baltimore, Norfolk, New Orleans, San Francisco, Seattle, Detroit, and Chicago.

Radio and the Woman

By
Crystal D. Tector

I THINK that I am the first one—at least I'll claim the credit until some one tells me otherwise—to predict that the next yuletide season is going to be known as the "Radio Christmas." Already we see signs of it—and I have noticed that quite a few newspapers have echoed the sentiments I printed on this page several weeks ago.

One of the biggest New York City papers says that there is no doubt about it—that everybody will be giving radio first thoughts when it comes to giving presents. Another New York daily predicts that over \$30,000,000 worth of radio goods will be sold during the holiday season. Still another is inclined to the belief that the people, looking for something new to give their friends and relations, will find in radio sets and parts the most acceptable presents.

I see that a new radio cloth is announced. It is short with "radio waves." I saw a dress made up of it, and I must admit that it was about as stylish and smart looking as anything I have observed in new material in some time.

I have also made a note of what will be very popular around the holiday season, and that is a recipe for radio pie. It is made similar to the ordinary deep-dish apple pie, only apples of the hard, green sort and quinces are used in equal parts. Before the crust is put on for baking, the fruit is given a goodly sprinkle of cinnamon and sugar. It should be served with coffee.

This recipe was given me by an old-time friend whose husband has been a radio bug for ten years back—one of the original "night owls," in fact. He found more pleasure, she tells me, sitting up until far into the night waiting for calls to

come in than in any other pastime. Of course, as he was always at home she had no objection, but along toward midnight he would get hungry and ask for pie and coffee—a real yankee supper. Apple pie was his favorite; but, one day, the good wife discovered that she was short of apples and, in desperation, she used an equal amount of quinces. Now, her Friend Husband went wild with delight and said that it was the best pie he had ever eaten. And like the minister who exclaimed when he tasted whiskey and milk for the first time, "Great heavens! what a cow," this very pleased radioist cried out, "Where DID you get those apples?"

Well, I am pleased that I have predicted a radio Christmas. It is no little glory and you must not blame if I am a bit peppy over it. Let us see to what extent my prediction will come true.

The latest radio story comes from Newport. I am told that one fair miss whose dad counts his wealth in the six-figure "colyum," decided that the home would not be complete without a receiving set. She phoned dad in New York, and, being an obliging father, he ordered one sent up. When it arrived, the British butler asked the expressman what it might be?

"A radio set," was the reply. "Then hit must be for the cook," said the haughty servitor. "My lady 'as a pearl set, and a diamond set; but any jewelry coming in a package as large as that must 'ave been sent to one of the underlings."

"Them ain't jools—you poor fish!" yelled the expressman, staggering under his load, "It's a radio set—something you hear beautiful music with!"

And just then the fair daughter appeared on the scene and explained.

Radio—and This Summer of 1922

(An editorial inspired by, and describing the photographic illustrations on, the front cover of this issue of RADIO WORLD.)

RADIO has brought new romance into the world to supplement the exploits of Paul Revere and John Paul Jones. Radio travels as swiftly as light—not through one valley, or on one lonely sea, but to the world at large on the tireless wings of ether.

Radio answers the call for more liberal education of nations and peoples, and permeates the remote places of the earth with music and information.

Turn to the front cover of RADIO WORLD, this week. Here we see how radio played an important part during the summer of 1922—now drawing to its close.

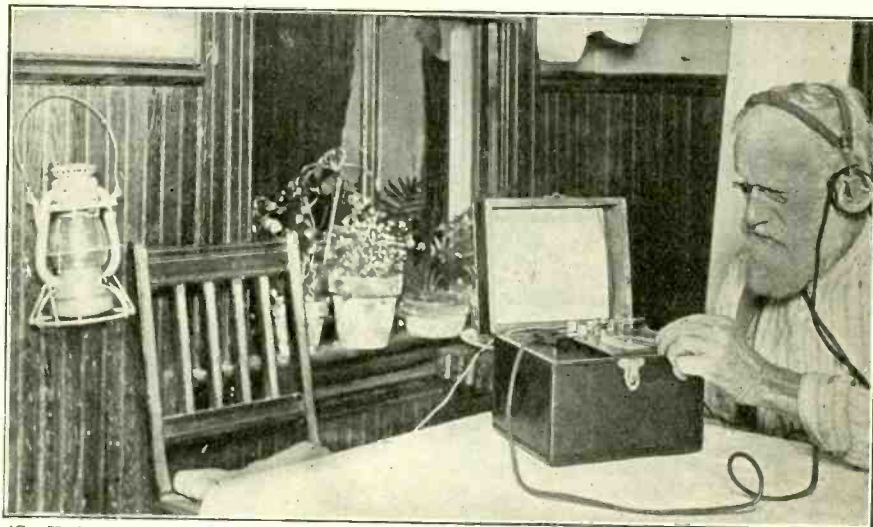
The photograph to the left of the upper picture shows a mother and her daughter tuning in a broadcasting station, perchance to hear a concert. Their means for receiving the ether is a loop aerial mounted on the radiator of their car. This reduced the interference to a minimum. By a simple operation of the direction of the loop aerial, this may be wonderfully controlled. The set is one of the portable type, which may be safely carried on any trip—anywhere. It comprises a vacuum-tube detector with two stages of amplification.

The picture on the right shows the same set with loop and other apparatus on the ground.

The lower photograph will prove what one may do with radio when touring in a motorcar. This particular party is passing through Chicago and listening to music from Newark, New Jersey.

To print all the wonderful stories of the part radio played in summer vaca-

The Up-to-date Farmer Finds Radio Is His Best Friend



(C. Kadel & Herbert News Service)

This up-to-date farmer has just connected up his radio receiver, to get in on the weather and crop reports. This is of vital importance to him. Heretofore he had to rely on a week-old newspaper, perhaps. Today he gets his information on the dot.

tions this year, would fill pages of RADIO WORLD. To reduce them to a word; "No vacation in the future will be complete without radio."

Change in WGY Program

BEGINNING Monday, September 11, WGY, the radio broadcasting station of the General Electric Company at Schenectady, New York, will offer regular musical

programs every Monday evening in addition to the programs of Tuesday, Thursday, and Friday nights as at present scheduled. Other important additions will be made to the schedule and will be announced later.

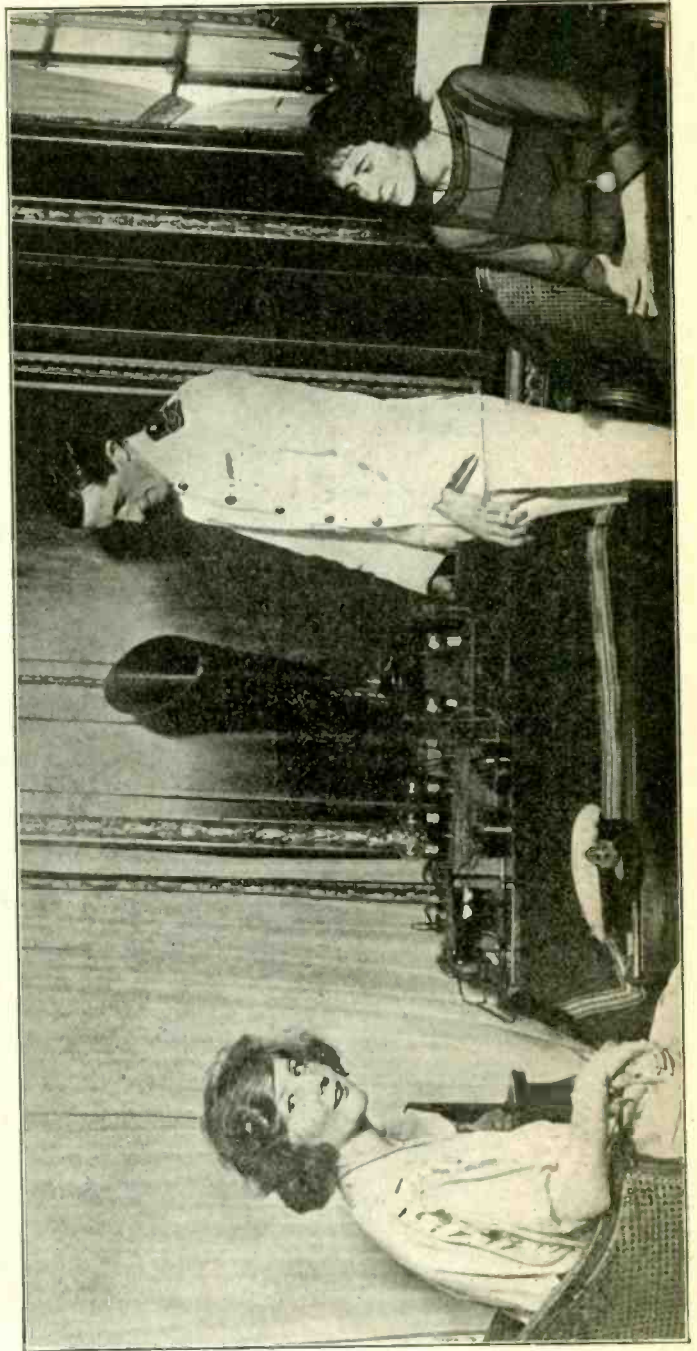
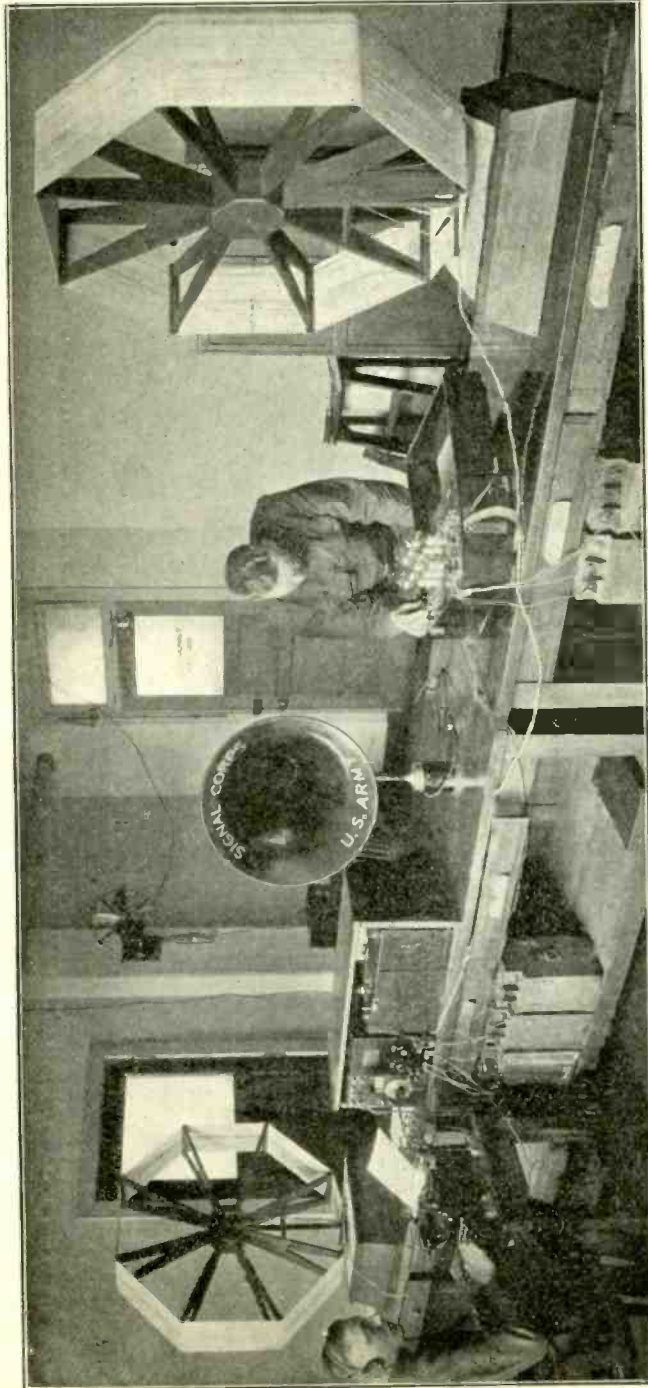
Latest broadcasting map 15c. That is, a complete broadcasting map appeared in Radio World, No. 8, dated May 20. Mailed on receipt of 15c. Radio World Company, 1493 Broadway, N. Y. C. (Advt.)

