

# RADIO WORLD

(Trade Mark)

ILLUSTRATED WEEKLY

## How Clemenceau's Speeches Were Amplified from a Truck



(C. Kadel & Herber.)

To insure the vast audience that wished to hear Georges Clemenceau, "the Tiger of France," the Western Electric Company used a radio speech-amplifier mounted on an automobile truck stationed outside the hall where the speech was delivered. The photograph at the left shows the amplifying truck; at right, D. C. McGalliard operating the amplifier.



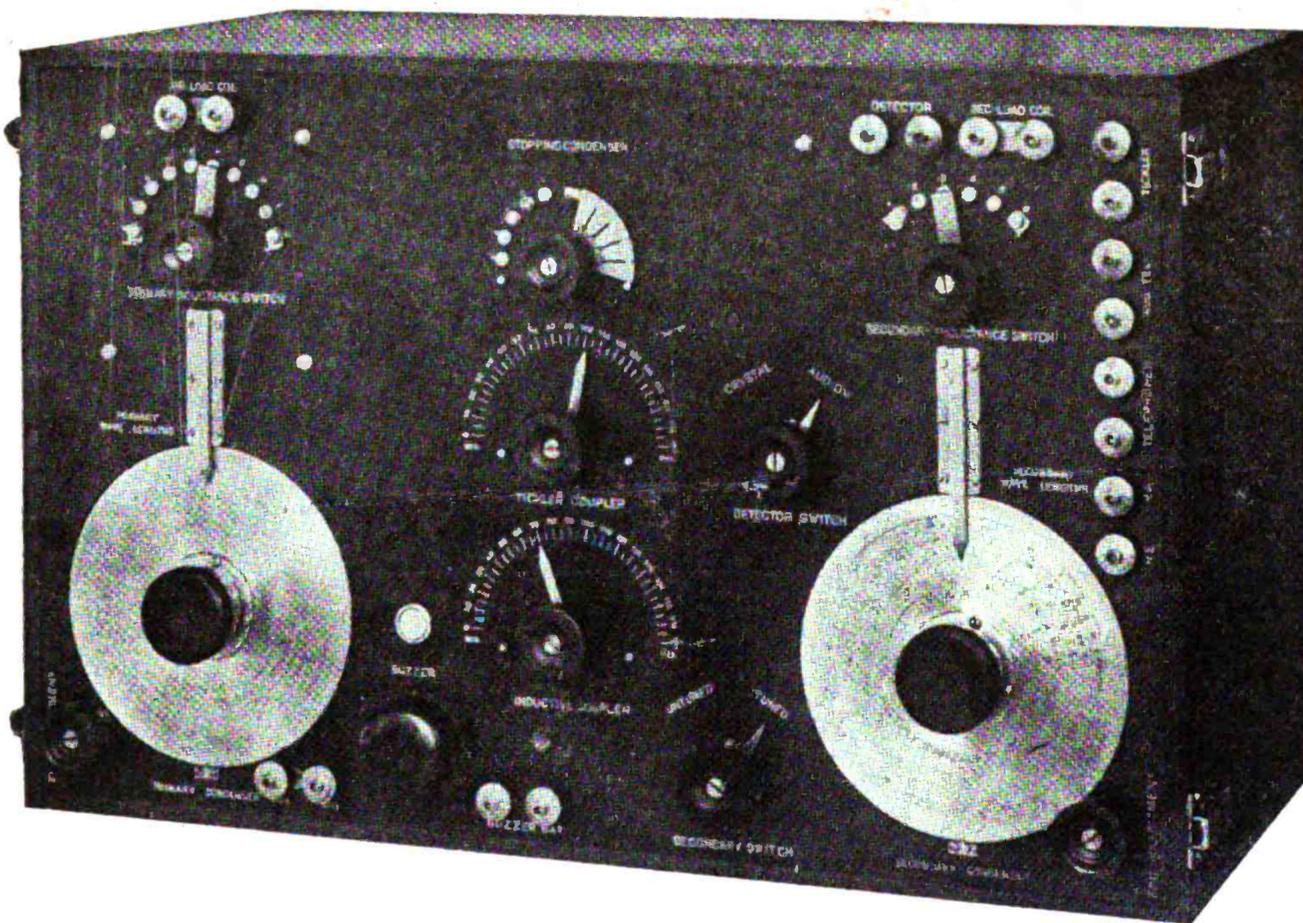
# A Gift For YOUR Entire Family

## *This Is a Radio Christmas*

### The De Luxe U. S. Navy Type Radio Receiver

#### Give the BEST

This De Luxe U. S. Navy Type Radio Receiver must not be confused with instruments selling for from \$200 to \$300. Highly selective. Will pick up messages, music, lectures, etc., that lower-priced instruments will not hear.



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**CHARLES R. ABLETT CO.**

199 Fulton St., NEW YORK CITY

**T**HIS receiver is equipped with binding posts which are normally short circuited for 300 to 6800 meters by which wave lengths up to 23,000 meters may be received by the attachment of loading coils. Capacities of proper loading coils for above are: Primary 50; Secondary 50; Tickler 30 millihenries. While the receiver is provided with a "standby" or untuned circuit, it also has an unusual degree of selectivity. Although primarily designed for the more advanced fields of Radio work, or the laboratory, the simplicity of arrangement and beauty of finish make it unusually desirable for the radio club or for the individual who desires the finest equipment obtainable for his home or office. In the receiver, Bakelite tubes, threaded, provide the forms on which inductance coils of high frequency cable are bankwound. After assembling, the coils are impregnated with an insulating compound, in vacuum, and thoroughly baked. The inductance switch controls a mechanism whereby the different sections may be connected, completely disconnected and opened, or completely disconnected and individually short circuited. This arrangement is important for, by it, each coil has a natural period when connected which is less than the shortest wave length in the receiver's range. The reception of parasitic signals is overcome, the absorption of desired signals by the coils is minimized, more energy is forced to the detector and on all wave lengths the interference is reduced.



VOLUME TWO OF  
**RADIO WORLD**

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## They Not Only Pump Air to Deep-Sea Divers But Keep in Touch with Them by Radio



When a man goes down into the ocean's depths, today, he does not have to worry that the telephone cable will break. He gets his instructions and also talks to the ship above by radio. This photograph shows one of the pumps that supply the diver with fresh air and, alongside of it, the transmitting set that makes it possible to keep in touch with him by radio. The aerial for the diver is an insulated wire strung inside his air-cable. He uses a waterproof set strapped to his back. This set is tuned to the wave length of the ship afloat. While submarine wireless is quite an everyday affair, the communication between the diver and ship is a recent improvement.

**T**O the uninitiated, it is a constant source of wonder and ever increasing mystery as to how deep-sea divers receive signals while under water. Both the United States government and private individuals have made experiments which prove that radio waves transverse water with the same ease as they transverse the air. It is no mystery, then, to understand that if you use a very well-insulated wire for an aerial communication may be carried on through the medium of water. In a series of tests made by government experts, it was established that a

submarine could carry on communication with land stations and airplanes while running fully submerged. A very interesting experiment may be tried out by experimenters who would like to prove this fact. Bury a well-insulated wire in some nearby fairly large body of water, using it as an aerial, and connect up your apparatus in the ordinary way, using the same body of water as a ground. Then use this aerial to prove that it is no different from the aerial you take hours to string up over your roof. Government experts claim that better reception of signals is accom-

plished in some cases than when a regular aerial is used. In the tropics there is a noticeable decrease in atmospheric disturbances when the submerged antennae is used. The outcome of several experiments that are being carried on at the present time will be published in RADIO WORLD as soon as they are made public, and some startling news may be expected. The French Government also is carrying on a similar series of tests along the same idea. It is claimed that France has something of vast importance in connection with grounds, which information will be known soon.

# How to Put a Vernier Attachment on Your Condensers

By Ortherus Gordon

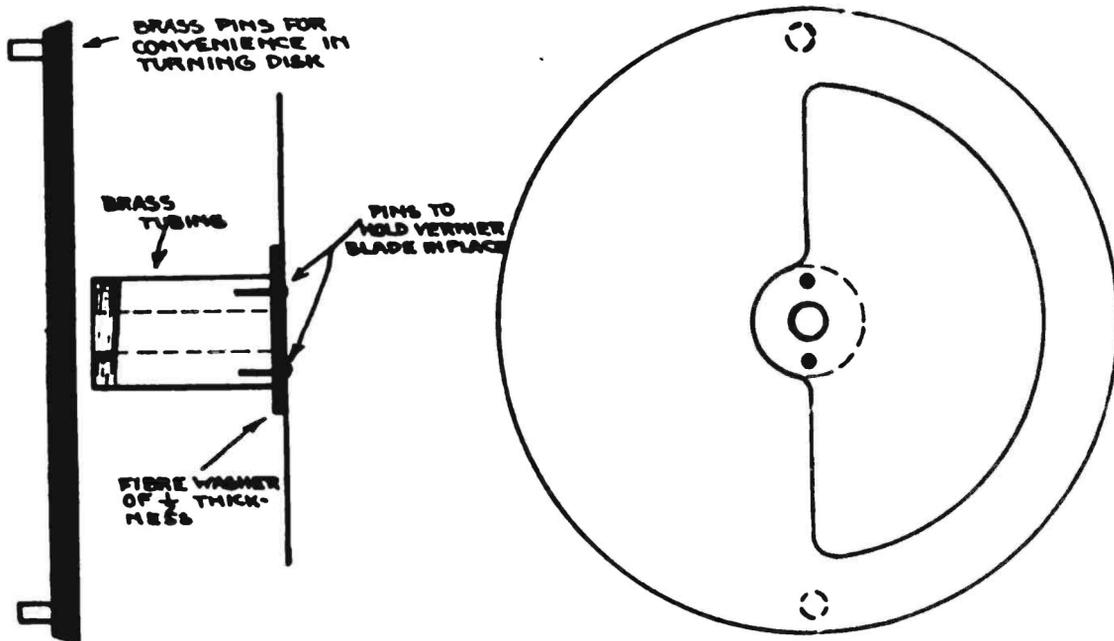


Figure 1—Home-made vernier attachment which may be applied to any standard make of variable condenser.

**R**IGHT on the heels of the need for sharp adjustment of radio instruments have come "vernier" attachments for almost everything. Vernier is not a Scotch word, meaning "close"; but the last name of a Frenchman—Pierre Vernier—who first felt the maddening desire for a scale which would measure the fractional parts of a whole unit. He invented what is now known as the "vernier scale." His idea was hailed as a boon by scientists. At the present day a scientific instrument which has any leaning toward accuracy cannot afford to be without a vernier attachment. In fact, some of the verniers are so minute that they carry a magnifying glass around with them for convenience in reading; otherwise the fine points would be lost to the naked eye.

Applied to radio apparatus the vernier idea has given manufacturers

a chance to put out some pretty slick articles, especially in the way of variable condensers. But woe to the radio amateur who already has variable condensers without Pierre Vernier's neat device to make them discriminating and set them off! Scrapping perfectly good variables is out of the question—even if in favor of such a desirable feature as the vernier.

There is only one attitude the unlucky amateur can take—look glum and stand it, unless he sees some merit in the idea that one radio amateur worked out for the benefit of his own little variable condensers. He wanted a vernier control on his condensers because he knew what close tuning meant. He couldn't afford, however, to buy new instruments. Therefore, being a radio amateur, his thoughts naturally turned toward home construction, and they weren't bent more

than a minute in that direction before he decided that what he wanted was not construction, but reconstruction. In other words, instead of building a whole new condenser he decided to build only the vernier attachment and then find some way to add it to his existing instrument.

No sooner said and fretted about than, shortly afterwards, several ways were outlined in which the great idea could be worked out. A little later came definite plans. There it was—the neatest little vernier attachment you ever saw, movable and everything, which could be added to a standard

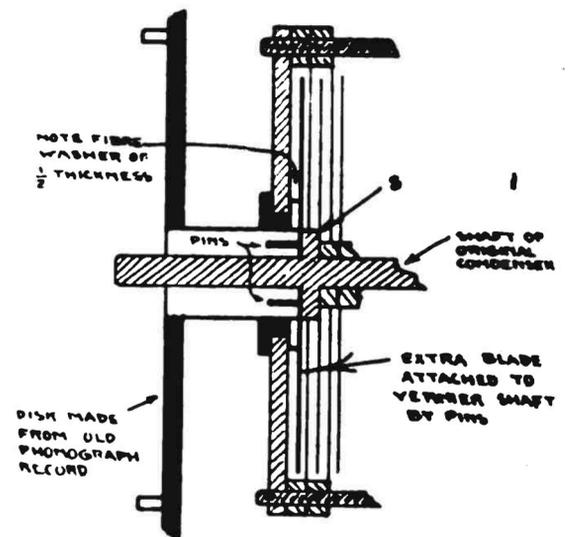


Figure 3—Assembly of the vernier unit and the standard condenser. The phonograph disc is not put on until completed instrument is mounted on panel.

condenser without danger of putting it out of commission! This article, illustrated by the sketches, tells how the amateur did it.

What he wanted was an extra movable blade—not one that turned with the others, but an independent affair, which would swing off by itself when he so desired. He also wanted something that could be operated from the panel and that wouldn't be a disgrace to his bright 3-inch dial.

To fill these requirements he collected, on his workshop bench, an old phonograph-record, one fiber washer, a piece of brass tubing and two new condenser blades—one for the stator and the other for the rotor. The inside diameter of the brass tubing was slightly larger than the outside diameter of the rotor shaft, so that the tubing would fit snugly over it. With these simple parts he proceeded to make the "vernier unit."

When it was finished it looked like Figure 1. The phonograph-record had

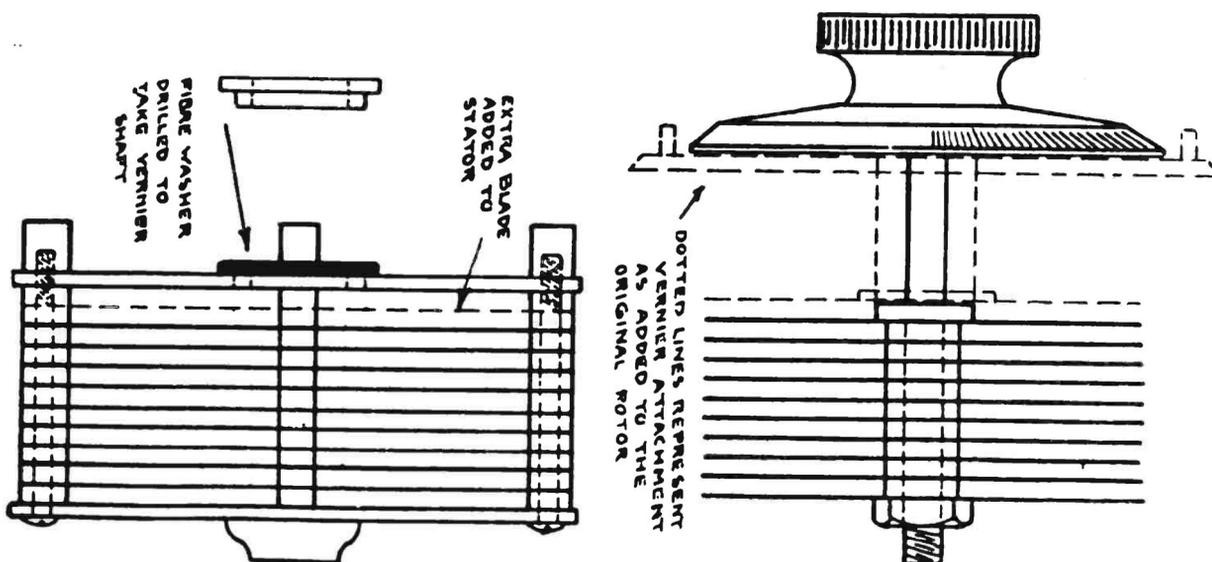


Figure 2—Vernier attachment as fitted to the rotor of the standard condenser, also the changes made to the stator of the condenser to accommodate the new unit.

## Broadcasting the Yale-Harvard Game



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

The photograph tells the story. In the background is the soundproof booth which overlooked Yale Bowl. In the right foreground, on the overcoat of a newspaper reporter, is reproducer, the device by which the cheers could be heard so plainly. Men with reproducers attached to their overcoats were scattered about the huge bowl so that any section that started cheers or songs could be immediately heard by just plugging in at the booth. From the booth the sounds were transmitted by special wire to WEA.