U. S. Signal Corps' Big Receiving Set

IN Washington, D. C., one of the most active radio-centers in the world, the Signal Corps of the United States Army, at its headquarters, operates one of the largest receiving sets ever installed. The photograph at the left gives a splendid view of the large room, the indoor loop-antennae, the receivers, and the massive loud-speaker. With this receiving set, messages from European stations are picked up and recorded by the typist at the left. Perhaps no other branch of the service has taken so active an interest in radio as the Signal Corps, and it is certain that no other branch boasts such up-to-date equipment. Every new device is tested out, and no improvement is overlooked.

The Army Air Service plans to use the new Signal Corps set No. 135, combining radiophone and telegraph circuits good for distances up to 75 miles and 200 miles, respectively. The range will be greater than is planned for the big Martin bombers, however, as better facilities for erecting aeriols are available on airships than on planes. One method considered is to install the antenna within the envelope; another is to suspend it below the ship, drawing it up upon landing; while a third contemplates hanging the wires of the aerial along the sides and over the top of the ship.

(C. Harris & Ewing, Washington, D. C. From Paul Thompson, N. Y.)



"Listening In" Aboard the "Mauretania"

THE Cunard Line has installed a radiophone in the main salon of its gigantic Atlantic liner, "Mauretania," for the entertainment of passengers. Every afternoon and evening, a larger American stations have been clearly heard.

The ladies in the photograph at the right, sitting on either side of the receiving set, are Miss Florence Dixon (left), the dancer, and Miss Irene Loo. Both are enthusiastic radio fans, Miss Dixon being able to read code. She did much on the voyage over to bring other women passengers to a clearer understanding of radio.

There is little doubt that radio is taking first place as a means of recreation. If you can picture yourself aboard a floating palace—a great ocean steamer furnished and equipped to the last degree—and seated in her luxuriously furnished salon listening to a concert coming clear and distinct from shore, you have an idea of the very advanced pleasure of ocean travel in these days. But this is only one thing that radio will bring to those who cross the seas. It will not be long before every modern steamer is so thoroughly equipped with radiotelephonic devices that to talk with those you have left behind or those you intend to meet will soon be as common as ringing up someone in your home town.

(C. Central New Photo Service.)

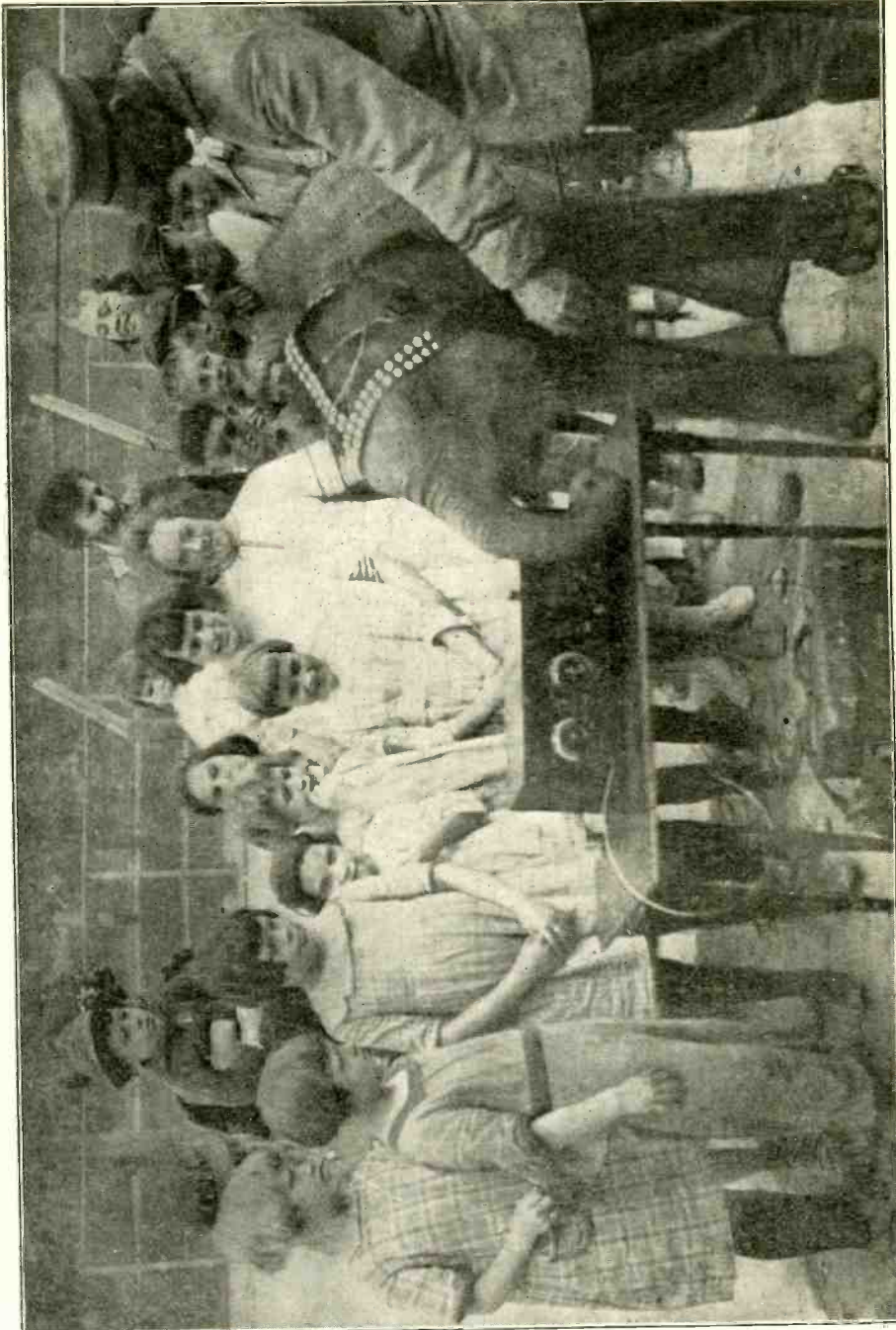
"Waiting for a Bite" Is No Longer Tiresome

THE modern fisherman listens to all that his radio set brings from the ether waves while he is waiting for the fish to bite—and, as every fisherman knows, such patience will frequently cease to be a virtue. The ingenious disciple of Izaak Walton, in the photograph at the left, is Mr. William Nigey, of New York, on Bolgrade Lake, Maine, a particularly favored spot of fishermen. It is not necessary for him to row, as a study of the photograph at the left will show that his boat-canoë is motor equipped, and that, when he is in a place where the finny tribe bite, all he need do is "shut off, attach his antenna, and use his motor as a ground."

What could be more perfect? Radio found tremendous favor with the vacationists of 1922—and here is positive evidence of it. When a practical man, fond of the great sport of fishing, hies himself to some faraway spot and rigs out his craft with a radio set—well, it does prove that he may expect some wonderful "stunts" when the fans begin to think 'em out.

Many a mountain camp was enlivened this summer by radio; and many a seaside resort found that the new mode of transmitting words and music added much to the gaiety of its guests. All through the Adirondack Mountain region radio sets were unusually popular. It is evident that when the vacation season of 1923 rolls around, radio will be one of the most popular elements of pleasure.

(C. Kadel and Herbert News Service.)



(C. International News Reel.)

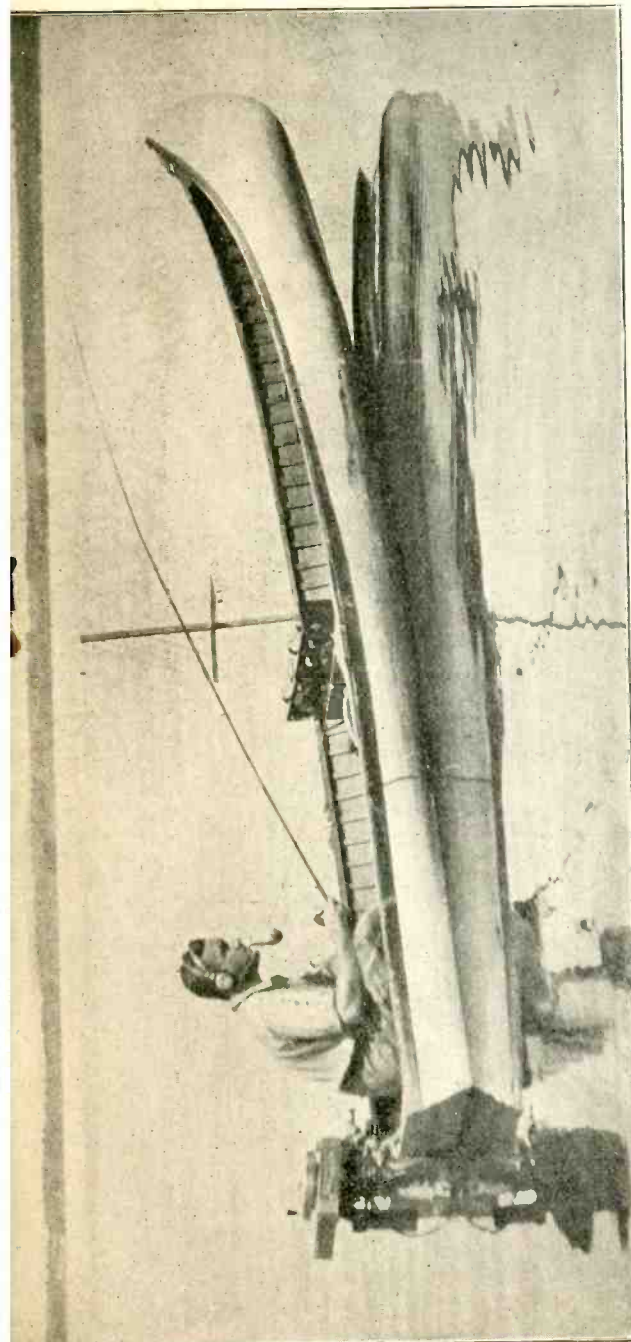
Baby Elephant Hears Mother's Voice

TOM THUMB" is a baby elephant, four months old. He weighs 276 pounds. Tom belongs to a traveling circus which "played" Seattle, Wash., several weeks ago. Now, Seattle, like every other up-to-date American city, has its full quota of radio experimenters, one of whom was anxious to discover if a baby elephant would recognize its mother's voice by radio. This may seem silly, but the average radio experimenter stops at nothing to-day in his effort to learn what radio will do—and surprising are the things brought to light.