## Short Waves

By John Kent

### The Potentiometer's Work

THE potentiometer produces fine variations of voltage by means of a sliding contact which plays over a fixed resistance through which a constant current flows and which has a certain definite resistance. A clear idea of the potentiometer may be had by taking two circuits, an input and an output, going to and coming from the resistance. The input, which may be a source of emf (electromotive force), goes to the ends of the resistance. The output is taken from one end of the potentiometer and the sliding contact.

Ohm's law states that  $E = I \times R$  (Voltage equals amperage times resistance), and since the input circuit is through the whole resistance,  $I$  remains constant. The part of the resistance between the variable contact and the end from which the output circuit is taken is variable; hence, since  $I$  is constant, in order to maintain the equality of the equation, voltage equals amperage times resistance. If the resistance changes then the voltage must change in the same direction by a proportional amount.

\* \* \*

### Try This Method

MANY amateurs like to hook up their own sets. They buy a lot of apparatus, a panel and other devices, then they solder up all the connections and are surprised and disappointed when they don't get the results they expect. Try this: Instead of going ahead and hooking up permanently at once, use some old copper wire and experiment. Then if you don't get satisfactory results, you can change your connections without feeling that you have been stung.

\* \* \*

### The Sensitive Spot

IN operating a crystal detector, it often occurs that a sensitive spot usually is lost with the least jar or shaking of the table. To keep a proper balance, adjust your crystal detector to the sensitive spot of reception. Drop some melted wax from the top of a battery onto the covering of the crystal detector. This means that the sensitive spot of the crystal must be covered. The detector will then be grease proof and cannot be knocked out of ad-

(Continued from preceding page)

been cut down until it was half an inch larger all around than the dial. The hole in its center had been enlarged and the threaded end of the brass tubing fitted snugly into it. On the other end of the brass tubing, fastened to it by pins riveted over, was a condenser blade. The whole unit, plus a fiber washer, as shown, was slid over the shaft of the rotor so that the new blade fitted closely against the shoulder of the shaft, as shown in the upper part of Figure 2. The "vernier unit" is drawn in with dotted lines.

The shoulder mentioned (S) should be filed, or machined, so that it is the same thickness as the washers which separate the blades, otherwise the corresponding spaces in the stator will have to be widened so that the vernier blade will not touch any of the stationary blades.

In preparing the stator so that it will accommodate the extra "unit" it was only necessary to add a blade, as indicated by the dotted line in the lower part of Figure 2. Mr. Amateur also found it necessary to enlarge the fiber bushing in the cover of the stator so that it would take the increased diameter of the brass tubing. This is also indicated in Figure 2.

The vernier unit made and the stator prepared, everything was ready for assembling. Figure 3 gives an idea of how the condenser was put together again. A fiber washer, just one-half

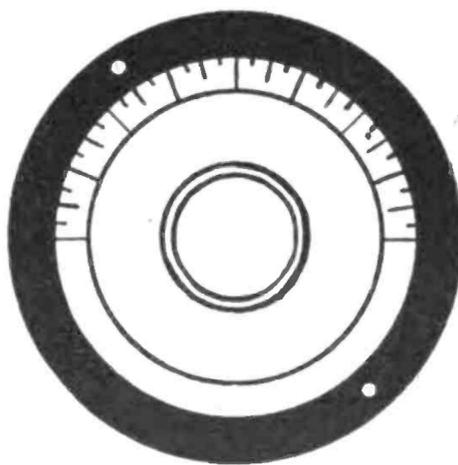


Figure 4—How the disc of the vernier attachment and the dial of the regular instrument look on the panel. The disc and the dial are not put on until the instrument is set up on the panel.

as thick as the space washers used in the instrument, must be inserted between the vernier blade and the inside of the stator cover, as shown in the sketch. The disc and the dial are not put on until the instrument is set up on the panel. Then both disc and dial go on outside, so that it appears as in Figure 4.

The reconstructed instrument is a beauty. The pins, which are sunk into the phonograph disc, help in the adjustment because, actuated by them, the vernier plate may be turned by the idle fingers while the other movable plates are being turned by the thumb and forefingers.

No dimensions are given in this article. It is the idea itself that is the more important

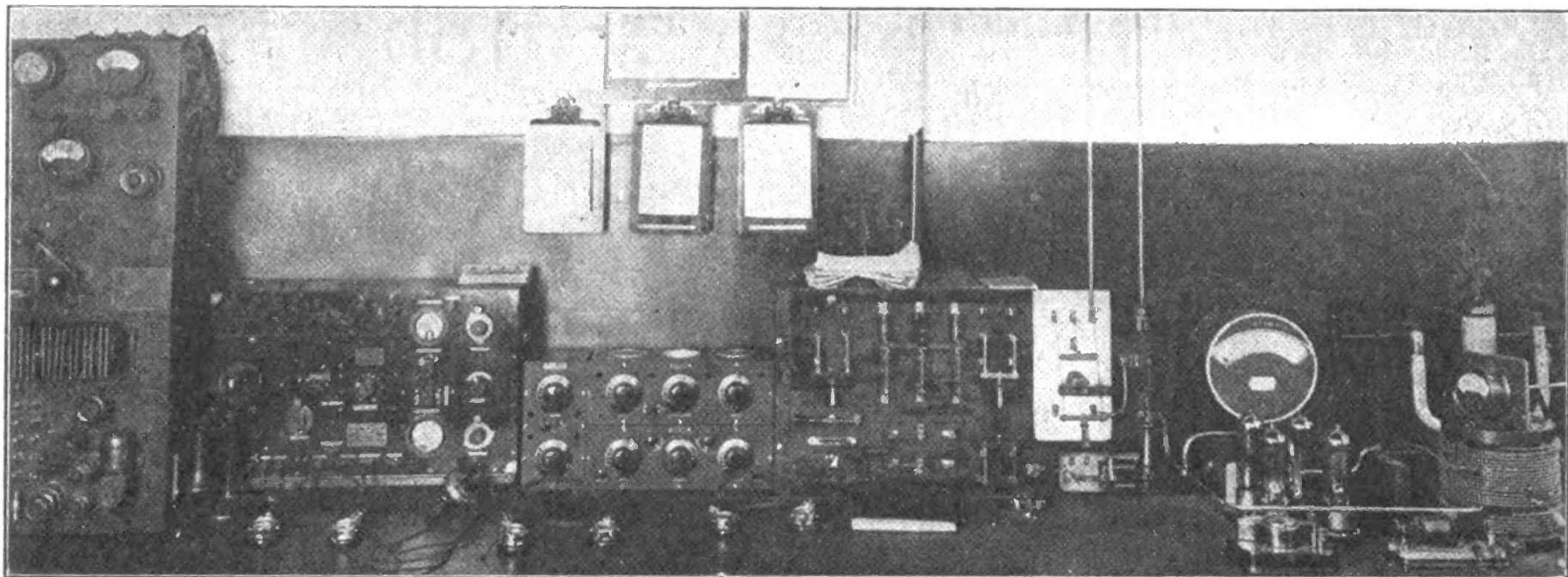


Figure 1—General arrangement of the receiving and sending apparatus of 1XM. On the extreme left is shown the 200-watt, quenched-spark transmitter used only as an emergency set and which has a normal working range of 500 miles.

# 1XM — A Station That Claims High Radio Honors

*By C. White, Consulting Engineer*

**T**HE Massachusetts Institute of Technology's radio station 1XM, operated by the M. I. T. Radio Society, is one of the most remarkable amateur radio installations in the United States. Its unique design and high operating-efficiency place it in a class by itself. Signals transmitted by this station have been heard many times in Honolulu and very often in Great Britain and Europe. Such results are made possible only by the most careful technical attention to small-design problems, which actually determine the success of a station.

Figure 1 illustrates the general arrangement of the sending and receiv-

ing apparatus. On the extreme left is shown a 200-watt quenched-spark transmitter used only as an emergency set, and which has a normal working range of 500 miles. Next to it is a Signal Corps type of radiophone transmitter and receiver. This outfit is often used for reception. At times, it is employed to broadcast local phone-messages, but its use in this particular field is limited by the local broadcasting stations. The next group of apparatus is an Amrad short-wave receiver, using radio- and audio-frequency amplification. The switch-board panel is unique in operation. It effectively controls the motor-generators and the connections for modulation on the tube transmitter shown on the right.

This transmitter has a normal working range from 3,000 to 6,000 miles! It is creating much attention among radio amateurs. This feat of opera-

tion is really worthy of nation-wide comment, since with only four 50-watt tubes an amateur station can send at a range equal to that of a commercial station using *many times* the power.

For straight C-W, 1000 volts is impressed on the plate circuit of the tubes and the modulation is accomplished by a key through relays on the grid circuit. The carrying power of the 200-meter wave is enormous. The 1000 volts, D-C, for the plate supply, is obtained by a mercury arc rectifier. For work at shorter ranges, the plate-supply voltage is taken directly from the 500-cycle motor-generator. By this method, a characteristic pitch note is produced. Those amateurs who have copied 1XM signals will testify as to the quality of this note.

Figure 3 shows a close-up of the transmitter showing the control panel, key, and relays, tubes, meters, transformers and filters (under table), tun-

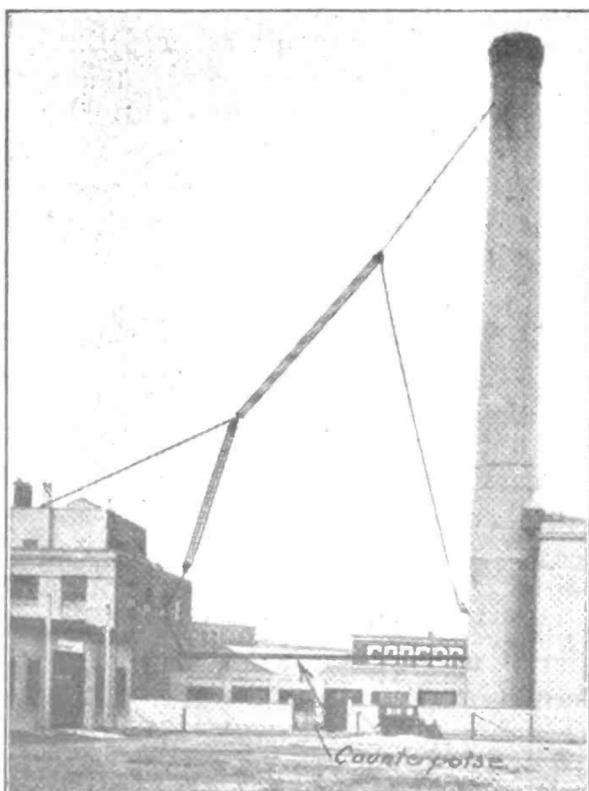


Figure 2—Showing the counterpoise which is used for a ground. The low capacity of this system causes a very sharp wave to be radiated.

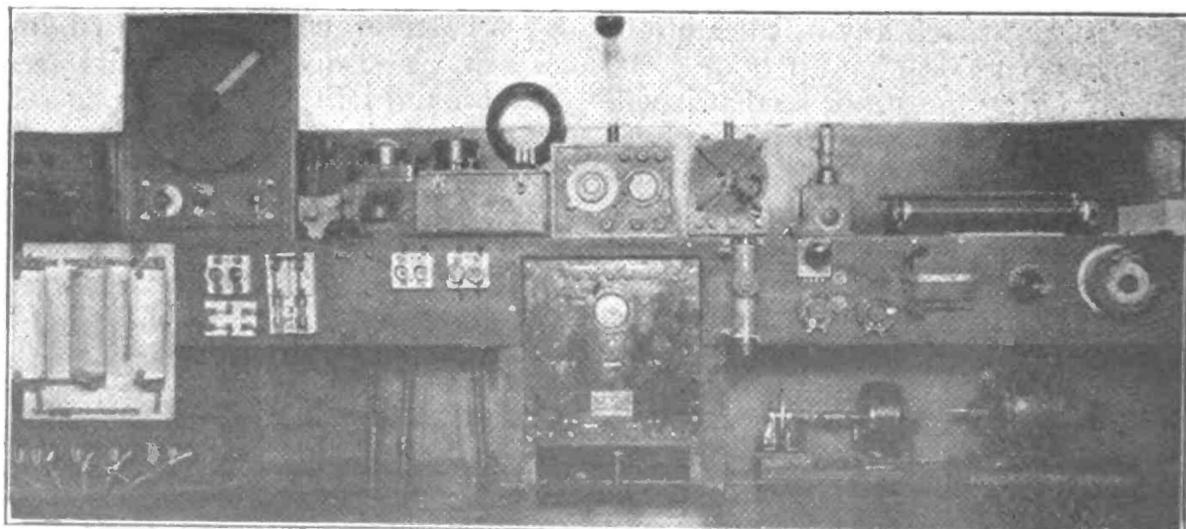


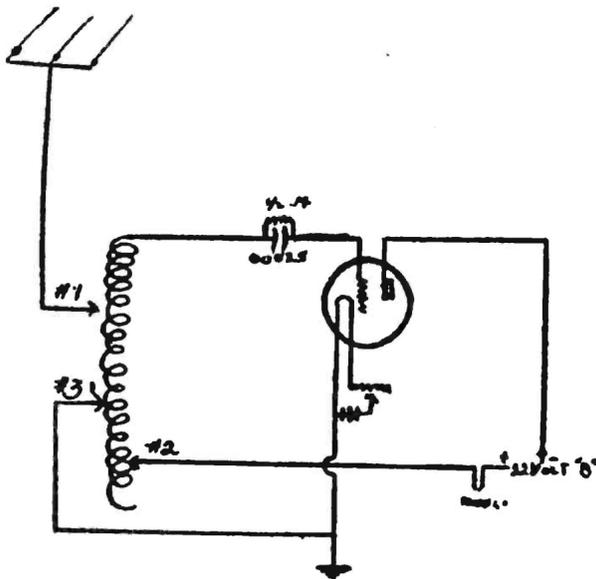
Figure 3—Close-up of the transmitter showing the control panel, key, relays, tubes, meters, transformers and tuning coil, also the mercury arc-rectifier. The radiating equipment consists of four wire cage-aerials one hundred feet long.

# Try This New Tuning-Coil Hook-up

By Robert L. Dougherty

**I**N these days, when all you hear talked about in radio is superregeneration, heterodyne, and two-variometer circuits, other elements are overlooked. If one refers to a tuning coil, he is looked at in surprise and, maybe, disgust. But if the average amateur were to be told that he could get regeneration on a three-slide tuning coil, he would turn from disgust to wonder. However, this is just what I am going to try to prove to you in this hook-up.

For the person who is inclined to experiment, or the radioist who would like to have a bulb set but is hindered by lack of ready funds, the little circuit published herewith will prove a pleasant surprise. It is not without its merits. Of course, the results will not be equal to those of a three-unit regenerative set, yet it is surprising what may be accomplished with it after one has become accustomed to its manipulation.



Schematic diagram of hook-up for a three-slide regenerative set. If you happen to have a variable condenser around, you can insert it in the aerial load. This will make the set more selective, although it is not absolutely necessary for proper manipulation. The new W-D 11 works admirably with this hook-up. It needs only a single dry-cell to operate at its highest efficiency. Long distances have been worked with this set. See what you can do with it—you sceptics and hook-up hounds.

The apparatus needed is a three-slide tuner, a bulb, socket, rheostat, A and B batteries, and phones. When hooked up according to the illustration, and slider No. 1 is moved back and forth—that is, the one controlling the wave length—a sound similar to the “frying noise” in a regular regenerative set will be heard. If this noise is not heard, you will have to adjust slider No. 3. The best position for this slider will generally be found about three fourths of the way along the coil in approximately the same position as that accompanied in the illustration. Slider No. 2 should be used after the signals are heard; but it will be found that it will work best when kept below the position of slider No. 3. After slider No. 3 has been adjusted, it will not be necessary to move it, as all the tuning is now done with Nos. 1 and 2. A variable grid leak is of great assistance in connection with this hookup.

## Radio Relays to Remember

By George W. May, R. E.

### Topography of Country Effects Range

**O**NE important element in radio is “the lay of the land”—the topography of the country. It has a great deal to do with the effective range of both the receiving and the transmitting set. Outfits that are exactly alike in their make-up and located only a few hundred feet away, have been known to have widely different ranges. Many times this has been experienced by the average radioman and, some-

times, found hard to explain; for conditions seem to be apparently the same, but close observations will bring to light some little factors that tend to reduce or increase the range of the set.