A transmitting set was installed in the circus tent and Tom Thumb was taken to a point in the suburbs of the city where the receiving set was rigged up and the head phones attached to his ears. Naturally, Tom's mother bellowed loud enough to be heard miles away when she missed her baby boy; perhaps there are amateurs who picked up her bellowing and mistook it for static—who knows? It is said that Tom became quite nervous and fidgeted about—and it is evident that he heard something. However, he seemed to be interested in the set and insisted on using his trunk to tune the incoming sound to his apparent liking.

At any rate, he amused the children of the neighborhood who gathered around him, as the photograph at the right shows. Broadcasting experts claim that birds and animals will provide an interesting part of radio programs of the future. Already plans have been made to broadcast the whistling of the marmots in Glacier National Park—little doglike animals that produce a music that is particularly sweet and unusual. Canaries have been singing into transmitting sets in California; and in England, recently, it is reported, the plaintive notes of a nightingale were distinctly heard. All of this means that radio will become educational as well as entertaining. It is impossible to state—of imagine—how far it will go in bringing to mankind many of the mysteries and wonders of nature which have been denied him. The radio inventor and experimenter are working fast.

(C. International News Reel.)



Answers to Readers

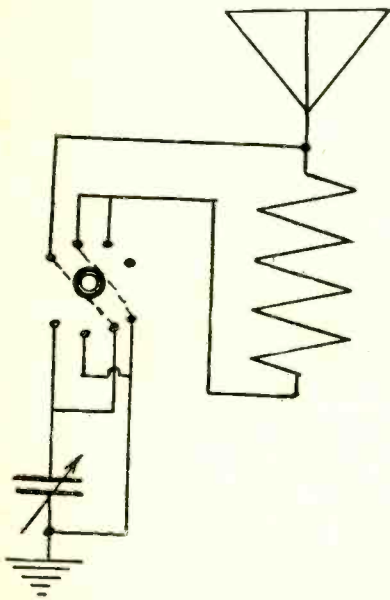
I HAVE a short-wave regenerative receiver with a two-stage amplifier. I also have two variable condensers, 21-plate and 43-plate. What should I do with them?—R. Creter, Madison, Conn.

Placing a variable condenser in the ground circuit has the function of reducing wave length—that is, if placed in series. If you have a short-wave receiver and you can get the short-wave stations, the variable condenser is not needed. If your aerial, with your receiver, does not permit you to get down to the lower wave-lengths then insert the 43-plate in series with ground. The 21-plate may be placed in shunt to the secondary.

Will RADIO WORLD publish a hook-up of a set using honeycomb coils for the primary, secondary, and tickler; also detector and two stages of amplification? I use a loud-speaker with this set? What size coils should be used for concerts on the 360-meter wave length?—F. F. Smith, Broad Channel, L. I.

Your question is fully answered in this issue in the article headed, "How to Make a Honeycomb Coil with a Two-Stage Amplifier," by Fred Chas. Ehlert. A loud speaker may be used easily with this set. Referring the coils, or inductances, would suggest you to use L 35 for tickler, and L 50 or L 75 for both primary and secondary. In conjunction with these coils a .001 microfarad capacity variable condenser should be used.

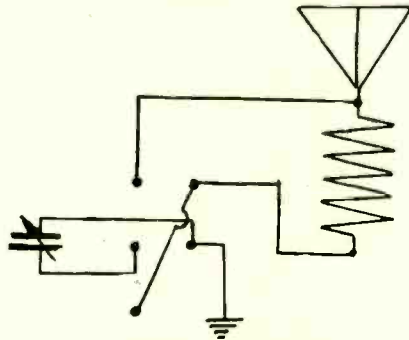
Please publish a schematic diagram showing how to connect a capacity switch, double blade. This would either have to connect the condenser in series to decrease the effective wave-length of the aerial, or connect in parallel the condenser across the primary of the coupler.—Charles Spelling, Lancaster, Pa.



Hook-up, showing how to connect a capacity switch, double blade, as requested by Mr. Charles Spelling.

The accompanying hook-up shows the standard capacity-switch. Dotted lines show position of blades when condenser is placed around, or in parallel, with primary of vario-coupler.

It would interest me to see a diagram of a circuit employing a double-throw, double-blade switch (knife type) showing how to connect a condenser in series, or parallel, to tuner.—Joseph Schenck, New Brunswick, N. J.



Hook-up of a circuit employing a double-throw, double-blade switch, as requested by Mr. Joseph Schenck.

A good circuit is published above showing how to connect switch with tuner, as you describe.

What is counterpoise ground and where can it be used?—Morris Schneider, Glen Cove, L. I.

Counterpoise ground is artificial ground, such as large pieces of sheet metal, or a number of wires, spread out and insulated from the ground.

The counterpoise is placed just beneath the aerial. In large commercial stations, this counterpoise or ground is used in preference to the earth ground. It is claimed that the receiving qualities are considerably increased.

Always have the counterpoise longer and larger than the amount of copper the aerial contains in order to give effective capacity. The idea is to have the aerial and counterpoise act as a capacity in the circuit.

How many turns will be required to wind on spider-web coils, for primary, secondary, tickler, and 360-meter wave length? My antenna is, approximately, 100 feet long. I am using a primary and secondary condenser.—RADIO WORLD Reader.

Thirty-five turns may be used for the tickler, 50 turns for primary, and 75 turns for secondary. The tickler coil generally has to be about 50 per cent of the secondary, but good results have been obtained on the above number of turns.

Is the enclosed circuit correct? Have worked around it but with no results.—Patient Reader.

Your circuit is incorrect. Reverse your battery placing the plus, or positive, pole on the plate side of the tube and the negative side on the telephone block. If your connections are all properly soldered and making good contact you should get good results.

Is it possible for me to use a regular alternating-current lighting circuit as an aerial to receive music?—Thomas Bischoff, New London, Conn.

Considerable depends on the electric-light circuit. If the lines come into your house overhead, you are apt to get much better results than if they came into the house through a conduit pipe. It is very difficult to predict results with this system, as most

everything regarding broadcasting depends on local conditions; for instance, the amount of steel in the building and the electric-light circuit itself. The condenser, in this particular case, must be built to stand a pressure of, at least, about 2,000 volts without breakdown. I would suggest that you will find it cheaper to buy a condenser of that character from some reliable concern than to make it, thereby creating less danger in using it. Remember that a good reliable concern always guarantees its products.

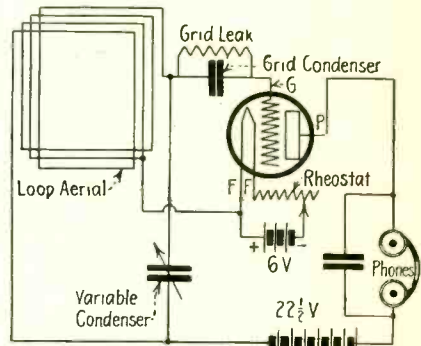
I am using a lamp-socket plug as explained in RADIO WORLD, No. 18, dated July 29. Must a ground connection be used with this type antenna?—Louis Hansen, Toledo, Ohio.

A regular ground-connection will have to be made with this type plug. The two posts are on the plug so that various combinations of capacity may be obtained and the correct value used.

In your RADIO WORLD, No. 19, dated August 5, you publish a hook-up by George W. May. I would like to use this circuit in making a set. Are the variable condensers shown all the circuit requires, or is a vario-coupler used?—F. C. Burnell, Long Island City, N. Y.

In this circuit, no vario-coupler is used. The loop and transformers are of such inductance and capacity that they respond to the 360-meter wave length. The variable condenser used across the loop is a 43 plate of .001 microfarad capacity.

Will you publish a hook-up of a vacuum-tube set with loop aerial.—John Hayes, Los Gatos, California.



Hook-up of a vacuum-tube set with loop aerial, as requested by Mr. John Hayes.

The schematic diagram above shows the loop aerial connected to a vacuum-tube set. It must be understood that, at least, two stages of audio frequency must be used with this set in order that some fair distance may be covered.

With my single-slide crystal set, I hear WWZ and WHN. Why can't I hear WJZ, Newark, N. J.?—Leo Hart, Brooklyn, N. Y.

You are very close to the broadcasting stations you mention and that probably accounts for your hearing them. Your detector crystal is not sufficiently sensitive to hear WJZ, and we advise you to get a more sensitive crystal or install a tube detector.

Can I use a 2,000-ohm with a 3,000-ohm receiver? What is the connection?—John Merschaff, Toledo, Ohio.

You may use these phones together, but it is always best to use those same ohmage together. Connect them in series with each other.

Fifty-two issues for \$6.00. Sub. Department, Radio World, 1493 Broadway, N. Y. C.—Adv't.

Steinmetz Defines Possible Radio-Power Transmission Waves Sent Around Earth from Powerful Station Would Return to that Station and Create Greater Force

(Abstract of an address made by Dr. Charles P. Steinmetz, chief consulting engineer, General Electric Company, before the Radio Congress, Chicago.)

THE successful development of radio communication by telegraph and telephone, raises the question of the possibility or impossibility of radio power transmission.

In some respects, radio-power transmission exists to-day, for the message you receive by radio has been carried by the power of the electromagnetic wave from the sending to the receiving station. However, while the sending station sends out electro-magnetic waves of a power of several kilowatts, or even hundreds of kilowatts, this power scatters in all directions, and it may be only a fraction of a milliwatt which we receive, that is, less than a millionth of the power sent out. But this small power is sufficient, when amplified, to give us the message.

The problem of power transmission essentially differs from that of the transmission for communication, that in power transmission most, or at least a large part of the power sent out by the generating station must arrive at the receiving station, to make it economical to transmit the power.

Hence, the problem of radio-power transmission is that of directing the radio waves so closely that a large part of their power remains together so as to be picked up by the receiving station. Much successful work has been done in directing radio waves. For instance, our transatlantic stations send out most of their power eastwards. But still, even as directed, the power scatters over the coasts of Europe from Norway to Spain, so that it is impossible to pick up an appreciable part of it. The limits of impossibility of concentrating a beam of radio waves may be illustrated by comparison with a beam of light. Light is an electromagnetic wave, differing from the radio wave merely by having a wave length many million times shorter. While usually the light scatters in all directions, like the wireless wave, we can direct it in a concentrated beam by the searchlight. But there is inevitably a scattering of the light in the searchlight beam, and when the beam starts—perhaps with a square-yard section at the search-light mirror, at ten miles distance—it has, at the very best, scattered to a diameter of two thousand feet, and at one hundred miles distance the beams cover a section of sixteen square miles.

If it were a beam of radio power, it would thus require, at one hundred miles distance, a receiving station covering sixteen square miles, about four miles wide and, what is still more difficult, four miles high, to pick up a large part of the power. The cause of this scattering is two-fold: First, the inevitable imperfections of any apparatus. No matter how perfect a reflector, there are slight imperfections, and at a hundred miles distance, they seriously count. Furthermore, even with an absolutely perfect reflector, the beam of light would stay together only if the light came from a mathematical point. As it must, however, come from a small area, this causes an inevitable scattering, which at best gives an angle of scattering of about two degrees. This is about one hundred

times as much as would be permissible to economically transmit power a hundred miles by a direct radio-beam.

Thus the probability of power transmission by directed radio is very small, except, perhaps, in very special cases where the distances are moderate and the efficiency of transmission of secondary importance.