Many advocates of the open air who take their receiving sets with them, especially when situated in a depression between mountains, may be disappointed when they get poor results or even no results. It is a known fact that radio waves do not descend to any extent into valleys

surrounded by high, steep mountains. If there is a considerable space, this does not hold true; for in this case the radio waves follow more readily the exact contour of the earth's surface. When the mountains are close together, the waves seem to jump from peak to peak rather than descend between them. If you are in the mountains, try and erect your aerial at as high a point as possible. Maybe you happen to be in a location where your signals are poor. Dry, arid land surrounding a radio station also tends to reduce its range, while expanses of water will tend to increase the range. Surroundings of metal often decrease the range. High, steel buildings absorb waves. Whenever you are surrounded by buildings, it is well to suspend your aerial as high as possible.

\* \* \*

### Locating the Aerial

**W**ITH the best of conditions, the aerial can be run from one end to the other of the house, inside as well as on the roof, although the outside aerial is recommended as superior to any other. The greater the height at which it can be suspended has some effect on the ability of catching wave trains or signals. We must remember that radio waves go through everything. The plaster on the walls of a house have no effect on radio waves and offer no obstruction to them what-

(Continued from preceding page)  
ing coil, and the mercury arc-rectifier.

The radiating equipment consists of four wire cage-aerials 100 feet long, the upper end of the antennae is attached to a 150-foot stack. A counterpoise is used for a ground, and the low capacity of this system causes a very sharp wave to be radiated.

Figure 3 also shows the general appearance of the system and gives a fair conception of the magnitude. The efficiency of the cage-type aerial, as proved by actual tests at this station is very high.

Aside from the ordinary routine relay of messages, the society conducts an active research and testing cam-

paign. Many of the experiments carried out at this station are of an extreme technical nature. The result of tireless effort has been the development of many new and unique hook-ups.

Figure 3 gives a general idea of the nature of the experimental bench. The ease with which any voltage, A-C or D-C, may be obtained makes it quite easy to conduct any type of test work with the minimum amount of wiring. By diligent application, due to well-founded technical training and experience, this station is maintained and operated at maximum efficiency. New apparatus is constantly being added. An 8-tube superheterodyne was con-

# Secretary Denby Rates Radio High in Government Work

Naval Service Earns Over Two Million Dollars in Six Years. Aids Merchant Marine, Press, and Governmental Service

By Carl H. Butman

WASHINGTON, D. C. — Radio in the United States Navy, taken solely as a business proposition, is a money maker for the government. During the past six years, \$2,222,956 has been deposited in the United States Treasury out of a far greater amount collected for the transmission of commercial radio messages. The collections during the last fiscal year totaled \$627,904, out of which \$369,735 was deposited in the treasury, Secretary Edwin Denby states in his annual report. Collections in the year 1922-23 showed a falling off of such receipts due to the fact that many merchant ships were laid up, while savings also decreased because all governmental departments were endeavoring to economize in communication expenses.

Governmental traffic handled by Naval Radio stations, other than Naval communications, would have cost \$1,080,800 at commercial rates and was less than a third of the traffic handled the preceding year.

This amount added to the commercial receipts would have brought the year's business in Naval radio traffic to \$1,708,704 in receipts and savings. When it is considered that the Navy in no way competes with commercial stations, but handles messages only where and when commercial stations are not available, the aid rendered in this auxiliary radio work is better appreciated.

For the Merchant Marine alone the Naval Communication Service handled 3,749,483 words during the past year and forwarded press matter to the number of 1,012,279 words.

As a new departure in the interests of economy, an attempt was made, last summer, to employ the Naval radio circuits exclusively for transcontinental traffic, but static interfered in May and June so severely that delays were encountered. Fairly satisfactory results were obtained from transpacific circuits, but the completion of the new high-powered set at Guam is required for efficiency in that circuit. Headquarters of the

European communication service were established at Paris, and of the Asiatic Division at Cavite. In Europe, the Naval Service co-operated with the American Relief Administration and the European Chile Fund. During the Limitation of Arms Conference, two Pacific circuits were set up for the Japanese Government, one of which has been continued for business purposes between the United States and Japanese Governments.

A service rendered by the Navy, but little known, is in receiving S O S calls, which in the winter average thirty a month on the coast between Maine and Cape Hatteras.

Sixteen of the Navy's shore radio stations were closed as "not necessary in accordance with the approved national policies," during the past twelve months. Twelve of the fifty-six radio compass stations, operated by the Navy free for the benefit of merchant vessels lost in fog or without efficient compasses, may have to be eliminated due to lack of personnel, it is stated by Secretary Denby. He explains that the furnishing of compass bearings to vessels off the Coasts and on the Great Lakes is of great value to shipping interests. Some stations handle as many as fifty calls a day in bad weather.

At present these stations operate on an 800-meter wave and are efficient for a range up to 150 miles, but a new long-wave radio compass is being developed which will operate on waves between 500 and 2,500 meters. This would increase the distance of audibility up to about 1,000 miles. In addition, it is expected that this instrument will have great value in time of war.

A new Naval radio-set for use in spotting gun fire was tested out at the Anacostia Naval Air Station recently. After a fifteen-hour flight-test with the manufacturer's model of the SE-1375 spotting plane set, the model was returned to the manufacturers as a guide for production of a number of sets. It is reported to have stood up well under the test and, with the exception of a few minor changes, to have given very satisfactory results.

## Roughing It By Radio

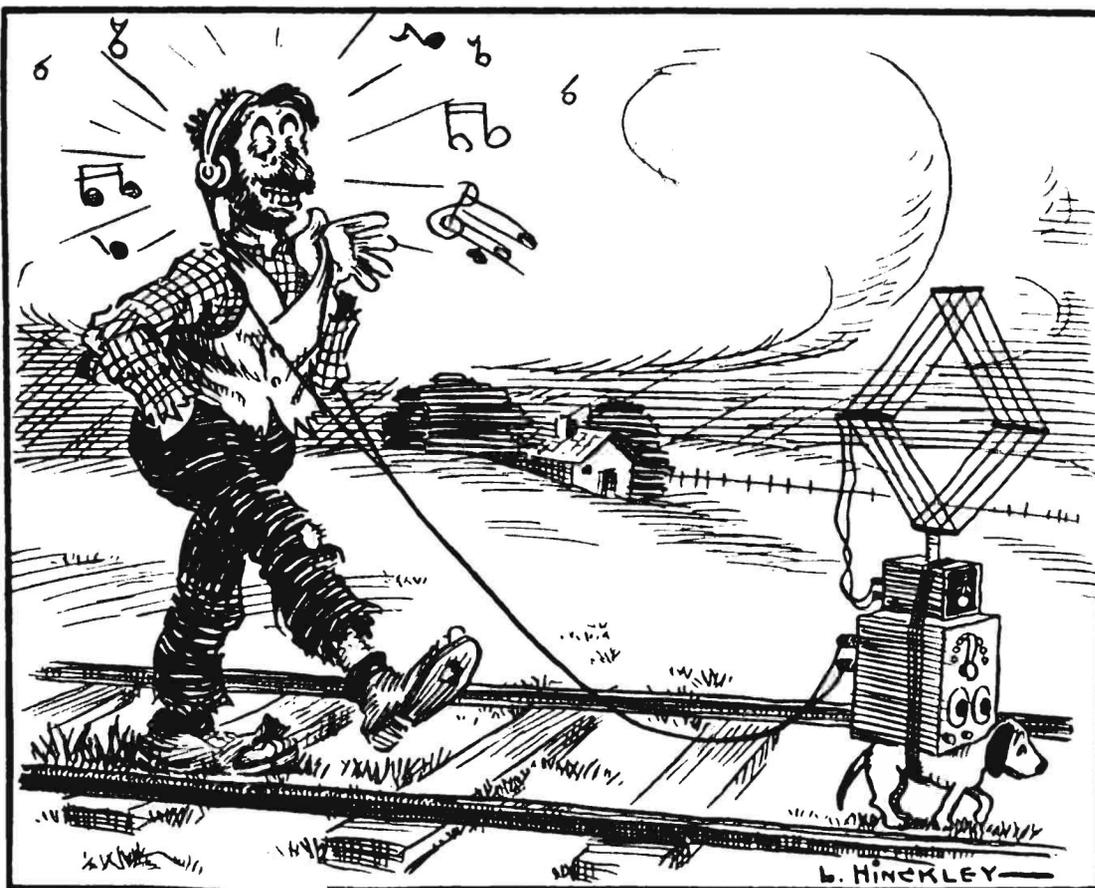


Illustration by Lawrence B. Hinckley

# Accurate Tuning with the Capacity Switch

By Donald Van Wyck

**T**HE desire to place all controlling elements of a cabinet radio-receiving set on the outside of the panel has brought into general use the series parallel-switch. The suggestion that additional instruments be provided for the receiving set in order to increase selectivity is usually accompanied by groans from the man who pays the bills. But when incorporated in the outfit they may be rearranged to advantage.

The rearrangement consists chiefly in reconnecting the primary condenser so that its sphere of usefulness is considerably increased. By the shifting of a few wires and the addition of a single-switch knob,

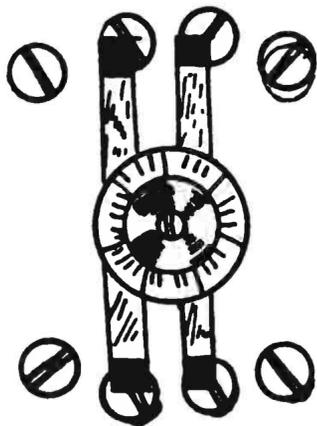


Figure 1. How the switch will look when completed and laid out on the panel.

the goal is achieved. The effect on the radio enthusiast when another switch is added depends entirely on his status in the radio field. The newcomer who scarcely knows the controls feels that he never will be able to tune in the set properly.

The amateur out in the country where open space is not at a premium generally erects an aerial of 200 feet or more. No doubt he believes that a long aerial will produce signals of greater strength; but he fails to consider that radio-phone broadcasting, in which he is most interested, is sent on a wave of 360 or 400 meters, whereas his aerial has a fundamental wavelength of, maybe, 450 meters or more, or is probably very short.

With this in view, the only possible move is to insert some capacity switch and capacity in series, or parallel, with the aerial. The aerial is like a huge conductor with the earth as the other conductor and the air between as an insulator, or dielectric. Thus, by placing a condenser in series with the aerial, it will produce an effect similar to two condensers in series.

The primary condenser of radio-receiving sets is usually connected



Figure 2—A completed knob made from a wooden spool.

in series with either the ground or the antenna lead. When it is in this position, it enables the desired fine tuning, but does so by simultaneously shortening the natural period of the antenna system comprising antenna and ground leads and the primary inductance.

While this reducing is permissible with the antenna and variable condensers in use, it nevertheless lowers the effective tuning of the set as a whole. The series variable condenser makes the tuning of the receiving set more difficult.

With the variable condenser placed in series with the primary inductance, tuning may be said to be more complex because the condenser unit must be set within certain limits depending on the wavelength to be received. This with the primary fine and coarse switches makes three controls which must be set in correct relation to one another. When the primary condenser is connected in parallel to the primary coil the condenser dial may remain at zero during the preliminary tuning with the switches, and, later, may be utilized as a corrective tuning measure. This latter arrangement also increases the wavelength to which apparatus may be tuned.

There is no doubt that both series and parallel switches have their advantage, the former for the lower and the latter for the longer wavelengths possible with each particular outfit. This series parallel-switch then answers the purpose. This switch has puzzled many radio amateurs who are puzzled when they realize its complications. The double switch-arm has also served to confuse the casual inspector because he labors under the impression that it is necessary to bring flexible leads to each of these metal strips or else he thought that both arms were separate pieces of sheet metal. Yet the series parallel-switch is nothing more than two separate contact arms. It is simpler to construct your own capacity switch than to go out and purchase

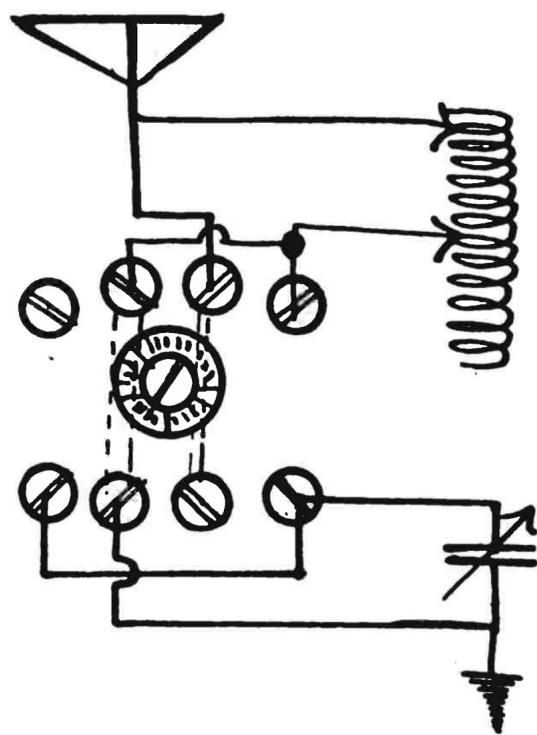


Figure 3—Schematic diagram showing how to hook-up apparatus for a series-parallel switch.

switch consist of spring sheet-brass, a switch knob, and 8 contact points. The knob may be made at home from a piece of hard wood or hard rubber, or it may be made from a large-size thread spool sawed radially in half.

Two contact arms are cut from the sheet brass in the shape shown. The distance from end to end may not exceed 3 inches, and may be less, depending on the amount of available space. From each end, bend the strip at right angles about  $\frac{1}{8}$  of an inch from the end. The two metal arms are screwed to the knob on the large, or under, side by small wood screws. The spacing between the two blades is such that there is at least  $\frac{1}{8}$  of an inch to separate the two inside edges, and that the cut-out portions at the center may not touch the machine screw which holds the knob in place. The eight contact points for the switch are placed four on each side of the center along the arc traversed by the ends of the switch arms. The spacing between the points is determined by the switch blades and should be such that the blades rest squarely upon the faces of the contacts in each position. The contact points should be neatly placed with reference to the center line of the switch knob so that the appearance of the panel may be enhanced rather than spoiled. The accompanying diagram shows the wiring circuit of the capacity switch. The condenser for this purpose should be about 43 plates, although a smaller size will do.

In general, the switch is placed in the series position for tuning in short wave-lengths and in parallel when tuning in the longer wave-lengths. Usually this switch is used with the honeycomb type receivers, although it may be used with most

# The Radio Primer

For Thousands of Beginners Who  
Are Coming into Radio Circles

## Weekly A B C of Radio Facts and Principles Fully and Tersely Explained

By Lynn Brooks

**H**OW are electric currents produced?

Electric currents are produced in several ways, the two most important being by electromagnetic induction (magneto and dynamo), and by chemical action. Electric currents are moving electrons. These electrons move along a wire, thus producing the current with which we are most familiar. They may also move

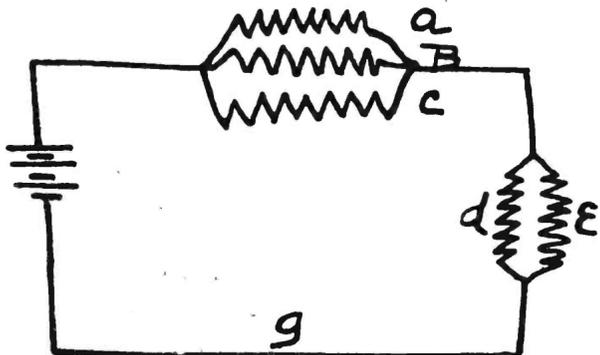


Figure 2—The sum of the currents passing through a, b, and c is equal to the sum of the currents passing through d and e. Each sum is equal to the current passing through any part of the single wire, as at g.

unattached through space from one point to another. This is what happens when a flash of lightning occurs. It is what occurs in the X-ray bulb and in vacuum tubes used in radiotelegraphy. They may move also through a liquid or gas. This is what happens when we use an electric current to electroplate objects—as, for instance, silver-plating spoons.

\* \* \*

*What has a circuit to do with conductors?*

A circuit is a number of conductors arranged so that they are connected electrically. A current of electricity will flow through a circuit when some source of electric current is attached to the circuit. When a current is flowing in a circuit the current is of equal strength in all parts of the circuit, provided the circuit consists of only one path.