The second possibility of radio-power transmission—at least theoretically—is by resonant vibrations or standing waves. Suppose we had a very large sending station sending out electromagnetic waves not of hundreds, but of thousands of millions of kilowatts. Suppose we could find a wave length where the absorption in the passage of the wave through space is sufficiently small so as to be negligible compared with the amount of power. Assuming, first, there were no receiving stations, then the waves issuing from the sending station would circle the globe and return to the sending station, and if the wave length is adjusted so that the return wave coincides with the outgoing wave, it would return its power, and little power would be required from the sending station to maintain such a system of high-power standing waves, only enough to supply the losses—just as little power is required in an electric wire transmission system to maintain the voltage wave so long as no current is taken off.

Suppose, now, we erect a second station, tuned for the same wave length as the sending station. It would resonate with the standing electromagnetic wave issuing from the sending station, thereby stop its passage by absorbing its energy. It would, as we may say, punch a hole in the standing wave-sheet coming from the sending station. Power would then flow into this hole; the sending station would begin to send out additional power to maintain the wave sheet, and this power would be received by the receiving station. This would give real radio-power transmission. Any receiving station of suitable design would then be able to pick up power from the universal power supply carried by the standing wave-sheet covering the earth.

Several sending stations may send out power. These may either have different wave lengths that would not interfere, and the receiving station could be tuned to receive power from any of the generating stations. Or—what would be preferable—all the generating stations would be tuned to the same wave length; that is, the same frequency. Then they would have to be synchronized and operate in synchronism, just as different electric-generating stations on the same transmission line are operated in synchronism.

Theoretically, this is an interesting speculation, but whether it could ever become a possibility, would depend on the question, whether a radio wave of such length could be found to make the losses of power by absorption, *et cetera*, economically permissible, and whether stations for such wave length and power would be economically feasible. Furthermore, it would have to be an international development. Therefore, even if such radio transmission by a stationary electromagnetic wave sheet were possible, its realization at best is rather distant.

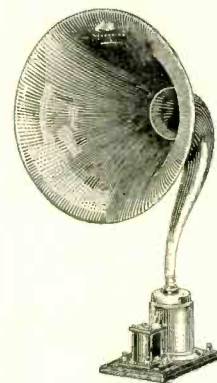
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enjoy wireless
programs daily
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MAGNAVOX
Radio
The Reproducer Supreme

WHEN you buy a Magnavox, you are not just buying a horn connected to the ordinary telephone receiver. The electrodynamic principle involved in the construction of Magnavox Radio is recognized as the only satisfactory principle by which a reproducer may be constructed.

With the Magnavox, the incoming signal is electrically amplified—the horn or bell merely projects this amplified signal into the air.

R-2 Magnavox Radio with 18-inch horn



THIS instrument is intended for those who wish the utmost in a amplifying power: for large audiences, dance halls, etc., but requires only 6 of an ampere for the field.

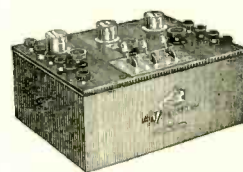
Price, \$85.00

R-3 Magnavox Radio with 14-inch horn

SAME in principle and construction throughout as Type R-2. Is ideal for use in homes, offices, amateur stations, etc.

Requires one ampere field current from your filament battery.

Price, \$45.00



Magnavox Power Amplifier—Model C

CAN be used with any "B" battery voltage which the power tube may require for best amplification.

AC-2-C, 2-Stage.....\$80.00
AC-3-C, 3-Stage.....\$110.00

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In Spite of—

The Shrewdest Observers of Conditions In This Country Are the Men Who Handle the Big Stock-Brokerage Business In Wall Street

IT is interesting to note that these men have permitted the market to rise during the past week or so. Many stocks, industrial and otherwise, that have not been active for a long time, have suddenly shot ten points ahead. Other standard stocks that have been more or less dormant for a considerable period, also have shown new life during the past week.

And all this, mind you, in face of the coal strike, the railway strike, and other things which are supposed to disturb business conditions in a very material degree. Wall Street occasionally makes a mistake, but not very often, and it is quite evident that the financial powers that be are quite sure we are going to have a great fall and winter—perhaps, not because of the recent conditions, but in spite of them.

Therefore, ye of little faith, harken and follow the leaders and **KNOW** that we are on the threshold of a remarkable, busy, successful, and lengthy stretch of renewed business activity.

Radio Goods that Stand the Test

Manufacturers, send a sample of your goods to our Technical Editor, Fred. Charles Ehlert, 9006 Pleasant Street, Queens, Long Island, N. Y. It will be carefully tested and returned. If your goods satisfy our experts, RADIO WORLD'S endorsement will be published in our merchandise department without charge or obligation of any kind on your part. This is a free service on the part of RADIO WORLD, calling for no expense whatsoever on the part of the manufacturer, except the sending of a sample of his goods.

Knott Sure-Ground Clamp

E. R. Knott Machine Co., 1 Ellery Street, South Boston, Mass.

THE radio enthusiast who wishes a perfect connector may be assured of this by using the Knott Sure Ground Connector. This connector is a cast product especially designed with a screw arrangement. By loosening the screw clamp, one merely fastens it around the water or gas pipe, or any other metal ground and make up fast on the set screw. While making up on the set screw, the metal that grips the ground has a needle point which finds and digs itself into the pure metal of the ground. A hole is also accounted for, so the ground wire when brought to the clamp from the set may be soldered. This is a compact, efficient and rigid clamp.

Antenella Plug

Chas. Freshman Company, 290 Hudson Street, New York City, N. Y.

A NEAT-APPEARING plug for the radio fan who wishes to use it for receiving concerts by inserting it in an electric-lamp socket. The antenella plug is well-designed and of good construction. It is in a form that can be easily handled. Insulating housing material of two longitudinal sections is assembled, each having a condenser and binding post on each section. Voltage breakdown-test proved that the plug withstood, approximately, 1,500 volts before discharging. This should guard the owner against any breakdown on the ordinary electric-light lines. The condensers are of good construction, using mica as their dielectric. Plates are of copper foil and capacities of .0003 mfd. capacity. When employed as an aerial with crystal set, results were good but were found to be far better when employed with a vacuum tube set.

A screw arrangement on the plug makes it possible for anyone to connect it to the ordi-

nary electric-light socket. The unit, when assembled, is rigid, efficient and compact. It is one of the plugs manufactured that may be recommended to anyone who desires to receive concerts utilizing a plug in the lamp socket as an aerial. * * *

Name Plates for Receiving Sets

E. R. Knott Machine Co., 1 Ellery Street, South Boston, Mass.

WHEN making up a receiving set, most amateurs—after they have one assembled—forget just what connections they made, especially on binding posts. For this reason, wrong connections are fatal. The answer to this is that when proper connections are made, a name-plate should be fastened properly to the set. The E. R. Knott Machine Co. manufacture such name-plates as Aerials, Ground and others. Such a binding-post radio name-plate—which goes over the binding post and reads above the fastening—is a real necessity on a radio set. Every amateur should mark his set to prevent burning out instruments because wires are connected incorrectly.

Radio Homcharger De Luxe

BEAUTY has been combined with utility in the new Radio Homcharger de Luxe, a battery-charging rectifier developed by the Automatic Electrical Devices Company, 135 West Third Street, Cincinnati, Ohio, especially for the homcharging of A and B batteries. Finished in a dull mahogany and old gold, it harmonizes with the finest room-furnishings, and permits the radio enthusiast to recharge his battery after an evening's entertainment without disconnecting it from his set.

The Radio Homcharger de Luxe is constructed on the same perfect operating principle used in the type A homcharger. Its working parts are entirely enclosed, eliminating all danger of shock and fire. It is

Revival in Trade

Southern Visitor Brings Good News from His Section—Particularly in Radio.

EDMUND DUPREE, president of the Star Electric and Engineering Co., Houston, Texas, called at the office of RADIO WORLD recently. Mr. Dupree was in New York buying goods for the fall and winter season of radio trade. He said that business at the Star headquarters in Houston has been brisk all summer, and that there has been no slump in activities, although sales had dropped off a little during August. However, he said, business has already taken a new turn and his concern will enter September with a good stock, encouraging local demand, and a fine prospect promise for the remainder of the year.

First Dubilier Dividend Encouraging

THE Dubilier Condenser and Radio Corporation has declared its first quarterly dividend of \$2 a share on its preferred stock, payable September 1, to holders of record of August 25. The corporation reports that earnings in its first three months of operation—May, June and July—were more than five times the amount required for the preferred dividend for that period.

New Firms and Corporations

Notices in this department are considered as purely interesting trade news and published without compensation to us. We welcome trade news of this nature. All notices having an advertising angle are referred to our Advertising Department, and are placed under Classified Advertising at 5 cents a word, or as Display Advertising at \$5 an inch.

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

Western Radio Corp., Manhattan, specialties, \$10,000; G. F. McCoy, M. L. Hegarty, Ler J. Conlon. (Attorney, W. E. Kennedy, 47 Cedar St., New York.)

Amplitone Co., Manhattan, make telegraph and telephone instruments, \$15,000; R. Ely, D. Cohen, A. C. Knoeller. (Attorneys, Hedges, Ely & Frankel, 165 Broadway, New York.)

Bruno Radio Corp., Manhattan, \$5,000; M. Singer, E. Greenfield, L. Kaye. (Attorneys, Eppstein & Axman, 175 5th Ave., New York.)

Radio Wet Wash Laundry Co., Manhattan, \$10,000; S. and M. Goldberger, M. Eleveltzky. (Attorney, S. E. Oppenheim, 203 West 106th St., New York.)

The Millard Radio Corp. has changed its name to Yankee Roll Co. of New York, Inc., New York.

William C. Cosby, Box 338, Abeline, Texas.

constructed of the highest-grade materials throughout—molded bakelite base, jewel ammeter, and oversized silicon steel transformer. There are no frail castings to break, as all parts are made from highest quality stampings.

Last-Minute Radio News!

What is considered an unprecedented feat of radio engineering was the starting, by radio, of a train of thirty-three cars of electrical apparatus from East Pittsburgh. The train, with its cargo which is destined for Chile, weighed 2,400,000 pounds and measured 1,300 feet.

Russia's new radio station in Moscow was able to receive messages from the diplomatic conference in Genoa. The receiving apparatus is entirely of Russian construction. The station has two masts each 560 feet high.

The wireless between England and Spain, which has been handled for some time by land wires to the Poldhu station and thence by radio, has been greatly improved by the substitution of the new Marconi station at Ongar as the transmitting agency. This station is worked by distant control from London. Messages filed in that city are sent direct by radio without any retransmission.

A summons for criminal libel brought against H. J. Kenner, manager of the Better Business Bureau, at No. 61 Broadway, New York, was dismissed by Magistrate Ronaud in Tombs Court. The summons was obtained by Charles Beadon, stockholder in the International Radio Corporation. The bureau alleged that the corporation had sold its stock through misleading statements in advertisements.

While off the Irish coast the radio operator of the Cunard liner, "Carmania," picked up a message, asking that the ritual for burial at sea be sent in full. The request came from the Canadian government steamship, "Canadian Trooper," whose captain found he had no prayer book when confronted with the necessity of burying one of the firemen at sea. The "Carmania" supplied his need.

During the coming week, and coincident with the opening of the college year, a new and unique radio-broadcasting station, officially listed in the Government call book as WHAZ, will be opened under the direction of the Electrical Engineering Department of the Rensselaer Polytechnic Institute at Troy, New York.