\* \* \*

*Will the current be the same when flowing through the circuit, as shown in Figure 1?*

The current going through the resistance — R — the current going through the telephone receiver, and the current going through the telephone

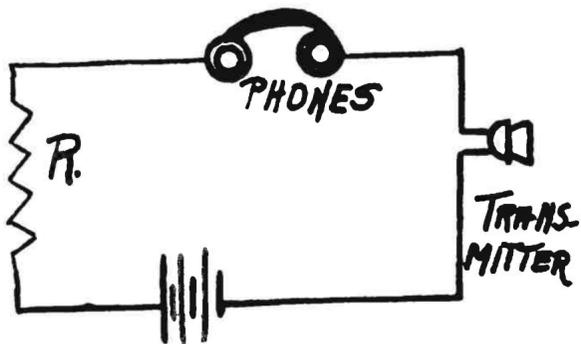


Figure 1—Diagram of electric circuit with resistance, telephones, and transmitter in the circuit. The electric current is equal in each unit.

transmitter are equal. If the circuit is divided then the sum of the currents passing through the divisions are equal.

\* \* \*

*How are the currents in Figure 2 divided?*

The sum of the currents passing through A, B and C are equal to the sum of the currents passing through D and E. Each sum, of course, is equal to the current passing through any part of the single wire, as at G.

\* \* \*

*Will an electric current produce magnetism?*

A current is recognized by the effect it produces. An electric current will cause magnetism, give rise to heat, cause chemical action, and may be made to operate by using the magnetic effect.

\* \* \*

*What have we learned?*

We have learned that magnetism is produced by an electric current; that a moving electron is surrounded by a magnetic field; that the magnetic field is made up of magnetic lines of force; that the direction of the magnetic lines of force is the direction along which the north pole of the magnet is urged.

\* \* \*

*What is the magnetic circuit?*

The magnetic circuit is the path which the magnetic lines of force follow in going from the north to the south pole of the magnet. It has been found that iron is the only perfect conductor of these magnetic lines of force.

\* \* \*

*What does iron contain?*

Iron is said to have permeability be-

## How to Treat Phones

By John Kent

**I**F the owners of receiving sets would realize what delicate instruments the headphones are, we wouldn't hear so many complaints that they are not getting as good results as they did the first few weeks their set was in operation.

You wouldn't expect your ears to be as perfect as they are if you gave them half the abuse that the average headphone gets during its life.

Here are some of the things you shouldn't do to a pair of phones:

Don't open the phones (take off the ear caps), or let anybody else do so unless you know just what you are about.

Don't tap on the diaphragms. They are easily bent and dented.

Don't drop them. They may not break; but any jar lessens the magnetism in the permanent magnets, thereby lessening their sensitiveness.

Don't pull the phones out by the cord. It is only tinsel.

Don't set them in a place where they are liable to get damp or wet.

**DON'T TEST BATTERIES** with a pair of good phones. You are liable to burn them out. Most phones are wound with No. 40 wire which is as fine as a hair and is not meant to stand heavy voltages.

## Aerial Connections

By George W. May, R. E.

**L**EAD-IN wires to the receiver may be connected to the end of the aerial or to the center. If connected at the end, it then becomes what is known as an inverted aerial. If connected at the center of the aerial it becomes a T aerial. This type aerial has a tendency to reduce the wave length approximately one-half that of the inverted L aerial. In case the aerial is constructed on the roof or outside the house, it is advisable to carefully insulate the lead-in wire by running a porcelain tube through the window casing or some other part of the house. This is not absolutely necessary in dry weather; but when the wood gets wet, it becomes a good conductor and may cause trouble as a result of electrical leakage through moisture.

cause it will carry lines of force. Different kinds of iron have different degrees of permeability; therefore, certain kinds of iron will carry more magnetic lines of force than others. Wrought iron has a very large permeability. All other substances are poor conductors of magnetic lines of force.

# National Radio Week—Dec. 23 to 30

## Are You Ready for this Big Event?

**N**EXT WEEK, beginning at dawn on Saturday, December 23, and ending at midnight on Saturday, December 30, is National Radio Week.

It is the first National Radio Week in the history of this important and wonderful new science.

It will be celebrated all over the United States, Canada, and Cuba.

It comes at a time of the year—Christmas and New Year's—when all the civilized world is alive with gaiety—filled with the desire to do good and bring cheer to others.

And, this year, in no other way can the people give or receive cheer so well as through radio.

It is new! You who are dyed-in-the-wool fans know its joys and surprises. Those yet uninitiated are anxious to know—to "listen in."

It is estimated that there are six million radio fans in the United States. How many others want to be fans?

You can help them to become fans. By doing so, you help radio.

What can you do? you ask.

Hold block parties—the good old-fashioned kind—substituting radiophone music for bands.

Have radio parties—invite all your friends—and get the "kick" out of the air.

If there are any radio "knockers," prove to them that radio has come to stay.

Improve your set. See what distance you can get out

of it and communicate with everybody you hear at any great distance.

Boost radio to your friends who have no sets.

If you have a radiophone transmitter, cooperate with the neighbors by transmitting for their benefit. Get acquainted with them. Help them to become fans.

If you have a spark station, try to help out by transmitting only when necessary. Cut out talking to the fellow on the next block just to hear your spark working.

If you can play any instrument—outside of a receiving set, of course—apply to your nearest broadcasting station and offer your services. They will be glad to have you.

You Old Timers! Get acquainted with the little fellows. Show them what they can do with a little time and patience. You had to be taught first.

You Experimenters! Try out new ideas. Everybody is looking for them. And you may strike something big.

See if the pastor of your local church wouldn't like to have you install your set for a couple of nights and give small radio recitals from the broadcasting stations.

Interest the merchants in your locality. Maybe they don't realize that they are letting a good thing get by them.

In any event, celebrate National Radio Week and be a National Radio Week booster!

## Radio Rules for the Day, Week and Month

**M**ANY who own radio sets believe that once the sets are in working order and bring in signals, the only thing left to do is to watch the batteries. A radio set isn't like an egg—it improves with age. A radio set needs looking over once in a while. Dust is an enemy of radio, because it generally forms a short circuit.

Aboard ship there are certain things that are part of the daily routine that must be done. They serve to illustrate the care that should be taken with a radio set. Here is a set of rules to follow:

### Daily

1. Wipe off all instruments carefully with chamois skin or a very soft cloth.

2. Examine contacts of all receiving circuits and remove dirt and corrosion.

3. If using crystal detector, clean by immersing in bisulphide of carbon.

4. Clean spark-gap and transmitting apparatus. Inspect all transmission leads both on the back and front of board.

### Weekly

1. Rub all moving parts lightly with vaseline. Blow out variable

condensers to remove particles of dust that may collect between plates.

2. Clean transmitting condensers and inspect the connections.

3. Clean key contacts and dress down with a light filing, if found to be pitted.

4. Rub the antennae switch blades lightly and see that the clamps are making good contact.

### Monthly

1. Test and charge storage batteries. See that the solution is clean by use of hydrometer.

2. Make note of any deviation in the operation of any of the instruments and file same with the head of the department.

3. Inspect antenna connections and wipe off all insulators with stiff brush dipped in carbon bisulphide.

**FANS, AMATEURS, DEALERS, BROADCASTERS, MANUFACTURERS,  
AND THE GENERAL PUBLIC**

Are Looking Forward to

**NATIONAL RADIO WEEK**  
**DECEMBER 23 TO 30, INCLUSIVE**

All Interested in Radio Should Help to Make This Event a Smashing Success.

If you want to know more about it address:

**NATIONAL RADIO WEEK EXECUTIVE COMMITTEE**

J. ANDREW WHITE, Chairman

326 BROADWAY

NEW YORK

**Be a National Radio Week Booster**

# Factors That Effect the Range of Radio Transmission

By *B. R. Cummins*

*Radio Engineer, General Electric Company.*

ONE of the questions almost invariably asked regarding a radio transmitter is, "How far will it send?" This question is justifiable. It has become standard practice with builders of radio-transmitting equipment to carefully specify the conditions under which any guaranteed ranges can be made. Even then it is seldom that a conservative company will guarantee transmission at all times.

In the first place, a radio transmitter will transmit several times as far at night as in daylight; it will transmit farther on a dark night than on a moonlight night. This is due to the fact that sunlight and moonlight causes an ionization of the atmosphere, which results in much greater losses than occur when such ionization is not present. The greatest ranges are obtained when the atmosphere between the transmitting and receiving stations is most nearly a perfect insulator.

The range depends on the nature of the territory lying between the transmitting and receiving stations, the greatest ranges for a given power usually being obtained over water. Any metal, particularly iron or steel, lying between the stations will cause a loss of signal strength. Such metal may either be in the form of artificial structures such as buildings or building frameworks, or may be in the form of ore deposits. Some sections of the country are noted for their poor location for radio reception, and the cause of this can usually be traced to this reason.

In many places it is possible to receive effectively from all directions but one, and it is usually found that in this direction a metallic structure, or a metal deposit, is responsible for the lack of reception.

A radio station which can be depended upon for reliable communication, through the winter months, for a given range can only work effectively during the summer months over a fraction of this range, assuming that the power of the transmitter is not increased. This is not due to any diminution of signal strength, but to the percentage presence of so-called static disturbances during the summer months. Static disturbances, which result in cracking, hissing, or grinding noises

in the receiver head-phones—frequently sufficient to make this radio signal unintelligible—have been the subject of investigation and analysis for many years, during which time many attempts have been made to determine their origin and means for preventing their detrimental effect on radio reception. While some very special receiving-equipment and antenna systems have been devised to increase the ratio of signal strength to static strength (the so-called "signal-static ratio"), the most positive way of overcoming static seems to lie in transmitting sufficient power to make the radio signals intelligible even in the presence of static. This was the procedure followed, for example, at the Lafayette Station in Bordeaux, France, built by the United States Navy Department during the World War, for reliable communication if transatlantic cables were cut by the enemy. This station has a capacity of 1,200 kilowatts.

The range depends, also, on the type of receiving equipment which is used and the ability of the operator to use his equipment to the best advantage. A receiver with one or more stages of amplification will receive stations which cannot be heard without such amplification. There is a limit to the extent to which amplification can be used. It does not serve, for example, to overcome static disturbances, because such disturbances are amplified to the same extent as the radio signal itself, leaving the signal-static ratio the same and, therefore, not making the message any more intelligible.

The wave length at which transmission is carried on is also an important factor in the range of a given power. Energy radiated at short wave-lengths is absorbed to a much greater extent than energy at longer wave-lengths. For this reason, very long wave-lengths, comparatively, are usually used for a long distance such as transoceanic communication.

The personal equation of the receiving operator is of importance. Signals which are quite readable to some operators are absolutely unintelligible to others.

The number of stations working in close proximity also decrease ranges which would otherwise be

obtainable; for many signals which have sufficient strength to be easily interpreted are made unreadable by interference caused by other stations.

In general, therefore, in specifying the range of a radio transmitter, it is necessary to specify whether transmission will be carried on by day or night; in winter or summer; the type of receiver, and the amount of amplification; the nature of the country lying between the transmitting and receiving stations; whether or not uninterrupted communication is required or whether so-called "deferred service" is satisfactory; the wave length on which transmission will be carried on; the kind of transmission desired, that is, telephony, continuous wave telegraphy or interrupted continuous wave telegraphy; the vicinity in which the transmitter will be located with respect to other transmitters; and, lastly, but by no means of least importance, whether or not the range specified, even after the foregoing conditions are known, shall be a conservative one or the maximum expected.

It is impossible, in a very brief discussion, to analyze more fully the various factors entering into range considerations which have been enumerated; but the mere mentioning of the existence of these factors should be sufficient to make all of us realize that a brief statement to the effect that a radio transmitter has a range of, say, 500 miles, is practically meaningless.

This does not mean that reliable communication cannot be carried on over given distances, for a careful consideration of all conditions will permit satisfactory equipment being installed. Such equipment will frequently transmit distances far greater than the rated range of the set. For example, a transmitter manufactured by the General Electric Company which is rated, under definite conditions, at 175 miles, has recently communicated by telephone over a distance of 4,050 miles.

In view of the foregoing, anyone concerned in the range of radio stations should assure himself of the conditions under which the transmission has been, or is to be carried on, before arriving at any definite conclusions.

# Remote Logging Camps on Pacific Coast Get News Daily by Radio

By Carl B. Hawes

**W**ASHINGTON, D. C.—The spirit and morale of the logger, situated far within the fastnesses of the great Pacific Coast forests, has been materially improved since the installation of modern radio-receiving sets in logging camps. Many of the western newspaper broadcasts carry the daily news of the world into the heart of our lumbering districts where their daily papers do not reach and the telephone is not available.

Instead of waiting a month to learn of some event in the outside world, the logger gets press dispatches daily. Thanks to radio, he is no longer a backwoodsman, in the old sense of the word. He received the news referring to the President's message on the Ship Subsidy Bill and the final score of the Army and Navy football game almost as soon as the city radio fan.

## Forest Workers Get Forty Stations

"With modern apparatus of the vacuum tube type, the logger can tune in on no less than forty broadcasting stations from Calgary to Los Angeles, and from Denver to Portland," according to the National Lumber Manufacturer's Association, whose research department has been devoting considerable time to the use of radio. Up in the forest-clad hills of Oregon, far from the railroad and mail routes, a digest of the daily news or a concert from San Francisco, "listens pretty good," as one logger put it.

The logger's radio set has a more important use than its recreational value, however; it is a business asset in the remaining big timber stands of the country. Through the aid of the fleet of airplanes, assigned to forest-fire observation by Major General Patrick, of the Army Air Service, each of which is equipped with sending and receiving radio, conflagrations in the districts patrolled have lessened notably.

Co-operating with federal, state, and private forest-protection, high-flying airplanes cover more territory in a day than a forest ranger on foot could cover in three months. "Spotting" a fire, or smoke, the plane hovers over the site while the observer plots the location on a map and then broadcasts a fire warning giving the location. Station operators equipped with receiving apparatus catch the air scout's message and relay it, usually by private phone lines, to the ranger or patrol station nearest the fire, and within a few minutes detachments of skilled fire-fighters are enroute to the section in danger. Since speed is so essential in



(Photo by National Lumber Mfrs. Assn.) Loggers of to-day are enjoying radio as much as city fans. "High-Climbers" crawl to the upper branches of trees 300 feet high to ring the aeriels, carrying axes to trim branches as well as a line by which the aerial is hoisted.

fighting forest fires, first the airplane, and now radio, won the respect of the owners and operators of timber lands.

Radio also serves to anticipate the approach of lightning storms and to approximate their intensity by means of a static barrage which might be called a "radio lightning recorder." This consists, the Lumber Association states, of a movable loop-antenna which rotates about a vertical shaft, not unlike a radio compass. By turning the loop parallel to the general direction of the oncoming storm, the direction of approach may be determined with an error of less than four degrees, as the static discharge is at its maximum when the loop is parallel to the line of approach.

## Radio Lightning Detectors

The purpose of learning the direction of the storm is to enable the members of the patrol to plot its course and send out observers to locate trees struck by lightning. Lightning is said to cause twenty-five per cent of forest fires, and its particular hazard lies in the fact that unseen bolts strike trees

and smolder for days before actually breaking into flames.

The static barrage, the latest of radio fire-fighting equipment, has been operated quite successfully. Technically it measures the frequency of the static discharge and records it on a dial or indicates it visibly across a spark gap. When the frequency of the discharge becomes excessive an automatic electric gong is rung to announce impending danger. The direction of the storm is then determined by means of the radio loop, and by the time lightning is flashing over the stands of timber, patrols have started through the threatened district, alert to spot trees struck by lightning.

Many of the forest wireless stations are manned by ambitious young amateurs, some of them owning their sets, and all of them seeking to do constructive radio work and perfect their knowledge. One privately owned receiving set is reported to have picked up accurately messages from four airplane patrol routes miles apart.

## Lofty Aeriels, 200 Feet High

City amateurs who boast of thirty-foot aerial masts, would be envious of the natural masts available in the western forests, where giant fir trees tower three hundred feet. At least they would be envious until they began to wonder how to utilize this excessive height for stringing an aerial. On the camp's "high-climber" evolves the job of rigging the lofty antenna. He is skilled in climbing tall trees, as part of the logging business demands daily trips aloft to oil pulley blocks for cables or to prepare a new setting for the yardage operation. By skillful manipulation of a single loop of rope about his waist and around the bole of the tree, the high climber, equipped with a pair of leg-irons, or spurs, slowly raises himself upward. With a deft twist of his wrist, he flips the rope upward a foot or two at a time, trusting his weight to it while he replants his leg irons a little higher on the trunk. It is a task the city-aerial builder would not relish. It requires unusual skill and steady nerve on the part of the climber; but that veteran thinks nothing of it.

Foresters and lumbermen say that, in the Pacific Coast timber-belt, radio has accomplished, within a few months, what would otherwise have taken decades to bring about. It has become a permanent fixture tending to promote both contentment and efficiency, as well as to afford a means of fire protection of hitherto undreamed of worth.

# Radiograms

## The Latest Important Radio News Briefly Told for the Growing Army of Radio Fans

**P**RESIDENT HARDING'S message to Congress was successfully broadcast from NOF, Anacostia, D. C., on Tuesday, December 5. A full-page photograph showing a similar broadcast was published in RADIO WORLD, No. 37, dated December 9, the Christmas Number. Broadcasting the President's address will always be an important radio event. Three separate telephone-wire circuits carry his voice from the Capitol to the Naval broadcasting station NOF. The transmitter which picks up the President's voice on the platform in the House is part of the public-address system recently installed to carry the voices of speakers to all parts of the Capitol. This transmitter is connected to NOF by three wire circuits. The Chesapeake and Potomac Telephone Company has provided three circuits to insure against any possible interruption. One circuit will be used for conveying the President's voice, a second will be used by the engineers as an "order wire" over which they can direct operators and keep the transmitter at an even pitch. The third circuit is provided in case anything happens to either of the others. These telephone circuits are extremely important and without the greatest skill on the part of the local telephone engineers, the President's speech could not be broadcasted directly from the Capitol.

A new radio-receiving set has been installed at the Government's Hospital for the Insane, Anacostia, D. C., by the Department of the Interior. The set has a receiving range of about 750 miles and enables the inmates to receive concerts every evening from many different sending stations.

Domestic exports of radio apparatus during the month of October totaled \$207,535 and weighed 114,309 pounds, according to figures compiled by the Department of Commerce. The value of these radio shipments was as follows: England, \$70,391; Quebec and Ontario, \$35,728; Argentine, \$32,092; Brazil, \$27,072; Japan, \$11,299.

The first broadcast of the War Department was transmitted from NOF Monday evening, December 4, on 412 meters. It was a speech on the Muscle Shoals Nitrate Plant.

The Weather Bureau advises in connection with a recent hurricane which occurred in the Yucatan Channel and southern Gulf of Mexico that the warnings issued by the Weather Bureau were promptly received by cable and by Swan Island (US). These messages were broadcast by radio and by notices to mariners as fast as received by the Panama Canal office. They were instrumental in causing some of the boats in

the New Orleans trade to postpone their sailings for a day or two. The canal and shipping interests appreciate the prompt service given by Forecaster Mitchell and the Swan Island radio station.

The world's record for long-distance radio transmission was broken on November 5, when President Harding's message to the world was received in practically every country of importance on the face of the earth. It was heard even in New Zealand, 10,000 miles away. The message was transmitted from Radio Central, the station at Port Jefferson, L. I., designated for international radio communication.

Morris Keyser, of Philadelphia, recently heard a spoken voice without an ear trumpet for the first time in twenty-seven years. A week before he heard music for the first time on a receiving set, using headphones. He believes that radio has stimulated his hearing so that he will eventually catch sound without any artificial help.

The first detailed report to reach New York City of the rescue of the steamer "Monte Grappa's" crew of forty-five men in midatlantic by the White Star lines, "Pittsburgh," again puts another medal on the breast of the never sleeping radio. The "Monte Grappa," a new 10,000-ton ship belonging to the Navigazione Libera Trestina, with a cargo of 9,200 tons of grain, was bound from Montreal to Venice. She left Montreal on November 5, under the command of Captain Stefano Bartoli. On Sunday, November 12, she ran into a heavy southerly gale. Her cargo shifted and the ship took a heavy list to port.

Fearing his ship would roll over, or sink, Captain Bartoli ordered an S O S sent out at 7 a. m. Tuesday. His position was given as 43 degrees, 18 minutes north; 41 degrees, 55 minutes west. This call was picked up by the "Pittsburgh," and Captain Jones, after plotting his own position, found he was 185 miles from the "Monte Grappa." Radio communication was kept up during the day.

Captains of deep-sea vessels are requested to report the date when ice and other obstructions reported by radio from ship to ship are sighted. Many reports of this kind come to the Hydrographic Office of the Navy Department bearing only the date of the radiogram and lacking the date when the obstruction was seen. Co-operation in supplying this additional fact will be thankfully appreciated by the United States authorities.

Weather bulletins, forecasts, and storm warnings are now broadcast from the Naval radio stations at Key West, Florida, and Point Isabel, Texas, by continuous wave (arc) instead of by spark, on the following schedules: Key West (NAR), 10 p. m., (seventy-fifth meridian time); wave length, 5,700 meters. Point Isabel (NAY), midnight, noon, and 7 p. m. (seventy-fifth meridian time); wave length, 5,000 meters.

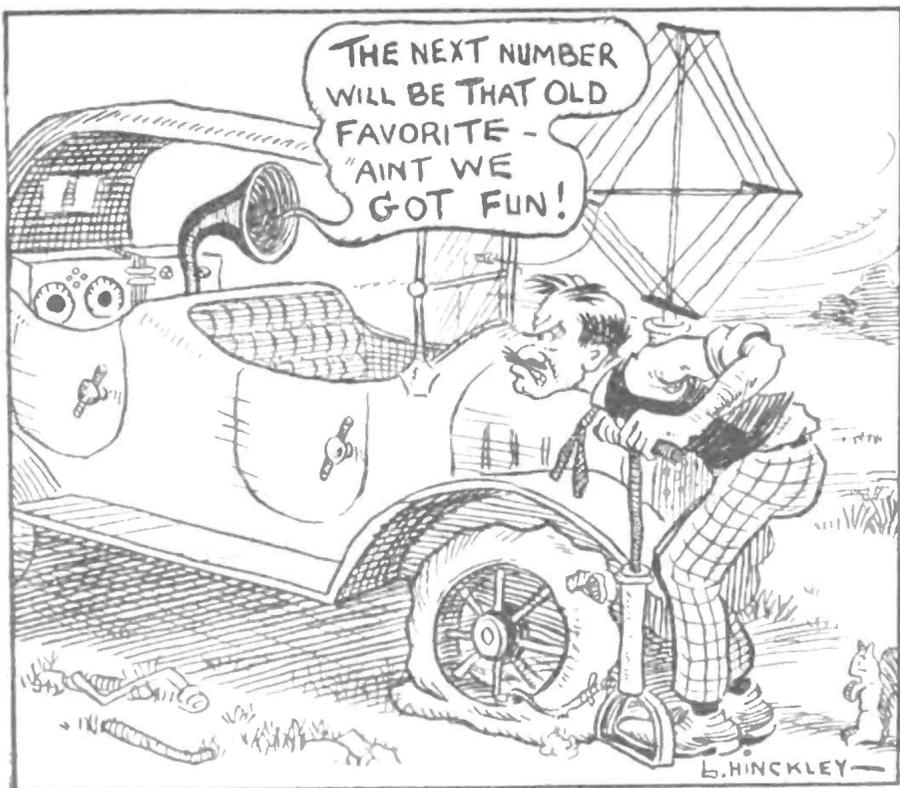
An applicant for radio operator's license was barred from being examined, for a period of six months, on account of having used a false name in his examination papers. Anyone making false statements in applying for examination will be likewise treated.

The French wireless company, "La Compagnie Generale de Telegraphie Sans Fil," recently founded a subsidiary radio company to operate under the name of "Radio-Orient." It has started radio communications with Syria, Lebanon, and most of the European countries.

The decree of May 31, 1921, prohibiting the operation of radio of foreign ships in Swedish territorial waters within 10 miles (nautical) of a coastal radio station is being strictly enforced. The only exception to this rule is in cases of great urgency or where the safety of the ship is concerned. Under the same decree, foreign ships in Swedish harbors may not receive radio messages without permission of the telegraph directorate.

The general call signal WWA has been assigned for all vessels operated and controlled by the Radio Corporation of America. This general call signal will be used by R. C. A. ships or coast stations desiring to ascertain whether there is an R. C. A. ship within range, and any R. C. A. vessel hearing another ship or coast station calling WWA should answer.

## Mr. Grouch's Radio in Danger!



(Cartoon by Lawrence B. Hinckley)

# Radio and the Woman

## Crystal D. Tector Says that the Women of the Country Will Be Heard from During National Radio Week

**A** WEEK from next Saturday—December 23 to be exact—and the first National Radio Week will have started. May it be a great and glorious success from every point of view! May every city and hamlet in the United States and Canada and Cuba—and even in Mexico, where radio is beginning to get a foothold—celebrate it in a thoroughly fitting manner. May it be the forerunner of an annual event that will be looked for by every true American—just as is the Fourth of July or Christmas or any other happy season.

\* \* \*

**I** KNOW that the women of the country are going to be heard from. In fact, I can truthfully say that my radio sisters have expressed the genuine radio spirit and have planned and built in a manner far beyond my wildest dreams. I told the editors of RADIO WORLD that we would not be lacking in interest and in willingness to work. We will do our share and do it with a thoroughness that will make our place in radio equally as important as that held by the sterner sex.

\* \* \*

**T**HE holiday spirit has begun to entirely envelop this big and breezy city. New York is completely permeated with radio. In every shop there seems to be something with a radio flavor—even to radio hats and radio perfumes. And most everyone seems to be either putting in a radio set or wanting to do so. Most every woman I meet seems to have the radio fever. It is quite the thing for a woman to say that she is able to work her own set. In fact, going up town in a Fifth avenue bus, the other day, I heard two pretty young misses talking in radio terms in a manner that would have floored an expert.

**A**ND I know of several families who are clubbing together to purchase sets. The alleged edict of selfish landlords does not seem to bother much, for excellent results are now obtained from indoor aerials. In fact, David Saranoff, vice-president of the Radio Corporation of America, recently sent messages to England, France, Germany and Norway, and received answers on an indoor aerial. Some of the loop affairs that I have seen are very handsome and would look well in a sitting room or parlor.

\* \* \*

**T**HE women of the "upper ten" are having their sets made to match certain effects of their furnishings, for radio parties are something of a vogue in New York this winter. I have seen several indoor affairs—and have heard of others—that were broadly extravagant in finish and coloring—some even being silver mounted. Of course, such sets are only for those who can afford them, and do not enhance reception to any extent; and I simply mention them to show how the craze is spreading.

\* \* \*

**O**NE does not need an extravagant set. The best results are obtained from sets that are well made and, above all well managed. The thing is to know your set. One gets better results from a motor car, a watch, a cooking stove, or any other commodity if one really knows it. So to every woman who contemplates owning a set I say, "Learn to know it," and you will be surprised at the results that will follow. Study it as you would study a child and you will find that it will be the greatest source of joy you can imagine. You can not install a set and start it going like a phonograph. It isn't that sort of mechanism. Take time—and know it inside out.

### Radio Penetrates Fog

**What Is Being Done by Lighthouse Service to Safeguard Shipping**

**T**HE greatest peril to shipping is fog. Until recently the captain of a ship has had no practicable means of accurately locating in a fog either his own ship or other ships which he is meeting. The radio fog-signal and radio compass give the navigator accurate bearings in fog just as well as in clear weather. In his annual report to Secretary Hoover, the Commissioner of Lighthouses states that several additional radio fog-signals have been installed during the past year, including one on the new lightship off Cape Hatteras, and one on San Francisco lightship.

The United States now has five such stations regularly in operation, and six more will be installed in the near future. The United States is in advance of any other nation in the establishment of these protective signals.

The lightships are the outermost signal stations of the country, many of them being anchored in the open sea, miles off the coast. Arrangement has been made this year between the Navy and Commerce Departments, for the Lighthouse Service to take over the radio communication equipment on the lightships, placed there mostly during the World War. Hereafter regular radio-service will be maintained with twenty of the outside lightships off the Atlantic, Gulf and Pacific Coasts; this will be of great value both in safeguarding and operating the lightships themselves, and in reporting the needs of other vessels, or of boats in distress. Provision is being made to receive radio broadcasting on these and other isolated vessels of the Lighthouse Service, and radio telephones are being tested for remote lighthouses.

### A Quebec Guide Listens In

**T**HE following letter was recently received by the General Electric Co.:

"WGY, Schenectady General Store, New York State, Sir:

i am gide for hunter man wot come at dis place Lac-des isle for hunting deer. dese hunter man bring it wit him a machine for heer you spik sunday nite also tuesday nite i heer song about my old modder dats long tim i dont see my modder and i tink dats dame fine song also i heer oder song i dont no de nam. tuesday nite storie for de small boy and girl bout mak de star shine for dem if dey is good boy and girl. hunter man laff lik hell an tole me ax you how we mak some moon shine.

i hear you spike jus de same lik your at me place i ting you have good machine i lissen more nex week.

tank you and much oblige  
gide Camille Poirier  
Chemis P. O., Quebec, Canada"

### Listen In—Then Write

**R**AUDIO WORLD has received a letter from a reader—a member of a radio club—who puts forth a little idea that, to our way of thinking, is a fine stunt. The letter is as follows:

"We have a small club of listeners and very often hear fellows in other States. We think it would be a good idea if, when anybody else hears a station, he would write and tell him about it. By doing so, we can get and exchange little helpful hints and ideas. It is always a pleasure to know that one is heard in other States and cities.

"We ask anyone reading this in RADIO WORLD to write us and start the ball rolling. "Listen in—then write!"—Charles Doherty, 746 Howard avenue, Bridgeport, Connecticut.

### Said It with Letters

**Hook-up in Radio World Brings Mail too Big to Handle**

**I**N RADIO WORLD No. 30, dated October 21, there appeared a hook-up of a single-coil receiver designed by Mr. W. Miller, Southern Methodist University, Dallas, Texas, with an invitation to amateurs who delight in experimenting to give it a try-out. That the invitation was heeded—and that there is a keen interest in hook-ups that are new and original—is attested by the following letter from Mr. Miller:

Box 222, S. M. U., Dallas, Texas.  
December 1, 1922.

Editor, Radio World:

Since you published a diagram of my circuit, in your issue No. 30, I have been snowed under with mail. Inasmuch as I am a student, I cannot reply individually.

I have received over 1,500 requests for further information, description, panel lay-out, and many other things—and I would like to know if you are in a position to publish the matter.