\$41,000,000 radio company files papers at Dover, Delaware: Canadian-American Radio Co., \$41,000,000; Frank Kweton, West New York, N. J.; L. F. Sniffin, Yonkers, N. Y.; Earl L. Keys, New York. (Corporation American Radio Co.)

Radio accessory factories of Canada are running under pressure, with three shifts for each 24 hours. Conditions prevail similar to that in the days of the war when factories were on munition work.

Consolidation of the Prima Radio Corporation of New York and the Manufacturers Tool and Die Works under the corporate title of the Prima Radio Corporation announced. The capitalization of the new company is \$50,000 8 per cent. preferred stock of \$10 par value and 1,500,000 shares of \$1 par value common. William Schilling is president and Andrew E. Puckrin is chairman of the Board of Directors.

Examinations for Radio Operator in Fourth District

EXAMINATIONS for commercial and amateur radio-operator licenses will be conducted by a radio inspector connected with the Navigation Service, Department of Commerce, at the following points in the Fourth Radio District on the dates indicated:

Florida—Miami, September 22; Key West, September 25; Tampa, September 29; Sanford, October 2; Jacksonville, October 4.

Georgia—Savannah, October 9; Macon, October 12; Atlanta, October 14 (amateur only); Atlanta, October 16 (commercial only).

South Carolina—Greenville, October 21; Columbia, October 24; Charleston, October 27.

North Carolina—Wilmington, October 31; Raleigh, November 2.

To Check Trade Abuses

DAVID N. MOSESSOHN, executive director of the Associated Dress Industries of America was interviewed recently by "The Times," New York, regarding the resolutions passed by the National Retail Dry Goods Association suggesting means for alleviating trade abuses and to promote growth and cooperation in the relations between manufacturers and retailers. Mr. Mosessohn said, in part:

The first consideration is a definitely and

carefully worked-out code of ethics. This code should embody all of the basic principles of proper dealings between wholesalers and retailers. Each of the basic principles should then be subdivided into the various applications that would govern the operations of both wholesalers and retailers. Both the principles and the sub-divided applications should be clear and concise, leaving no room for doubt or quibbling.

This is the work of a small selected group of not more than seven or nine men, including representatives of manufacturers and of retailers and one or two men whose experience in organization work can be relied upon to iron out all of the technical problems which are sure to arise in the preliminary preparations. It is essential that the code of ethics be fool proof. It should be constructive. It should be so compiled that confidence would be inspired by it and that both manufacturers and retailers would prefer to follow its dictates of their own free will, rather than regard it as a club over their heads.

It is not sufficient that the individual associations in the wholesale and retail fields should exercise jurisdiction over their respective memberships. The retail associations should have a joint board, and the manufacturers' and wholesalers' associations should also have their joint boards. In other words, the entire retail and wholesale fields should be operated under two respective jurisdictions, whose authority would be inclusive of an entire field. The joint boards, in turn, might be represented on one supreme conference, or arbitration board. Reports of unethical practices in

Coming Events

The editors of RADIO WORLD will gladly publish news items of all contemplated radio shows and expositions. Keep us posted by mailing full information.

ANNUAL SHOW OF THE ST. LOUIS RADIO ASSOCIATION, St. Louis, Mo., October 4 to 7, inclusive.

CHICAGO RADIO SHOW, Coliseum, Chicago, Ill., October 4 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, inclusive. A. L. Sponsler, secretary.

RADIO CLUB OF AMERICA. First autumn meeting will be held the last Friday in September. Renville H. McCann, secretary, Columbia University, New York.

CINCINNATI RADIO-AND-ELECTRICAL EXPOSITION, Music Hall, Cincinnati, O., October 7 to 14, inclusive.

NEW YORK ELECTRICAL AND INDUSTRIAL EXPOSITION, Grand Central Palace, New York City, October 7 to 14, inclusive.

NEWARK'S SECOND ANNUAL RADIO SHOW, Robert Treat Hotel, Newark, N. J., October 4, 5, 6 and 7.

SECOND NATIONAL RADIO EXPOSITION, direction International Trade Exposition Co., Chicago, January 13 to 20, inc., 1923, George A. King, director of publicity, 417 South Dearborn Street, Chicago, Ill.

PERMANENT RADIO FAIR FOR BUYERS, Hotel Imperial, New York City. Open from September, 1922, to May, 1923.

AMERICAN RADIO EXPOSITION, Grand Central Palace, New York City, December 21 to 31, inclusive. Direction American Radio Exposition Company, 120 Broadway.

BOSTON RADIO EXPOSITION, AND NEW ENGLAND AMATEUR CONVENTION, Mechanics Building, Boston, October 30 to November 4, inclusive.

SPRINGFIELD RADIO EXPOSITION, Springfield Auditorium, Springfield, Mass., October 3 to 7, inclusive.

ELECTRICAL RADIO AND AUTOMOBILE ACCESSORY EXPOSITION, Smith's Academy, Passaic, N. J., September 14, 15, 16.

either the wholesale or the retail field, should be filed with the joint board in that field, the authority of which should be great enough to correct the error or pass judgment on such action as might be deemed advisable in the premises. If doubt exists as to the extent of authority vested in the joint board, or where a principle or policy is involved that requires the judgment of a 'highest authority,' the matter should be placed in the hands of the conference or arbitration board. This board should be only advisory, but should have power to recommend action to be taken by the joint boards.

To Study Foreign Electrical Development

TO make a study of electrical development, including radio operation and equipment, R. A. Lindquist, chief of the Electrical Equipment Division of the Department of Commerce, has sailed for Europe. During a three months' survey, Mr. Lindquist will investigate the electrical appliance possibilities for American equipment in England, Sweden and Germany.

Change of Name

PIONEER RADIO PRODUCTS CO., 329 East 29th Street, New York City, manufacturers of radio equipment and new specialties, announce that hereafter the firm name will be Pioneer Wireless Products Co. This change has been made to avoid complication with concerns which have adopted similar names.

Subscribe direct or through your news dealer. \$6.00 a year, \$3.00 six months, \$1.50 three months. Radio World, 1493 Broadway, N. Y. C.

"MIRAD"

"Quality Radio Priced Right"

3 Plate Variable Condensers.....	\$1.50
Mirad Varicouplers	3.75
3000 Ohm Double Head Phones.....	6.00
1500 Ohm Single Head Phone.....	3.00
(Money back guarantee.)	
Mirad 23 Plate Condenser.....	3.95
Mirad 43 Plate Variable Condenser....	4.95
Mirad Detector Unit.....	30.00
Mirad Two-Step Amplifier.....	25.00

Postage Paid

Dealers' Sample of Above 25% Off

Miracle Radio Mfg. Co.
INTERURBAN BLDG., DALLAS, TEXAS

Buy Your Radio Receiving Set at Manufacturers' Cost

Buy your Radio Supplies at a large discount below the list or retail price. If a saving of \$15.00 to \$140.00 on a Radio Receiving Set or if a saving of 25% to 40% on Radio Supplies interests you, write or telegraph us today.

KING RADIO MFG. COMPANY
521 Penn Ave. Wilkensburg, Pa.

Will Cut Out Singing

THE output circuit of a modulator will contain a certain number of oscillations of high and low frequency, one at least of which consists of a carrier wave of double the original carrier frequency and modulated in accordance with the original signal.

This component of the output may be selected out by suitable circuits and, after amplification, may be transmitted to a remote station. This modulated doubled frequency will cut out "singing."

Radio Rappings Mystify Magician

HOWARD THURSTON, magician and psychic investigator, has just publicly announced that he is ready to admit that the belief in spiritistic communication expounded by Sir Arthur Conan Doyle and Sir Oliver Lodge, which he has ridiculed up to date, is actually founded on something tangible.

"My latest experiments," said Mr. Thurston, "have firmly convinced me, much against my will, that we are nearly always being approached by some unearthly forces which seem to be trying to impart to us or receive from us some information.

"During a recent series of tests, I was astounded, on several occasions, by the unmistakable presence of a very definite supernatural influence which seemed to be attempting to transmit some sort of a message to me or through me. These tests were carried on partially by the aid of a powerful semi-radio outfit of my own invention. And I wish to state most emphatically that if the unintelligible though distinct impressions received by me were not communications from spirits they must have been communications from other planets.

"Recently, I arrived at the conclusion that many of the planets, if not all, were inhabited by beings, spiritual or physical, who are similar to us in mentality, at least, and that in the course of time they will get into intelligible contact with us. In fact, I think they have been trying to get in touch with us for a long, long time and that it is barely possible that their signals which have been received by the highly sensitive ones among us, the real mediums, have been mistaken for messages from our departed friends and relatives. And, then again, it is barely possible that the other planets are populated by the spirits of those who have gone before us, reincarnated or otherwise. Who knows!

"I believe that any highly sensitive person with an ability to concentrate can, at times, receive the so-called spiritistic com-

munications. However, I do not think there is a man or woman living who can clearly translate them at the present time. We are on the brink of some startling psychic discoveries and the radio invention will be at least partially responsible for these disclosures. I am positive that the scientists who are back of the coming attempts to 'wireless' to Mars are going to bring some astounding facts to light, quite accidentally, in all probability. I feel sure that there is a direct connection between occult force and radio power."

Mr. Thurston says that he is not ready to give a description of the machine he is using, but that electricity is utilized.

Attention

Vacuum Tube Users

SAVE \$1.50 ON DETECTORS	SAVE \$3 ON AMPLIFIERS
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REPAIRING

Marconi, Moorhead, Electron Relay, A. P. Radiotron UV200—UV201
Cunningham C-300—C-301
Detectors for \$3.50 Amplifiers \$3.50

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GEO. H. PORELL CO., INC.
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Is Yours For the Asking—It Tells All About Our Wonder Sets, Vacuum Tube and Loose Coupler, also

Little Wonder Crystal Set

A Practical Receiving Set Within Reach of Everybody's Purse.

\$2.50 Unmounted Mounted, \$4.00

Radi-O-Plate Panels to Order.
All sizes cut as specified.

Holloway Electric Supply Co.
238 THIRD AVE. NEW YORK
Phone Gramercy 5628

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Reg. U. S. Pat. Office



A Real Radio Receiver

Guaranteed as represented or Money Refunded

Head Phones, Cord and Headband Included for Only

\$9.75

Complete

Consists of double-connected tuning coil. Wound to the critical point, with condenser, permitting of very close tuning and clearest reception. Detector admits of 3 motions of finder. Holds mounted or unmounted crystals. Fine cheery finished solid box.

Complete ANTENNA Equipment, with installation instructions, and Galena Crystal.

The achievement of the LISSEININ REAL RADIO RECEIVER is the wonder of the RADIO AGE. Gets concerts, market reports, crop news, baseball and prize fights. Radius 25 to 30 miles according to local conditions. Code 300 miles and more.

It's complete. Nothing else to buy. Just LISSEININ.

Send check or money order for \$9.75 and get your set Now. Extra pair phones \$4.75.

LISSEININ RADIO CO.

24 Paulison Avenue Ridgefield Park, N. J.

Welcome! Come in and hear the

Coraco

Radio Concert

Daily, 9 A. M. to 5 P. M.

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The Coraco Super-Radiophone is the latest and greatest improvement in radio. It has no outside connections—no installations expense—is as simple to operate as a phonograph. If you cannot call, write for full information.

The Coraco Company, Inc.
220 West 42nd Street New York

86,960 NAMES

Increase your sales by using names and addresses of firms and individuals interested in everything in Radio.