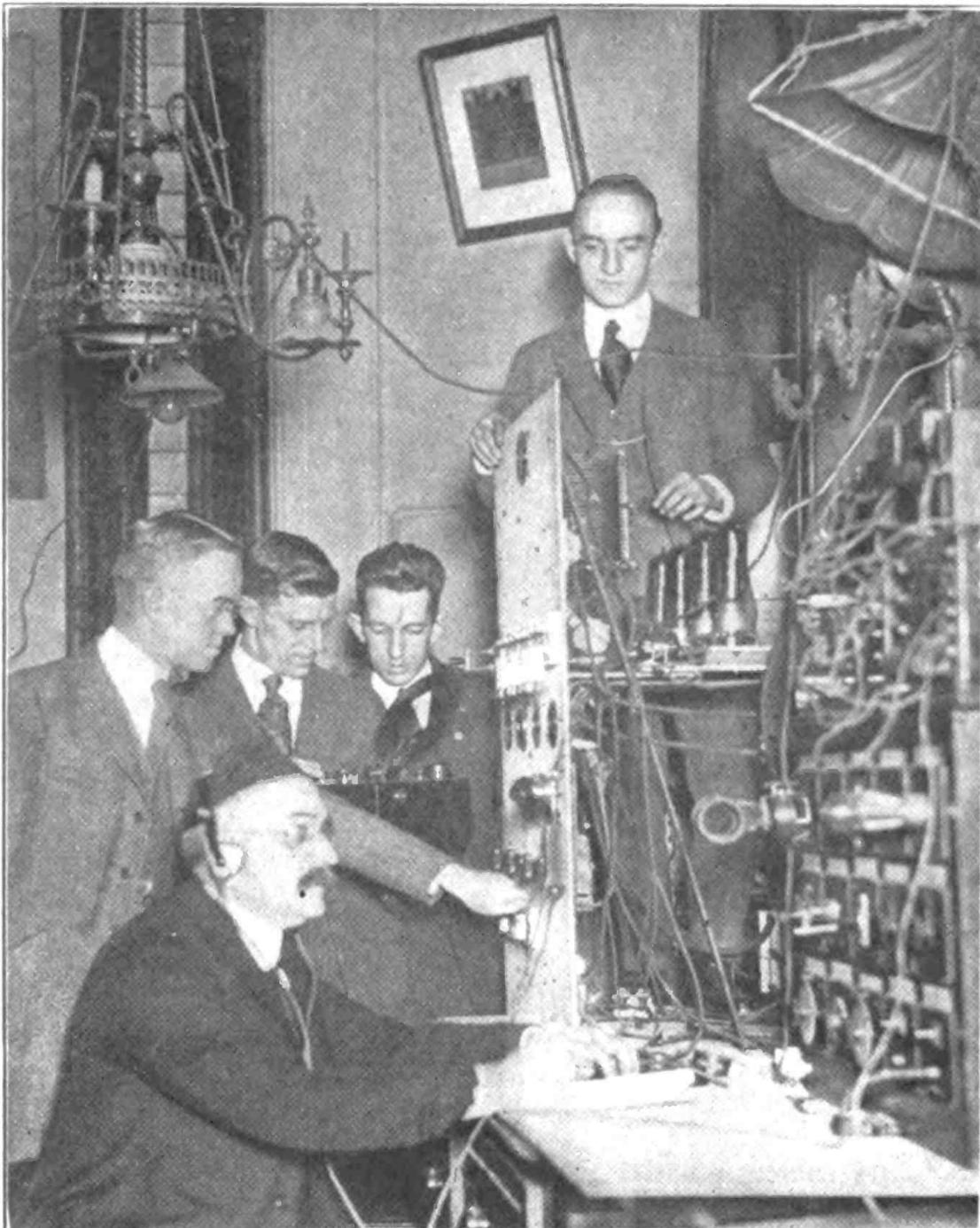
Yours very truly,  
(Signed)

W. MILLER.

Are there other radioists who have original hook-ups they would like to have published, so that the vast army of radio fans may have a chance at them? If so, it is evident that RADIO WORLD is the publication through which to present them. It would be interesting to learn how many fans *did not* write to Mr. Miller.

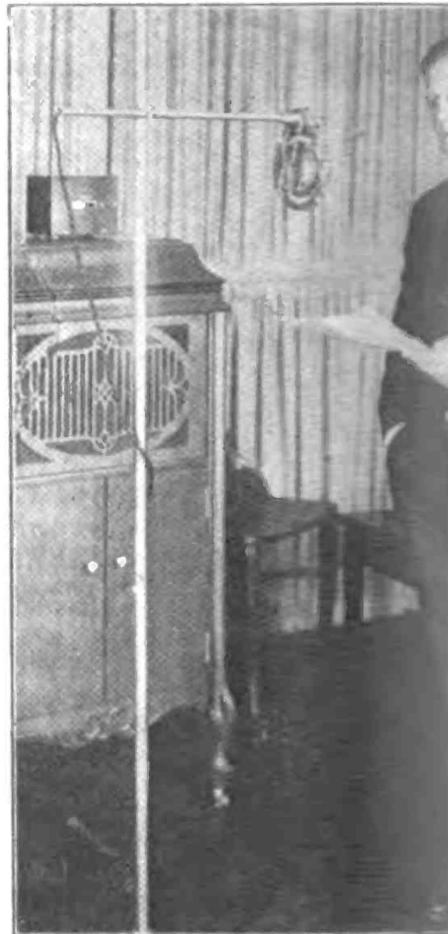
**To many anxious inquirers: RADIO WORLD has no free list. One copy is sent as a voucher to each advertiser or advertising agent represented in current issues. All other copies are paid for on subscription or through the news trade.**

# Latest Photographs of the Week Show



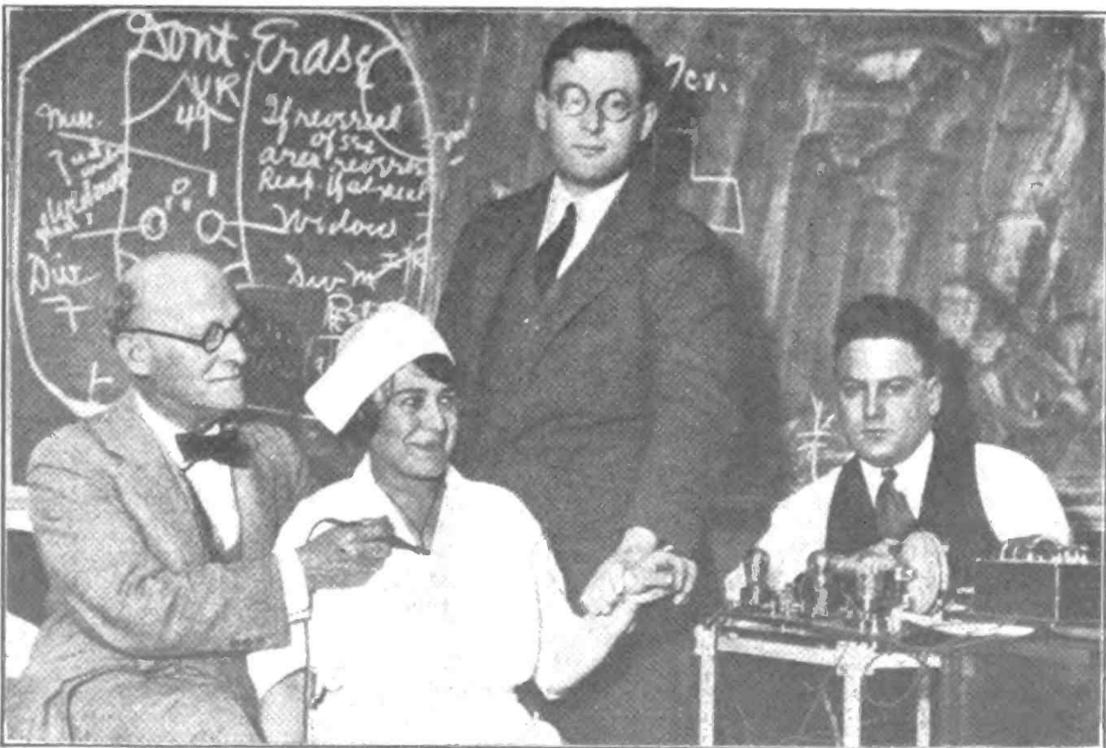
(C. P. & A. Photos)

(Left) The radio broadcasting apparatus recently installed in the rectory of Calvary Baptist Church, New York City. This is the church over which the Reverend John Roach Straton, the militant pastor, presides. Dr. Straton has joined the ranks of ministers who believe in reaching as large an audience as possible and realize that the only way to do so successfully is by radio. As will be seen from close study, Calvary Church possesses a pretty powerful transmitting set. Dr. Straton decided that his sermons—particularly those regarding the Ku Klux Klan—were being heeded by many people outside his own parish, so he had the transmitting set installed that all who wish may hear. An expert operator and staff are in charge of the set.



(C. Fotograms)

(Above) Lieutenant Elmer I. Oliphant, one of the gridiron's great who played with the United States Army team, now director of education at Union College, New York, is shown here giving a new football rules at the WGY broadcasting station of the General Company at Schenectady, New York. As will be seen, Lieutenant is talking directly at a microphone—the small circular-shaped object of him. This picture gives an excellent idea of how one should be talking for broadcasting—in a perfectly natural position about a half from the microphone. Then speak clearly and naturally. D.



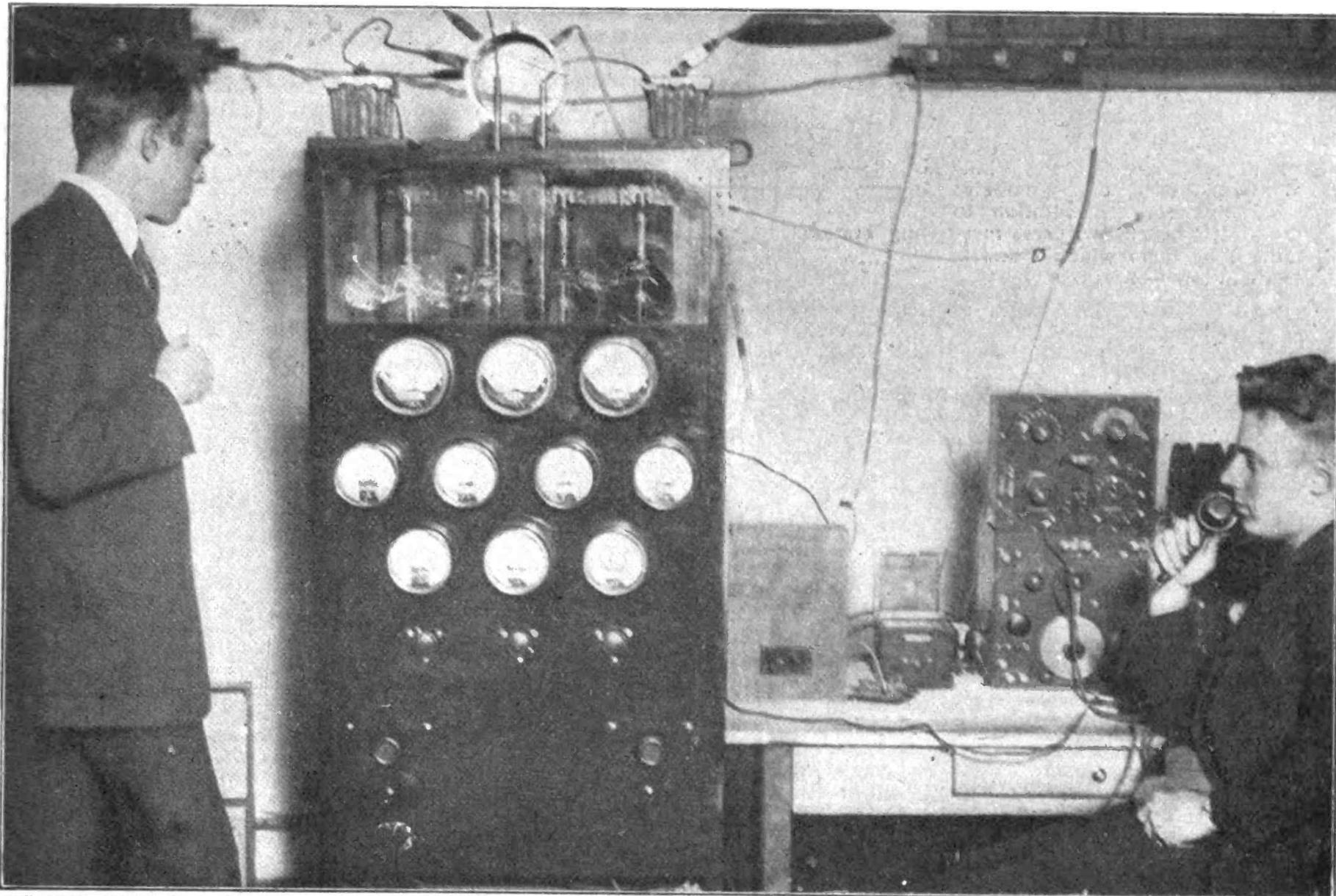
(C. Underwood & Underwood)

(Above) Dr. Albert Abrams, noted pathologist, who is now on the Pacific Coast, demonstrated his little "radio love detector," or, scientifically called, "electronic energy detector." This shows, right to left, Joseph O'Connor, radio expert, Dr. Wirklich, and Miss Ruth Rittman and (seated with glasses) Dr. Albert Abrams, holding a test of the machine. The young lady, a nurse, wished to know if she was in love. Dr. Abrams told her to concentrate and he then placed a wire connected with the "detector" over her heart. The radio machine told the story—she was very much in love.



(C. Kadel & Herbert)

# Radio Put to Startling New Uses



(C. Wide World Photos)

(Above) Thomas Donnelly and J. H. Jenkins, prominent clubmen of Chicago, have equipped a radio station atop the roof of the Drake Hotel. They spend their spare time transmitting concerts with a normal radius of 1,200 miles. They assume all expense and pay prominent stars to sing or play for the benefit of radio fans. Messrs. Donnelly and Jenkins have a novel arrangement of "plugging in" on any of the hotel ballrooms, thereby being able to broadcast all other concerts given at the hotel, aside from their own. They are known to "fans" as WDAP and 9XA. The photograph shows Mr. Jenkins and Ralph Shugart at work transmitting.



(C. Underwood & Underwood)

(Above) Did you hear the cheers when Princeton defeated Yale and Harvard, and Yale defeated Harvard, during the recent football season? Did you hear the Army and Navy boys sing during their recent thrilling game? This is one of the devices that brought these effects to you and permitted you to hear them as plainly as if you were right there in a front seat. The microphone, that cylindrical object so clearly shown in this photograph, is a wonderful thing. No sound is too insignificant

at stars, physical t on the Electric Diphenat in front and when t and a net yell!

(Small picture below) Radio is now used as an aid in securing recruits for the United States Army. The photograph shows Sergeant George Kline with his home-made radio set which he rigged up on the roof of a skyscraper near City Hall Park, New York City. Assigned to the duty of securing recruits for the Army, he decided on this novel scheme. And it may be said to his credit that he has already recruited several dozen men who, otherwise, might not have given their services to their country. Sergeant Kline's set, while a home-made affair, is simple and effective. He is a pioneer among radio enthusiasts.

(Left) Here is a modern Santa Claus and the very modern transmitting set through which he will speak to his legion of children this Christmas Eve. It is said that there are now over six million radio "listeners in" in the United States, and that nearly three million of them are children. So, this Christmas Eve, when dad begins his famous recitation, "Twas the Night Before," tell him not to be surprised if he is interrupted.



# With the DX Night Owls

## Page Kenneth F. Smith

**EDITOR, RADIO WORLD:**—I have a home-made receiving set, using a modified Colpitt's circuit with direct coupling and one Aeriotron (WD-11) vacuum tube operated on one dry-cell, with which I heard station KHJ, "The Times," Los Angeles, California, on two different occasions, namely: November 13 and 16. In addition to musical numbers, I heard two press messages broadcast by them which I understood very distinctly—one regarding the severe snow storms in the vicinity of Cheyenne, Wyoming, and the other regarding farm loans by Federal Reserve Banks. These facts may be verified. I figure Los Angeles a little over 2,000 miles from Cincinnati.

In addition to the above, I have heard PWX, Havana, Cuba, three times recently—a distance of over 1,450 miles, air-line; Denver, Colorado (DN-4), a distance of about 1,250 miles; and numerous other stations from 500 to 1,000 miles distant, such as Fort Worth and Dallas, Texas; Kansas City and Jefferson City, Missouri; Des Moines, Davenport, and Ames, Iowa; Minneapolis, Minnesota; Schenectady, Troy, and New York City, New York; Springfield and Bedford Hills, Massachusetts; Newark, New Jersey; Anacostia, D. C.; Atlanta, Georgia; and other nearby stations too numerous to mention.

I would not even intimate that this record has not been, or will not be, surpassed; but I think it is a fair record for a detector-tube set with *no stages of amplification*, using so little voltage. I would like to call the attention of Mr. Kenneth F. Smith, Birmingham, Alabama, to this letter, as he claims a record of 1,667 miles and says, "Come on, you amateurs; step up and get your feet wet!" I say, "Come on in, the water's fine!"

I will be glad to furnish the hook-up I am using, upon request.—F. E. Smith, 3508 Evanston Avenue, Cincinnati, Ohio.

## Claims a Canadian Record

**EDITOR, RADIO WORLD:** The only radio magazine that I can get really interested in is RADIO WORLD. While reading your last issue I discovered that many of your readers have established, or are trying to establish, long-distance records with bulb sets. I am not in the habit of bragging, but I think I have established the long-distance record in Canada so far as crystal sets are concerned.

With an ordinary crystal receiver (not a loose-coupler) and a four-strand inverted-L type aerial I have been successful in hearing WWJ, Detroit "News"; WCX, Detroit, Michigan; WWI, Dearborn, Michigan; WJAX, Cleveland; KDKA, Pittsburgh; WGY, Schenectady, New York. I have heard all these stations regularly. I have also heard WOC, Davenport, Iowa.

Of course, I heard all these stations in the fall, when weather conditions are ideal. Still I would like to hear from any other crystal-set owner who has made a record.—W. M. Guillot, Box 224, Windsor, Ontario, Canada.