310 Radio Manufacturers in the U. S.	\$3.00
650 Radio Supply Jobbers in the U. S.	5.00
6,500 Retail Radio Dealers in the U. S.	35.00
5,000 Amateur and other owners radio apparatus	10.00
25,000 Amateur and other owners radio apparatus	40.00
50,000 Amateur and other owners radio apparatus	75.00

Amateur Radio Directory of the U. S. Complete list of Amateur stations with names and addresses of operators or owners. Prepaid for \$3.00. Names and addresses are guaranteed 98% correct will refund postage on all mail returned as undeliverable if less than 98%. Remit with order.

SUBSCRIPTION AGENCY
1021 Carrington St. Janesville, Wis.

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.

The Nelson Radio Parts Co.
Manufacturers and Distributors of
RADIO APPARATUS
Write for Catalog.
89 ACADEMY STREET, NEWARK, N. J.
Tel. Market 4066

Rocky Mountain Crystals
BETTER THAN GALENA
The most sensitive mineral rectifier known. Can also be used with one or more stages of amplification.
Mounted, 35c.; Unmounted, 20c.; Postpaid
Manufacturers, Jobbers, Dealers, Clubs,
Apply for Special Trade Prices
Rocky Mountain Radio Products, Inc.
9 CHURCH ST., NEW YORK, N. Y.

Law Storage Battery
Constant voltage, large amperage. Will run two months without recharging.
Attractive Dealers' Discounts
Write for Details
WILLIAM LAW COMPANY
Aborn and Sabin Streets, Providence, R. I.

Radio Supplies
Variocouplers, Variometers,
Headsets, Transformers,
Sockets, Rheostats, Etc.
Guaranteed Crystal Set \$4
25-Mile
Or Money Refunded PRICE,
Send fifty cents for 20 efficient blue-print hook-ups.
Any Radio Set Made to Order or Repaired
Sunbeam Electric Co.
71 THIRD AVE. NEW YORK

The
GOODMAN
Is the Niftiest Short Wave
Tuner on the Market
Only \$6.00 & PP on 1 lb.
Send for pamphlet.
Order through your dealer.
L. W. GOODMAN
Manufacturer
DREXEL HILL, PA.
Dr. Miller, of Chicago, writes: "My perfectly good variometers and vario-coupler now go into the discard."

No Aerial No Loop
No Lamp Socket Attachment
ONLY—
RADIO-DUCT
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Sold in 10-Foot Rolls
At \$1.00 per Roll
IF YOUR DEALER HAS NOT GOT IT WE WILL SHIP DIRECT UPON RECEIPT OF YOUR REMITTANCE.
Columbia Electric Motor Co.
1414 ADAMS STREET
HOBOKEN NEW JERSEY
Telephone: 3731 Hoboken

Broadcasting Still Growing

THERE were 487 broadcasting stations licensed by the Department of Commerce up to August 26, licenses for 16 of which were issued during last week, while only one ceased to function—KZI, a station operated by Irving S. Cooper in the radio-crowded city of Los Angeles was dropped from the roll, so to speak. This station is one of scarcely half a dozen to stop broadcasting after undertaking the new and fascinating game of entertaining by the ether.

During the month of July, 76 broadcasting stations were opened in 68 different cities; Butte, Cedar Rapids, Hollywood, Joplin, Rockford, Ill., and Washington, D. C., getting two each; while Lincoln had three. The radio broadcasting boom is still on!

The following are the 16 new limited commercial or broadcasting stations licensed during week ending August 26:

- WLAD—Arvanette Radio Supply Co., Hastings, Neb.
- KFBN—Borch Radio Corp., Oakland, Cal.
- WLAJ—Johnson Radio Co., Lincoln, Neb.
- WKAM—Adam Breede, "Daily Tribune," Hastings, Neb.
- WKAL—Gray & Gray, Orange, Tex.
- WKAR—Michigan Agriculture College, East Lansing, Mich.
- WKAK—Okfuskee County News, Okemah, Okla.
- WMAA—Beaumont Radio Equipment Co., Beaumont, Tex.
- WKAT—Frankfort Morning Times, Frankfort, Ind.
- WMAH—General Supply Co., Lincoln, Neb.
- WLAB—George F. Grossman, Carrollton, Mo.
- WKAJ—Laconia Radio Club, Laconia, N. H.
- WKAS—L. E. Lines Music Co., Springfield, Mo.
- KFDB—John D. McKee, Lombard & Kearney, San Francisco, Cal.
- WNAL—R. J. Rockwell, Omaha, Neb.
- WKAW—Turner Cycle Co., Beloit, Wis.

Radioman a Hero

CHIEF RADIOMAN CLAUDE G. ALEXANDER has been commended by Acting Secretary of the Navy Roosevelt for his exceptional bravery in rescuing the pilot of a burning airplane at the risk of his own life.

Chief Alexander was a passenger in a naval plane, piloted by Ensign Ralph R. Auerswald on a cross-country flight in July, when the plane crashed near Encinitas, California, and almost immediately burst into flames. When the plane struck, Alexander managed to crawl out of his seat and release Ensign Auerswald's safety belt, lifting the unconscious pilot partly out of his cockpit before an explosion occurred, throwing Alexander clear of the wrecked plane. When he regained his feet, he saw Auerswald pitch headforemost out of the burning plane to the ground; picking him up, the gallant radioman carried him bodily to a place of safety. Chief Alexander's home is in Seward, Alaska, but he is attached to the U. S. S. "Aroostook," flagship of the Pacific Air Squadrons now at Mare Island, California.

Radio Train-Control

A NUMBER of attempts have been made to place locomotives under the control of the mysterious radio wave. None of them has been successful. But if battleships can be controlled in this fashion why not locomotives? asks the "Evening Mail Radio Review," New York. A safe and reliable radio train-control that would prevent railroad wrecks would be worth a lot of money to its inventor. Incidentally that inventor would be doing a great deal for humanity.

LOMBARDI
Vernier Variable Condensers
Best on the Market. Fully Guaranteed.
All Sizes. Dealers Write!
THE PLYMOUTH ELECTRIC CO.
155 Court Street New Haven, Conn.

RADIO BOXES
All radio carpentry work our specialty. Write for SPECIAL PRICES
JOE MIFSUD & CO.
373 Canal Street Telephone—Canal 9475
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Manufacturers of Radio Accessories
Eastern Radio Mfg. Co.
MAX RAHTHUS, Pres.
65 WEST BROADWAY
Near Murray Street
NEW YORK CITY

"SPAGHETTI"
VARNISHED TUBING
"EVERYTHING IN INSULATION"
VARNISHES, COMPOUNDS, PAPERS, ETC.
MITCHELL-RAND MFG. CO.
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BUILD YOUR OWN
Complete 50c. instruction book for 20c. only on radio reception and how to make eight classes of crystal and vacuum tube receiving sets. Wonderful information makes you understand radio. With every order we send free our price list of parts prepared especially for the several sets described. Buy direct from factory and save many dollars. Both instruction book and price list sent on receipt of 20c. only. Money back if not pleased.
RADIO PARTS MFG. CO.
Dept. 15, Park Pl. W., Detroit, Mich.

GOING—and Going Fast
We have only a few left and they are going fast, but while they last we will continue to sell them at the reduced price.
VT 1 Detector and Amplifier.....\$7.50
VT 2 Detector and Amplifier.....\$8.00
The above tubes are the genuine army J's and E's, respectively.
"RADIO BUILDER" PLANS FREE!
By Mail, 5c.
LIBERTY RADIO CO.
106 Liberty Street New York City

COMPLETE RADIO SET
READY TO LISTEN IN
\$14.50
C. O. D.
FOR THE COMPLETE SET,
INCLUDING AERIAL
(Regular Price: \$25)
This outfit is intended for the fan that appreciates a good thing. It includes a high grade tuner with a 40 to 60 mile radius, 1200 ohm phone, insulators, and complete aerial set. SEND NO MONEY unless you wish. Simply send us your name and address, and we will mail immediately. You pay Postman on arrival, our price, plus postage. Satisfaction Guaranteed, or money refunded.
THE UNWIN TRADING CO.
53 BROADWAY NEW YORK

KNOCKED-DOWN VARIABLE CONDENSER
MONEY-SAVING PRICES
An accurately made, fully efficient instrument that cannot get out of order or adjustment. Fully guaranteed. Extra heavy aluminum plates. Condensate end pieces. All other parts heavily nickel-plated. Knob and pointer included. Furnished assembled or knocked-down at the following low prices. Easily assembled by anyone following instructions furnished. Save money—order from us. Folder upon request.

No. of Plates	M.F.D. Capacity	Assembled	Knocked-down
3	.00007	\$1.75	\$1.50
11	.00025	\$2.50	\$2.00
21	.0005	\$3.25	\$2.50
43	.001	\$3.50	\$2.50

Lott's Better Radio Condenser Co.
475 ORANGE STREET NEWARK, N. J.

Linking the Americas by Radio

Three New Central-American Stations Will Embrace 54,000 Square Miles of Broadcasting Territory

By P. Boucheron

THE Radio Corporation of America has received orders from the United Fruit Company and the Tropical Radio Telegraph Company for five radio stations, three for Central America and two for the United States, each with a sending radius of more than 2,000 miles. The erection of these five stations will fill an important and essential gap in the radio communication system of the Americas.

The three Central American stations will be located on the corners of the triangle embracing Honduras, Nicaragua, and Panama. The Tropical Radio Telegraph's stations will be located at Managua, the capital of Nicaragua, and at Tegucigalpa, the capital of Honduras, the city designated as the capital of the new Central American Union. These stations will connect with the United Fruit Company's station at Panama.

The United States terminals of this communication system will be at New Orleans, where the present station of the Tropical Radio Telegraph Company is to be enlarged and new apparatus installed, and at a new station which the Tropical Radio Telegraph Company will erect in the vicinity of Miami, Florida. Intercommunication between these five stations, and ship-to-shore communications with them, will open up entirely new routes of communication between the Americas, one of which will be the opening of the radio route between Bogota, Colombia, and the United States, a distance of more than 2,000 miles.

The area embraced by the three Central American stations includes approximately 54,000 square miles, Managua, Almirante, and Tegucigalpa being separated by 150, 360, 460 miles respectively. Communications originating within the Central American States may be telegraphed over short distances by land wires to the triangle-group stations, then dispatched by radio to the United States or South America by the New Orleans or Bogota stations. Because of the layout of the three stations, service from nearly all parts of Central America is practicable. In fact, the system is designed to tie in all points from Southern Panama with North and South America.

Equally as important as the land and over-sea communication aspects of this new radio system is the announcement that the tropical stations will be used for ship-to-shore radio service by vessels plying the waters of the Atlantic Ocean, Gulf of Mexico, Caribbean Sea, and the Pacific Ocean.

The radical changes in the technical design of modern radio telegraph apparatus, the results of the combined efforts of the Radio Corporation of America and the General Electric Company, will be incorporated in the manufacture of the apparatus used in this intercontinent communication project. Years of exhaustive practical tests have slowly eliminated undesirable features of radio telegraph apparatus.

Vacuum tubes of the latest design, and many times more powerful than any tubes heretofore used in sets for commercial service, together with the highly efficient multiple-tuned antenna, will form some of the special features of these new stations. The wave lengths used will range from 2,500 to 4,500 meters, and the power actually delivered to the antenna at these wave lengths will be equivalent to over 100 kilowatts or the spark- or damped-wave apparatus.