## In 18 Days

**EDITOR, RADIO WORLD:**—I am sending a "DX night owl's" list. I have heard on my home-made one-tube, U-V 200 hook-up, by Greene, published in the Boston "Globe," October 15, the follow-

The Editors of RADIO WORLD will be pleased to receive sketches of hook-ups of the various "DX Night Owls" sending in records, with a view of publishing them.

Other letters from the DX "bugs" will be published from week to week.—The Editor.

ing stations in eighteen days, some of them more than once. My aerial is 42 feet high, 110 feet long, 2 wires, 4 feet apart, running east and west, T type:

KYW, WKN, WIAO, WBZ, WGY, WHAZ, KDKA, WIP, W2NA, WEAN, WJZ, WLK, WHAN, WLW, WBT, WOO, WNAC, WOC, WGM, WBU, WMAQ, WSB, WAAF, WDAP, WFAS, 2XI, WFI, WJAX, WOR, WAKP, WHAS, WEA, IOMB, WJAR, NOF, IOMK, WHA, WWJ.—William J. Head, Receiving Station WJH, 24 First Street, Bristol, Rhode Island.

## "Get Your Feet Wet!"

**EDITOR, RADIO WORLD:** In RADIO WORLD, No. 35, dated November 25, a letter was printed concerning DX work.

The author of this particular letter is Kenneth F. Smith, 133 Francis Street, Birmingham, Alabama. Mr. Smith challenged amateurs to "step up and get their feet wet." I am here with a record which, I believe, will prevent me from getting my feet wet. I beg to submit the following record for one evening: All stations were heard on a one-step, using a Reinartz circuit. My aerial was 100 feet in length, 50 feet high, using a water pipe as a ground.

One evening I heard the following stations, all over 500 miles away: KHJ, Los Angeles, 1,535 miles; KHQ, Seattle, 1,740 miles, DN-4 and KFAF, Denver, 800 miles; WFAA and WBAP, Dallas and Fort Worth, both 750 miles distant; WNAC, Boston, 912 miles; WGM, WSB and WDAJ, all in or near Atlanta, 650 miles.

The following evening I heard KHJ, CKCK, Regina, Canada, 950 miles; WAAC, New Orleans, 830 miles; WIP, Philadelphia, 740 miles; also WBAP, WFAA, WGAG, WHB, and twenty others, all over 250 miles away.

Come on, you amateurs, and "get your feet wet!"

I would appreciate hearing from any other amateur not using radio-frequency who can equal the above record.—Howard J. Hall, 521 E. McKenney Street, Monroeville, Illinois.

## 70 Ft. Long, 65 Ft. High

**EDITOR, RADIO WORLD:**—The record I have established with my set, I think, compares favorably with any I have read in your magazine. I use only a single-circuit regenerative set without any radio- or audio-frequency amplification whatsoever and only one tube. Yet I hear such stations as Minneapolis; WWJ, Detroit "News"; WOC, Davenport; Fort Dodge; WLW, Cincinnati; Cleveland; Chicago; WEA, New York (1322 miles, air-line); KDKA, Pittsburgh; Louisville; KSD, St. Louis; PWX, Havana; WSB, WGM, WDAJ, Georgia; Charlotte, North Carolina; Des Moines, Iowa; WEA, Lincoln, Nebraska; WFAT, Sioux Falls, South Dakota; Portland, Oregon (2,127 miles, air-line); KHJ, Los Angeles (1,667 miles, air-line), and many other stations located within a radius of 500 miles such as Sweeney Auto

School; WHB, Jefferson City, Missouri; Denver, Colorado; and others. I use a double-strand aerial 70 feet long and 65 feet high. My set is home-made and is only a week old. The joints are not soldered yet. Furthermore, this is the first set I have ever owned or operated.—R. Diamond, 413 Royal Street, New Orleans, Louisiana.

## Detector and 2-Stage

**EDITOR, RADIO WORLD:**—For some time I have taken a great interest in RADIO WORLD and thought I would send you the results I get with my home-made set—detector and two-stage audio. With this set and horn, which is a plain horn with receiver from head-set, I have heard the distant station of Honolulu and several others on the Pacific Coast; also many other stations in the United States and Canada. The hook-up is my own regenerative type.—Carlton D. Shults, Fort Plain, New York.

## First Set in His Town

**EDITOR, RADIO WORLD:**—In RADIO WORLD, No. 31, dated October 28, Mr. J. A. Merklein, Brooklyn, New York, claims the receiving record, so I will send in the list of stations that I received on November 20:

WEAY, Houston, Texas; WGM, Atlanta, Georgia; WDAF, Kansas City, Missouri; WMAM, Beaumont, Texas; WHB, Kansas City, Missouri; WBAP, Fort Worth, Texas; WHAS, Louisville, Kentucky; WSB, Atlanta, Georgia; WOC, Davenport, Iowa; WWJ, Detroit, Michigan; WJAD, Waco, Texas; WOS, Jefferson City, Missouri; WHAN, Wichita, Kansas; WOI, Ames, Iowa; WCX, Detroit, Michigan; KSD, St. Louis, Missouri; WBZ, Springfield, Massachusetts.

All the concerts came in clear and loud, although I am only using one stage of amplification. I built my own set on June 4. There are only two sets in this town, mine being the first. Anyone desiring the hook-up I use, please write me. Best 73.—Quentin Weaver, Saratoga, Texas.

## With Only One Bulb

**EDITOR, RADIO WORLD:**—Using only one bulb, I have heard over 60 different phone stations since June, scattered between the Pacific Coast, Canada, and Cuba, practically every high-powered station in the East, and a score or more of the low-powered ones are heard very QSA at all times. Reception from the South and West seems to be excellent. The most distant point in the West heard was KGW, Portland, Oregon, on July 8.—Albert Bannister, 2 Washington Street, Hudson Falls, New York.

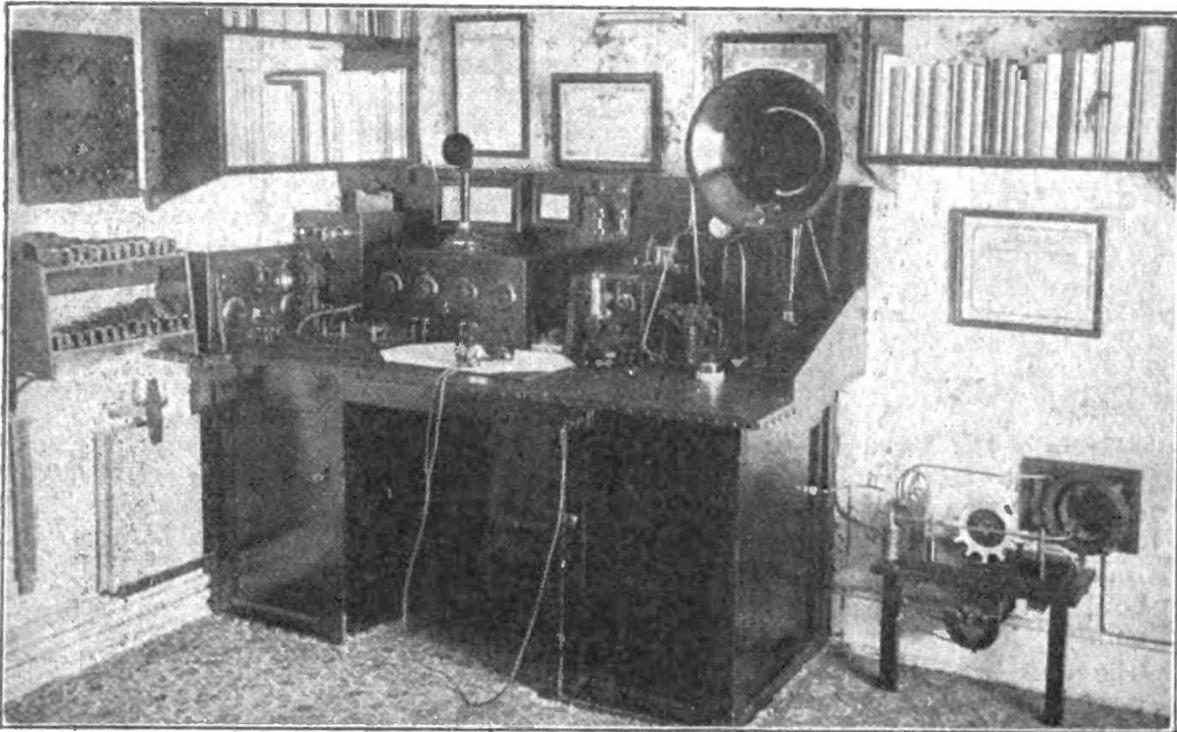
## On a Home-Made Set

**EDITOR, RADIO WORLD:**—I thought you would be interested to know that on Sunday evening, November 12, I received very clearly part of the program of WOC, Davenport, Iowa, on my home-made set which is only a single detector-bulb regenerative set. I used a Meteor Antenna Plug instead of outside antenna. If you care to check up this statement, at 10 p. m. eastern standard time, WOC was sending "The Star-Spangled Banner" played by the P. S. C., orchestra.—William C. Hicks, Waterford, New York.

# What I Accomplish with My Home-made Set

By Paul G. Watson

3 BV, West Chester, Pennsylvania



Very neat, attractive and businesslike is the layout of Mr. Watson's set.

**S**TATION 3 BV has made notable long-distance receiving records. On June 1, the C-W station 6 XAD, Avalon, California, was copied and confirmed by letter. C-W station 5 XA also comes in very QSA. The station signing 3 BV on C-W is Canadian 3 BV and may be distinguished from the United States stations as he uses "FM" instead of "DE" in calling and signing off.

All the apparatus is home-made from original designs. For the information of those interested in construction, the circuit of the short-wave tuner accompanies this article. It consists of a 43-plate .001 microfarad condenser, short-wave coupler, and two variometers. The pri-

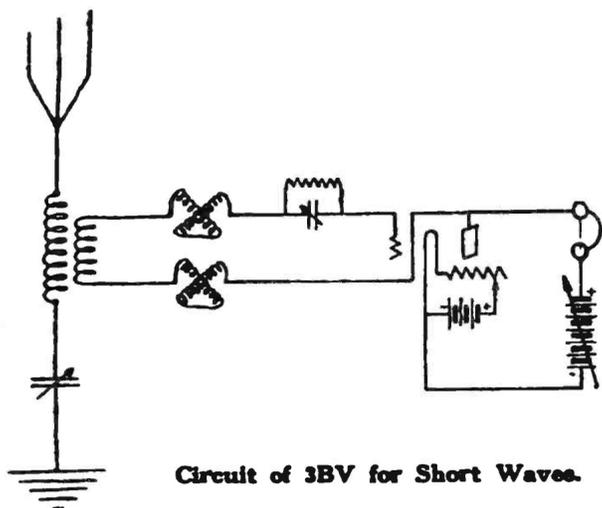
cessfully. Phones, Magnavox, and small horn are connected to this amplifier—the small horn for sound reading of telegraph signals, the Magnavox for music, and the headset for DX signals. Music from many distant music stations have been received, WOC, WHB, WSB, WBAP and many nearby stations.

The transmitter is a low-power, coil affair, and does not use the rotary gap. Power has not been available for some time, hence the spark coil. However, tuned sharply to 190 meters, I have worked 44 miles. It is inductively coupled and radiates about three-tenths of an ampere.

The antenna is a 6-wire, inverted-L, 90 feet long with an average height of 45 feet. The ground system is a grid of wires buried under the antenna.

In the construction and design of this apparatus, many points of electrical design were considered. The wire used on all the pieces of the set is No. 14, and connections on the table were made with No. 10 wire. Care in insulating connecting wires, proper arrangement of apparatus, all contributed to the efficiency of this station.

The above article and illustrations were contributed by Mr. Watson in response to RADIO WORLD'S call to amateurs and fans to send us just such material that brother radioists may profit by what others are doing. This is an ideal little story—brief, practical, and informative—and the accompanying photograph and hook-up complete it and give a capital idea of the author's very attractive set.—The Editors.



Circuit of 3BV for Short Waves.

mary inductance-switch of the variocoupler is back mounted and is controlled with a panel knob. Fine regeneration is obtained in this type tuner. The long-wave tuner is a honeycomb-coil tuner using a feed-back, or tickler, circuit. Either of these tuners may be connected to the audion-control panel through an anticapacity switch. This audion panel contains all the necessary controls, variable grid-condenser, vernier rheostat and B-battery switch for the "soft" tube. A two-step audio-frequency amplifier is connected to this detector. Acme A-2 transformers are used suc-

## Battery Hints

**K**EEP your eye on your storage batteries. Don't let them stand too long without recharging.

If you charge them at home, take them to the service station at least once every year. A few dollars spent in having an expert look them over may save the price of a new battery.

Keep the tops of the elements covered at all times. The water evaporates, but the acid does not. Use only distilled water.



Make it the **GREATER** Radio Christmas

**T**HIS year the message of Christmas will flash one inspiration over all lands and to all peoples — no frontier can turn back the swift messenger, Radio, whose steed keeps pace with light.

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R-2 Magnavox Radio with 18-inch horn: this instrument is intended for those who wish the utmost in amplifying power; for large audiences, dance halls, etc. . . . . \$85.00

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# Latest Radio Patents

## To Determine the Direction of Remote Radio Waves

No. 1,435,941. Patented: November 21, 1922. Patentee: James Robinson, Andover, England

MR. ROBINSON'S invention relates to improvements in electromagnetic arrangements for the reception of wireless waves, in which the direction of arrival of such waves from some remote point may be determined.

It is known that when an electrical circuit having characteristics suitable for the reception of electromagnetic waves is arranged in the form of a closed coil, or loop, the intensity of the signals received upon it from a remote transmitting station will be at a maximum when the plane of the coil coincides with the direction of propagation, or arrival, of the waves; and at a minimum when the coil is at right angles to the incoming waves. By rotating such a coil about an axis, it will be possible to discover the bearing of the transmitting station.

Mr. Robinson uses a pair of aerial coils in vertical planes set at an angle to each other—preferably at a right angle—and rotated about a vertical axis until no appreciable difference in strength of signal is found, when the effect of that coil which lies at right angles to the direction of arrival of the waves (the bearing of which is desired) is superimposed positively or negatively upon the effect of the other coil. Obviously the bearing can

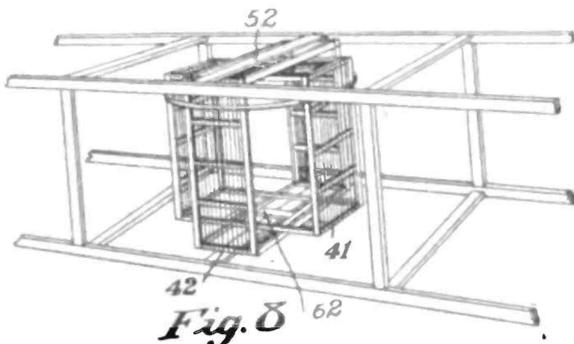


Fig. 8  
Eighth Figure of Mr. Robinson's patent showing diagrammatically a method of fitting coils to aircraft.

then be determined by the position of the first coil.

In the case of coils actually at right angles, the position for the reception of maximum signals by one coil can be roughly determined. By the superimposition of the other coil, this maximum position can be definitely fixed.

Not only does this arrangement represent a considerable saving of time in the determination of a bearing but it is now possible to appreciate and interpret signals, simultaneously and without interruption while their direction is being determined.

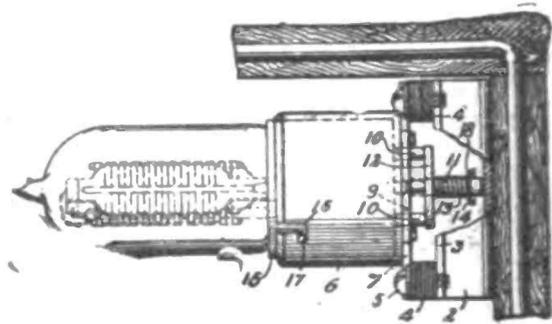
## Holder for Hard Usage

No. 1,432,982. Patented, October 24, 1922. Patentee: John O. Gargan, Brooklyn, N. Y.

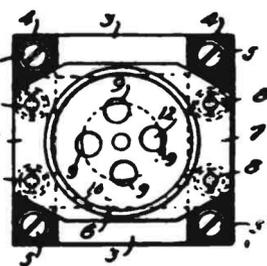
THIS invention relates to socket structures, and has for its object the provision of a socket in which spare vacuum-tubes used in telegraph sets may be carried without undue vibration or liability to breakage.