It is worthy to note that in the case of the Tegucigalpa, Honduras, station the delicate radio apparatus, as well as the heavy steel members used in the construction of the 437-foot towers must be transported over an 80-mile mountain trail. It is expected that this station will be placed in operation in two months.

Record for Receiving Continental Code

EDITOR RADIO WORLD: In RADIO WORLD, August 5th, you make a statement in reply to an inquiry by Mary Mathews, Montreal, Canada, that the record for receiving Continental Code is 56½ words a minute, made by L. R. McElroy, of Boston.

I beg to inform you that a test was held some years ago by Mr. Vaughn, chief engineer of the G. P. O. telegraphs and telephones for the north of England, in which a Manchester telegraphist reached the speed of 80 words a minute. It was impossible to write down at that speed, so the message was just read off. If you have any record to beat that in the State I would be pleased to hear of it. NEAL PURTILL, late operator, City School of Wireless Telegraphy Manchester.

Winnipeg, Manitoba, Canada.

Subscribe for Radio World, \$6.00 a year, \$3.00 six months, \$1.50 three months.



Hard Rubber Composition PANELS

Conform to Navy Specifications

A High Resistance Panel, Guaranteed Not to Warp, and Drilled Cleanly Without a Burr. Highly Polished—Edges Ground to Size.

Standard sizes, 7x10x3/16, 7x18x3/16, 7x24x3/16, 10x12x3/16, and 12x14x3/16, in stock for immediate delivery. Orders for special sizes received in the morning, shipped the afternoon of the same day. Binding posts, dials, and knobs to match. We have a complete line of Coils, Variometers, Variocouplers, Sockets and Rheostats.

Largest Discounts. CAREFUL ATTENTION GIVEN
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THE IDEAL LOUD SPEAKER FOR THE HOME

—because we have absolutely eliminated distortion and metallic sound

We have done this by using a powerful reproducer which has no floating coil or other moving parts but the diaphragm. A reproducer diaphragm must vibrate in accord with all the delicate overtones of the human voice or the violin, or follow accurately the complex tones coming from a large orchestra or band. The paper-thin diaphragm of the SPIROLA reproducer can do this, but when a floating coil or armature such as is used in the ordinary loud speaker unit is added distortion must inevitably result.

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We are so sure that you will be delighted with the great volume of sound and the pure, clear tone of SPIROLA CONCERT that we unconditionally guarantee it. If you wish to return your SPIROLA for any reason whatsoever do so within ten days and your money will be immediately refunded.

Beautiful cabinet type, only eight inches high, choice of either mahogany or dark oak finish with bronzed throat, complete with cord—at your dealer or postpaid anywhere in the U. S., Canada or England. **\$12.50**

No adjustments or extra battery needed—just plug it in, in place of your headset. One or two stages of amplification give ample volume for almost all conditions. Made and sold by

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Advertising rates on request.

Entered as second-class matter, March 28, 1922,
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 the act of March 3, 1879.

IMPORTANT NOTICE:

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

Will Be More Common Than Telephone

THE future of radio telephony lies largely
 in its entertainment and amusement
 value. There are comparatively few Amer-
 icans who have not heard concerts, funny
 anecdotes or public speeches by radio," says
 Meade Brunet, sales director of the Radio
 Corporation of America.

"Radio is the solution of the 'Back to the
 Farm' movement. To keep the boys down
 on the farm all you have to do is install a
 radio receiving set in your front porch, and
 they can hear the best music and entertain-
 ment without going to a city.

"Within a few years the radiophone will
 be more common than the telephone because
 of its humorous and cultural value for all
 kinds of families.

"Everything broadcast must be capable of
 appealing to the finer sensibilities. No risque
 stories can be sold, no discordant tunes can
 be played and the moral standard of public
 taste is going to be raised."

A 300-Mile Aerial

TEMPORARY use of an aerial nearly
 300 miles long enabled R. C. Black-
 well, general repeater chief in the Postal
 Telegraph and Cable Company's main of-
 fice in Chicago, to hear distinctly a talk
 made by Ty Cobb, manager of the Detroit
 Tigers, which was broadcast recently
 through the Detroit "Free Press" station
 WCX. With the cooperation of Joseph M.
 Richardson, night chief operator in Detroit,
 Mr. Blackwell "killed" one of the trunk wires
 between the two cities by taking off the bat-
 teries. He then attached his home-made re-
 ceiving set in the Chicago office. Proximity
 of the Postal wires to the "Free Press"
 aerial in Detroit made the long line a per-
 fect conductor. The use of a double set
 of variable condensers was productive of
 improved results.

COMPLETE YOUR FILE—You can get all
 back numbers of RADIO WORLD to date (17 in
 all) at 15 cents a copy, or the whole 18 for \$2.65.
 Or subscribe at \$6.00 a year, \$3.00 six months, and
 we will start subscription with first issue.
 RADIO WORLD, 1493 Broadway, New York City.

Auction of Radio Equipment

APPROXIMATELY fifty complete radio-
 telegraph transmitting and receiving
 sets located at Norfolk, Virginia, will be
 sold by the Shipping Board on or before
 September 15. The sets are surplus equip-
 ment of the board, such as are now used
 on service vessels and known as Navy
 Standard Type 1 K. W. sets. The apparatus
 was manufactured by American Marconi
 Company, Kilbourne & Clark, E. J. Simon,
 and other reputable, American radio build-
 ers. A large quantity of other apparatus
 and parts, such as transmitters, crystal de-
 tectors, motor generators, batteries, coils,
 insulators, panels, rheostats, switches, trans-
 formers, and other component parts, ex-
 cepting receivers, is also awaiting purchas-
 ers at the Shipping Board's warehouse at
 Norfolk.

Radio and Politeness

I WAS listening to a radio concert—real
 stuff—overture to "Tannhaeuser"—when
 a strident voice burst upon the ether waves
 and this is what I heard, writes Bruno
 Lessing, in "The American," New York.

"Hello, Bill? D'ye get me, Bill? This
 is Howard. Ah—uh—say, Bill, how's the
 new set working? 'Zat so? Say, Bill—ah
 —uh—ye didn't forget number twenty-eight,
 did ye? What's that? Talk up, Bill."

It kept up for ten minutes, during which
 the concert—as far as my receiving set was
 concerned—went bla-a-ah.

Through the kind offices of an authority
 on radio I was able to obtain Howard's
 telephone number and I called him up.

"Do you realize," I asked, "that thousands
 of people were listening to a concert and
 that you spoiled all their pleasure by using
 your sending set?"

"Well, what about it?" he replied. "Is
 it against the law?"

Courtesy has often been called the virtue
 of kings. If that be true we are the most
 democratic country in the world. When
 Columbus landed courtesy departed.

Listen to the average conversation be-
 tween chauffeurs or truck drivers whose
 vehicles have become entangled, watch a
 crowd trying to get into a moving picture
 show, note the demeanor of sales-people in
 a store chatting with one another while
 customers are waiting, follow a poor Italian
 or Jewish or Greek peddler while he tries

to obtain an interview with a public official;
 follow any poor person anywhere and watch
 him try to get anything. And keep your
 eyes open for courtesy.

The funny thing about it is that polite-
 ness is one of the first results of education.
 Most people bewail the fact that they do
 not possess the education they desire. They
 want to learn.

The trouble is that they all want to begin
 with biology or history or languages or
 philosophy and not with politeness and
 grammar.

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charges your "A" or "B" battery over night. Silent and clean in
 operation—requires no watching—may be used right in your
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Connects to any lamp socket. Self-polarizing—fully automatic—
 cannot overcharge or injure the battery.

Entirely enclosed—approved by Underwriters. Unconditionally
 GUARANTEED. Lasts a lifetime.

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 handsome recharger ever produced. Sold by all dealers, \$18.00
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- .005 MFD Tested Condensers 75c

The above parts have been tested in our Demonstrating Set, and are made
 of the best material and guaranteed.

SEND CHECK OR MONEY ORDER—MONEY WILL BE REFUNDED if the
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22	\$0.40	\$0.68	\$1.22
24	.48	.79	1.41
26	.54	.96	1.73
28	.58	1.12	2.08

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Combinations Used with Single Primary-Circuits

Wave Length meters	Primary turns	Secondary turns	Primary condenser
180 to 325	35	25	Series
525 to 710	100	75	Series
900 to 1,350	200	100	Series
1,420 to 3,350	300	255	Series
7,600 to 11,900	500	1,000	Shunt
10,600 to 16,900	600	1,000	Shunt

Value of the "Wave Antenna"

MANY radio enthusiasts who have been bothered by interference arising from atmospheric electricity, or from other transmitting stations, have wondered how the great commercial receiving stations were able to pick up in a reliable manner the signals from Europe, says "The Times," New York, especially during the summer months when static disturbances are at the maximum.

A few years ago, it was necessary for a receiving station to be located about fifty miles from another receiving station in order to prevent local interference when the transmitter was in operation. It is now possible to minimize static and prevent interference from nearby transmitting apparatus by the use of a new antenna system known as the "wave antenna." One of the busiest receiving stations in the world is at Riverhead, L. I., and its efficiency may be attributed in a marked degree to the wave antenna system. A remarkable feature is its ability to tune out the powerful im-

pulses of the giant radio central, or the signals of New Brunswick, N. J., Tuckerton, N. J., and Marion, Mass., and thus copy messages from across the sea without the slightest interference when the nearby high powered transmitters are in operation. It is estimated by radio engineers that the wave antenna eliminates about 90 per cent. of interference created by atmospheric disturbances. The same system has been applied to ship communication with the result that ocean liners are in touch with the Cape Cod receiving station as soon as they clear the English Channel.

If a new transmitting station begins operation in Europe the only work necessary at Riverhead for reception of its signals is in the installation of a new set of receiving instruments on a shelf which stands ready for increased business.

A Prediction

Those who have faith in the radio industry would not be surprised if as much as \$30,000,000 worth of radio equipment is purchased during the holiday season.—"The Mail," New York.

Let Your Apparatus Speak for Itself

AMERICAN RADIO EXPOSITION

- A national exposition for radio manufacturers, dealers, inventors and amateurs, covering the entire field of radio.
- A complete exhibition of apparatus, accessories and materials.
- Daily demonstrations, broadcasting, lectures, orchestral concerts, Grand Opera artists in person—motion pictures illustrating practical uses of radio and the principles of its operation.

To be held at

Grand Central Palace

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—The heart of the great terminal zone, close to the busiest shopping districts.

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DECEMBER 21st to 31st, 1922

—Schools and colleges will be closed, making it convenient for young folks to attend. To these young people the magic of radio makes a specially strong appeal.

Manufacturers and dealers should contract for space now
Address inquiries as to rates, etc., to

AMERICAN RADIO EXPOSITION COMPANY

120 Broadway, New York City Telephone, John 0009

Educational and Interesting

British Fans Want Compact Tube Sets

ENGLAND is beginning to purchase radiotelephone sets and listen in to British and Continental broadcasters, according to John H. Grout, United States Consul at Hull, England, who explains that wireless telephony is becoming popular in private use, especially in Hull where about fifty receiving sets are in operation.

Broadcasting stations in England are expected to be in full operation, sending out programs such as are now enjoyed in the United States, within two months, and twenty British electrical firms are manufacturing receiving apparatus.

Although both crystal and vacuum-tube receivers, or "valve sets," as the British call them, are used, the latter is the more popular, except for those who prefer only local entertainment. In Hull, two- and three-valve sets are preferred. More of these sets would be used, it is believed by the American Consul, if they were available. In England they are manufactured principally in London, Birmingham and Manchester, selling in Hull for about \$51. A two-valve set connected with variable inductance and a variable condenser is found sufficient to receive the Hague concerts on 1,070 meters, and the Eiffel Tower broadcasts on 2,300 meters. Most of the fans around Hull use double vertical aerials with a receiving length of 150 feet, including the lead in, the British maximum for receiving. Permission of the Postmaster General in London is necessary before setting up a receiving set, and the license fee is \$2.43. Oscillating valves are not permitted except in transmitting sets, and a very few transmitting sets are used, the interest being centered on listening in at home.

American manufacturers will find British purchasers most interested in compact, vacuum-tube sets, and a list of Hull electrical dealers has been sent to the Department of Commerce for consultation.

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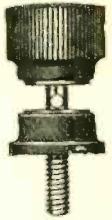
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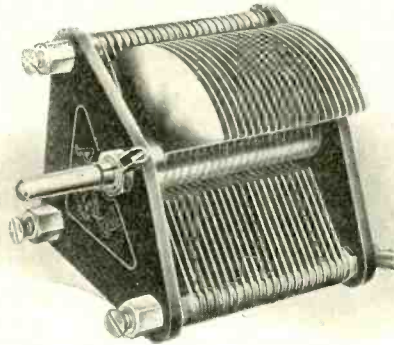
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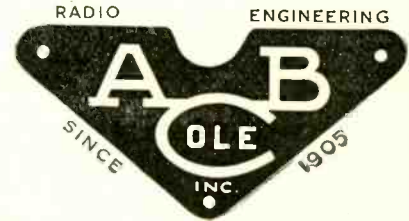
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The rate for this RADIO WORLD QUICK-ACTION CLASSIFIED AD. DEPT. is 5c. per word (minimum of 10 words, including address), 10% discount for 4 consecutive insertions, 15% for 13 consecutive insertions (3 months). Changes will be made in standing classified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

PATENTS—Electrical cases a specialty. Pre-war charges. B. P. Fishburne, Registered Patent Lawyer, 386 McGill Bldg., Washington, D. C.

Manufacturers of Rogers Radio Receivers and Rogers Receiving Radiometers. Rogers Radio Company, 5133 Woodworth Street, Pittsburgh, Pa.

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

BOYS—Write for our offer whereby you can secure a complete Audion Bulb Outfit and Amplifier FREE. LEE RADIO CORPORATION, Haddonfield, N. J.

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FOR SALE—Clapp-Eastham H. R. Receiver \$30.00; Western Electric Loud-Speaker, \$140.00; Atwater-Kent Variometers, \$6.50. H. B. Rogers, Cainsville, Missouri.

REGENERATIVE SETS below cost—Variometers, variocoupler-detector, two stage amplifier, jack control, complete, \$45.00. Caverley, 4744 Winthrop Ave., Chicago.

BUY RICO TRI-POLE HEADSET, \$6.40 or \$7.50; get \$3.00 or \$4.00 Variable Condenser free. Wonderful discounts to dealers. WAGNER NOVELTY CO., DEPT. R., DELPHOS, OHIO.

PATENTS—Send for form "Evidence of Conception" to be signed and witnessed. Form, fee schedule, information, free. Lancaster & Allwine, 259 Ouray Bldg., Washington, D. C.

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RADIO ENGRAVINGS FOR SALE—We have a large stock of radio half-tone and pen-and-ink reproductions which are suitable for magazines, illustrations, booklets, circulars, advertisements, etc. Tell us what you want and we will quote rates. R. W., Room 326, 1493 Broadway, New York City.

MY REGENERATIVE RECEIVER, DeForest-Remler type, using duo-lateral coils and Harko 2-step amplifier. Wired in cabinet and including B batteries, tubes and phones. Price \$75.00. S. Burke, 919 Va. Ave., Cumberland, Md.

If you did not get copies of Radio World, No. 1 to No. 21 send us \$3.00 or we will send you this paper for one year, (\$6.00 for 52 issues) and start it with our first issue, which will be mailed you as soon as possible after receipt of order.

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BUILD YOUR OWN RADIO RECEIVING SET. Complete directions with drawings and diagrams sent postpaid for 25c. SPECIAL: Best unmounted CRYSTAL DETECTOR on market sent postpaid for 40c. Send coin or money order today. Lowest prices on complete Receiving Sets and Parts. IMMEDIATE DELIVERIES. Complete catalog mailed free upon request.

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Pictures and Facts About Armstrong Amplifier

Radio World has published a number of pictures, diagrams and descriptive articles regarding the New Armstrong Super-Regenerative Amplifier. The numbers containing this material are dated June 24, July 8, July 15, and August 5. They will be sent postpaid on receipt of 15 cents each, the four copies complete for 60 cents. Or you can subscribe, \$6.00 year; \$3.00, six months; and have your subscription start with the number dated June 24. RADIO WORLD CO., 1493 Broadway, New York.

When Time Signals Are Transmitted

STARTING at five minutes before the time given for each station, time signals are sent out from the stations listed below. Each tick of a standard clock is transmitted as a dot, omitting the twenty-ninth second of each minute, the last five seconds of each of the

first four minutes, and, finally, the last ten seconds of the last minute. A dash is sent at the time given opposite the station.

All of these stations send out the time signal on the meridian standard time opposite their call. They are operated by the Navy.

STATION	CALL	WAVE LENGTH	TIME
Arlington, Va.	NAA	2500	Noon and 10 P. M. 75th meridian
Key West, Fla.	NAR	1500	Noon and 10 P. M. 75th meridian
New Orleans, La.	NAT	1000	Noon. 75th meridian
Darien, Canal Zone.	NBA	4000 (CW)	1 P. M. 75th meridian
North Head, Wash.	NPE	2800	Noon. 120th meridian
Eureka, Cal.	NPW	2000	Noon. 120th meridian
Pt. Arguello, Cal.	NPK	1512	Noon. 120th meridian
San Diego, Cal.	NPL	2400 (CW)	Noon. 120th meridian
San Francisco	NPG	2400	Noon and 10 P. M. 120th meridian
Great Lakes, Ill.	NAJ	1512	11 A. M. 90th meridian

No Danger from Radio Power

Dr. Charles P. Steinmetz, consulting engineer, General Electric Company, was asked the following question during his visit to the Radio Congress, Chicago:

"Dr. Steinmetz, many of us have amateur radio-receiving sets in our homes. We have heard rumors that the underwriters consider that there is a fire hazard because of the antenna and the ground connections, and that certain restrictions may be placed on amateur installations. We would like to have your opinion as to the real hazard involved."

Dr. Steinmetz replied as follows:

"There is no hazard in the amateur radio receiving station. It involves no fire risk nor risk to life. It is merely a harmless toy, but is a great deal more than a toy. It is one of the most valuable developments of recent years, by its instructive and educational value and the recreation and pleasure which it supplies. It would, therefore, be very regrettable if by a misguided public opinion obstructions were placed in the way of the fullest and freest development of the amateur radio-station. With regard to the possible lightning risk from the grounded antenna: first, the lightning risk in a city is very remote in any case; and, second, the grounded antenna rather acts like a lightning rod and exercises a protective action

against lightning. Any danger from the radio power received by the amateur station obviously is ridiculous when considering that the energy of a single pound of coal would be more than enough to operate the radio receiving-station continuously for over a thousand years. Certainly this is not enough energy to do harm."

Tune 20 times faster~ and louder with the ideal combination for vacuum tube control

The AMPLITROL
and the
KLOSNER RHEOSTAT
model 200 ~ see them at your dealer's

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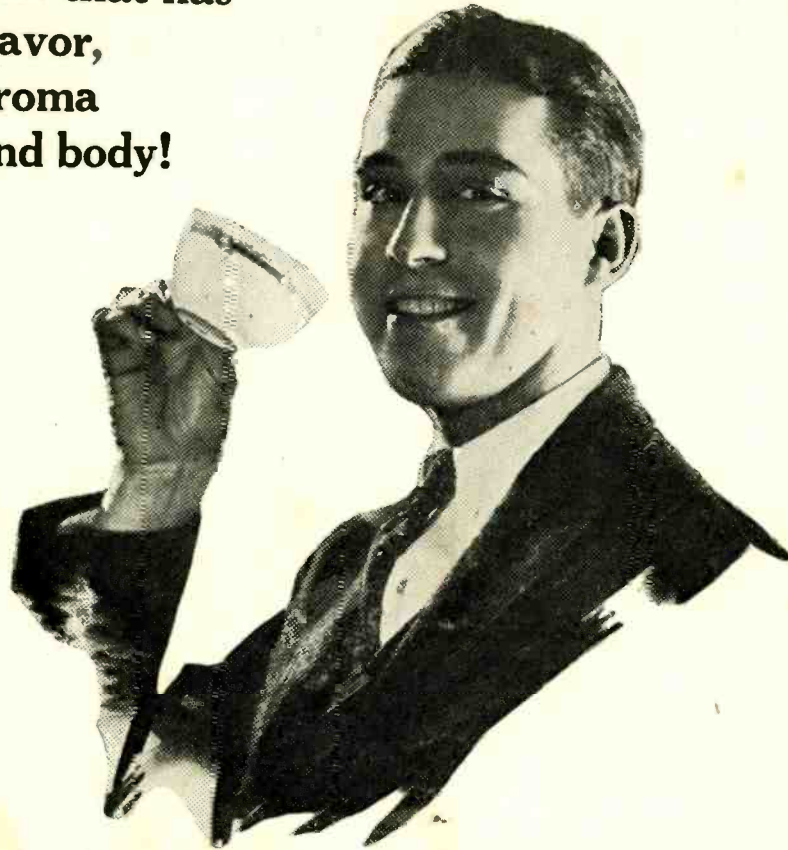
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and body!



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Ridgways Tea



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GRAND PRIZE San Diego 1916

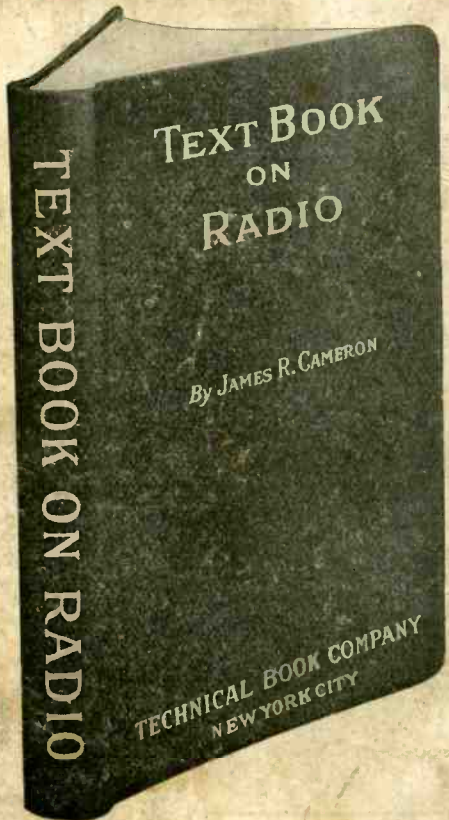
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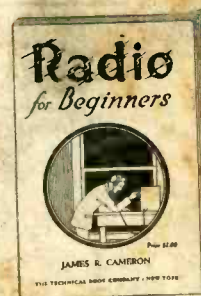
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