In telegraph sending and receiving sets, particularly of the portable type for field work, it is often advisable to carry spare tubes. Due to the rough usage to which these sets are often subject it is necessary to provide a holder for them, of such construction that the tube shall not fall out.

Mr. Gargan's invention comprises a socket into which the tube is inserted and to which it is locked by a bayonet slot-construction acting in combination with a resilient means at the base of the socket which operates on the base of the tube to hold it in place.



The upper sketch is an elevation of the tube and socket, with a portion of the base broken away, showing the device attached to a portable telegraph set. At right is a plan view looking downward on the device with tube removed from socket.



## Broadcasting Gain for November Is 17 Stations

DURING November, the Department of Commerce licensed 46 broadcasting stations and cancelled 29. Three of those deleted were transferred to other ownership and have been recorded as new stations. The gain for the month was 17 stations, which indicates that the looked-for saturation point in broadcasting stations has not yet been reached.

The stations whose licenses were cancelled in November follow:

- WLAT—Chas. G. Bosch Co., Burlington, Iowa.
- WBAE—Bradley Polytechnic Institute, Peoria, Illinois.
- WEAP—Brown's Business College, Peoria, Illinois.
- WIAN—Chronicle & News Publishing Co., Allentown, Pennsylvania.
- KFAV—Cooke & Chapman, Venice, California.
- KDZJ—Excelsior Radio Co., Eugene, Oregon.
- WKAJ—Fargo Plumbing & Heating Co., Fargo, North Dakota.
- WKAT—Frankfort Morning Times, Frankfort, Indiana.
- WDAW—Georgia Railway & Power Co., Atlanta, Georgia.
- WGAF—Goller Radio Service, Tulsa, Oklahoma.
- KDYN—Great Western Radio Corporation, Redwood City, California.
- WBAQ—Myron L. Harmon, South Bend, Indiana.
- Wald Publishing Co., Klason, Michigan.
- Chronicle Publishing Co., Dallas, Texas.

WSV—Dr. L. M. Hunter and G. L. Carrington, Little Rock, Arkansas.

WHAL—Jeffrey & Derby, Lansing, Mich. (now "Lansing Capitol News").

WFAX—Arthur L. Kent, Binghamton, New York.

KHJ—G. R. Kierulff & Co., Los Angeles, California.

WMAU—Louisiana State Fair Association, Shreveport, Louisiana.

WIAG—Matthews Electric Supply Co., Birmingham, Alabama.

KFDB—John D. McKee, San Francisco.

KDZD—W. R. Mitchell, Los Angeles.

## Wouldn't It Be Great, If—

The fellow with the phone set on the next block, who radiates 'steen amps, wouldn't turn on full power when he talks to the fellow two blocks away?

• • •

Every time you have a bunch of people for company your set would work as well as it does just after they go home?

• • •

You could get the results out of your set that you tell the other hams you do?

• • •

You could open up a radio store. Think of all the apparatus you could fool around with, and it wouldn't cost you a cent?

• • •

When you asked a radio salesman some question he would answer in such a way that it wouldn't make you ashamed to say you don't understand?

KFAB—Pacific Radiofone Co., Inc., Portland, Oregon.

WTK—Paris Radio Electric Co., Paris, Texas.

KYG—Radio Service Bureau, Inc., Portland, Oregon.

WHAN—Southwestern Radio Co., Wichita, Kansas.

WDAW—Ward-Belmont School, Nashville, Tennessee.

WHAT—Yale Democrat & Yale Telephone Co., Yale, Oklahoma.

WEAZ—Redmond, Donald, Waterloo, Iowa.

### 12 New Broadcasters

The following limited commercial or broadcasting stations, on 360 meters, licensed week ending November 29:

KFGG—Astoria Budget, Astoria, Oregon, 5 watts.

WPAG—Central Radio Co., Inc., Independence, Missouri, 500 watts.

KFEJ—Guy Greason, Tacoma, Washington, 10 watts.

WSAJ—Grove City College, Grove City, Pennsylvania, 100 watts.

WCAP—Kalamazoo College, Kalamazoo, Michigan, 100 watts.

KFCL—Los Angeles Union Stock Yards, Los Angeles, 500 watts.

WOAR—Henry P. Lundskow, Kenasha, Wisconsin, 100 watts.

KFCQ—Motor Service Station, Casper, Wyoming, 50 watts.

WOAZ—Penick Hughes Co., Stanford, Texas, 100 watts.

WOAQ—Portsmouth Radio Association, Portsmouth, Virginia, 150 watts.

WCAW—Woodmen of the World, Omaha, Nebraska, 50 watts.

KFDF—Wyoming Radio Corporation, Casper, Wyoming.

One new Class-B station, 400 meters, was licensed:

KFDB—Mercantile Trust Company of California, San Francisco, 500 watts.

**THE GOODMAN**



PATENT PENDING

The Nickest Short Wave Tuner on the Market  
Only \$9.00 & PP on 1 lb. Send for pamphlet.

**L. W. GOODMAN**  
DREXEL HILL, PA.

Major \_\_\_\_\_, Halifax, N. S., writes: Delighted. Received benevolently clearly on one tube first time I tried the GOODMAN. Would have saved trouble and money by buying months ago.

**GITHENS TRUTONE RADIO HORN—LOUD SPEAKER**



First one to sell on ten day trial Money back Guarantee

Retail Price \$21.00  
Includes Loud Speaker

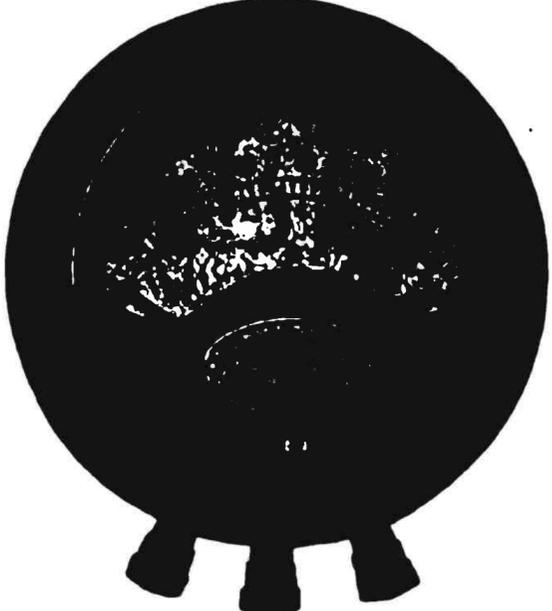
Trutone has been pronounced the best on the market by experts. It has a clear, true tone. Every radio fan should try Trutone and compare it with others. If YOU don't find Trutone the best, your money will be refunded. It is sold on a ten-day trial money-back guarantee. If not carried by your dealer write us. Distributors and Dealers, write!

**AUTO PARTS MFG. CO.**  
1815 Trombly Ave., Detroit, Mich.

the standardization of a high-precision standard wave meter by this means. A tuning fork of known frequency, approximately 1,000 cycles per second, is used as the basis of the standardization. A low-frequency generator is tuned to successive multiples of this frequency by means of the cathode-ray oscillograph, and corresponding settings of the wave meter are obtained. A third generator is similarly tuned to multiples of these frequencies, and thus by successive stages the standardization is extended to include frequencies as high as 5,000 kilocycles (60 meters). It is intended that this wave meter be used as the basic standard for the standardization of commercial wave meters.

**Lighthouse Men Organize**

SEVERAL men in the Lighthouse Bureau, Washington, D. C., have been dabbling with radiotelephone receiving sets, and it has occurred to them that their experience would be valuable to keepers and other members of the service who would like to enjoy the pleasures of the radio concerts. Therefore, they propose to organize a radio club among the amateur fans of the service. The initiation fee will be a postal, or letter, stating approval of the scheme and a desire to be enrolled as a member. The dues will be a word or two from time to time telling of difficulties encountered, results secured, or asking information. A space in the Lighthouse Service Bulletin will be reserved for answers to questions and interesting information that will enable them to construct their own sets or improve those they already own; also to conduct a clearing house for new ideas. Articles will appear from time to time on different phases of the subject. Charles C. Brush is in charge of the plan.



**Pignolet RADIO VOLT-METER**

ONE INSTRUMENT MAKES ALL TESTS

Write for booklet with suggestions for testing and adjusting Radio Sets. Thousands now in use give absolute satisfaction.

**Pignolet Instrument Co., Inc.**  
114 Liberty Street, New York, N. Y.

**Basis of Radio Measurements**

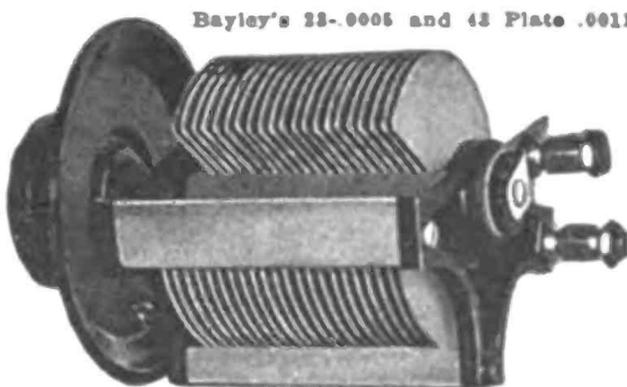
**Bureau of Standards Develops Precise Method of Standardizing Wave-Lengths and Frequencies**

THE Bureau of Standards has developed a very precise method of standardization of radio wave-lengths and frequencies, which is the fundamental basis of radio measurements in this country. By the process used, the frequency of radio waves is compared with that of an audible musical note. A tuning fork is mounted in such a way that it may be made to control the frequency of an oscillatory circuit. The frequency of another oscillatory circuit operating at much higher frequencies is then compared with it by an oscillograph.

This latter instrument consists of the cathode-ray tube—a special kind of vacuum tube in which the narrow stream of electrons is subjected to the action of electric fields applied by the two alternating-current generators. When neither generator is operating, the electrons, impinging on the active screen at the end of the tube, cause a single luminous spot. If one generator is connected, the spot is deflected back and forth along the single line, horizontal or vertical, as the case may be, with such rapidity that it appears as a solid line. If both generators are applied simultaneously, the spot oscillates both horizontally and vertically, and appears, in general, as a blurred luminous rectangle. If, however, the frequencies of the two generators bear a simple ratio, such as four to one, the spot traverses and retraverses a definite simple path, forming a figure by which the frequency ratio may be recognized. It has been found possible to compare frequency ratios as high as 21 to 1.

The bureau is at present engaged in

**RADIO FINDS A BETTER CONDENSER**



Its plates spaced close give it the best tuning qualities. It is a die-cast product; the stationary plates are cast solid, accurately and permanently spaced, on three upright supports, while the movable plates are cast on the center revolving spindle. Plates cannot loosen, which eliminates shorting. Each condenser has our money-back guarantee.

Price, 22 Plates \$2.25 each  
48 Plates \$2.75 each  
TO JOHNNY AND DEALERS  
A FLENNED PROMOTION  
**Bayley Condenser Co.**  
108-109 Vandewater St., Brooklyn, N. Y.

**DELICATE SOLDERING**

Both the manufacturers' and amateurs' problem on all fine work is readily solved by the instrument constructed for this particular purpose.

**THE POST SOLDERING IRON**

Platinum Heating Unit—Interchangeable Tip—Universal Current



One Half Actual Size  
**\$6.00**

From Your Dealer or Write

Awarded Certificate of Excellency, N. Y. Evening Mail Radio Institute

**POST ELECTRIC COMPANY, (Div. 509) 30 E. 42nd St., New York**

**YOUR NEWSDEALER**

will deliver RADIO WORLD to your home. In order to be sure of getting RADIO WORLD regularly, and of not missing a single issue, we suggest that you either subscribe direct or through your newsdealer at \$6.00 a year (52 issues), \$3.00 six months, and \$1.50 three months. Or instruct your newsdealer to deliver RADIO WORLD regularly to your home each week. Dealers will take standing orders and make deliveries of paper whenever requested. Radio World, 1400 Broadway, New York.

Advertising Rates, Display, \$5.00 per inch, \$150.00 per page

# Radio Merchandising

Classified Quick-Action Advertising, 5 cents per word

Telephone Bryant 4796

## Bank Operates Giant Radio

San Francisco Institution Broadcasts News to Fans West of Rocky Mountains

THE most powerful radio broadcasting-station on the Pacific Coast—and one of the most powerful in the United States—is now "on the air" in regular service on Telegraph Hill, San Francisco.

The station, officially known as KFDB, was established by the Mercantile Trust Company of California, and is the first on the Pacific Coast to be built, owned, and operated by a bank.

KFDB has a sufficient range to reach all points west of the Rocky Mountains. It is broadcasting every day (Sunday excepted) commercial, financial, and agricultural information between the hours of 10 and 11 a. m., and 2 to 3 p. m., with a musical program between 9 and 10 p. m.

The first attempt at broadcasting from KFDB, in August, developed an interesting

## New Firms and Corporations

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

Benjamin Electrical Supply Co., Manhattan, \$10,000; B. Schmones, J. Solomon, D. Getz. (Attorney, M. S. Yochelson, 320 Broadway, New York.)

problem in radio engineering. The power was supplied direct from a 2,000-volt generator, but the commutator hum of the generator prevented satisfactory radio reception.

To eliminate this disturbing noise, it was decided to install a 2,000-volt 20 ampere-hour storage battery, and use the generator for recharging the battery in series. The Philadelphia Storage Battery Company supplied 333 Philco Radio A Batteries for the purpose, and regular broadcasting was started on November 1.

## 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.

SECOND NATIONAL RADIO EXPOSITION, direction International Trade Exposition Co., Chicago, January 13 to 20, inclusive, 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. Colwell & Korbell, Fisk Building, New York City, directors of publicity.

SECOND DISTRICT RADIO CONVENTION, Hotel Pennsylvania, New York City, March 1, 2, and 3, 1923.

FIRST UNIVERSAL EXPOSITION OF INVENTIONS AND PATENTS, Grand Central Palace, New York City, February 17 to 22, inclusive, 1923.

## A Freshman Improvement

THE very latest improvement in radio is a combination variable grid-leak and Micon-condenser.

The grid-leak consists of a piece of fiber specially treated on which a bronze spring is rotated to vary the resistance in an unbroken range, from practically zero to five megohms. The condenser is a tested Micon-condenser of .00025 mfd. The whole is combined and sealed in a neat molded body with nickeled binding-posts and a pointer and dial to set the grid-leak resistance.

Every tube requires a different grid-leak resistance to operate at its maximum efficiency, especially when working on weak signals. It has been found in practice that it is possible to tune in distant stations by varying the grid-leak resistance to the proper point.

The variable grid-leak and condenser may be used in the parts of the circuit to eliminate noise and distortion. It has distinct advantage when placed across phones instead of usual phone condensers.

This device is manufactured by the Chas. Freshman Company, Inc., of New York City. The accuracy and construction will be in line with the tested Micon-condenser now well known in the radio field.

## Improved Anti-Capacity Radio Jacks

Manufactured by the Radio Improvement Co., 25 West 43rd Street, New York City



THE improved Anti-Capacity Radio Jack is one of the latest developments in radio and was designed especially for radio work. Radio enthusiasts are quick to realize the importance of these jacks—no soldering of wires, an important element; occupies less room, which is very true; inductance is practically eliminated and it has a classy appearance. This device is practically an improved radio jack, radically different from all styles of the old ordinary telephone jack. They will fit any plug. Owing to the elimination of long leads, induction is minimized. They are made in single circuit, open; single circuit, closed; double circuit, closed; and both single and double filament circuit. The "A" Battery Switch is, also, a practical device which, due to its red knob, permits the "A" Battery to be disconnected or connected at a pull, or push, of a knob.

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

## National Radio Week Special Number!

Remember "This Is a Radio Christmas"

and that millions of dollars will be spent during the holiday time for radio gifts.

Be sure to get your share of this business by advertising in the issue of RADIO WORLD of December 23, which will be

## RADIO WORLD'S NATIONAL RADIO WEEK NUMBER

Thru this medium you can reach thousands of readers, who are not only interested in radio themselves, and want new equipment, but who also will give presents to others whom they wish to make radio fans.

### ADVERTISING RATES:

Regular advertising rates in force for RADIO WORLD'S NATIONAL RADIO WEEK NUMBER, as follows:

\$150 a page, \$5 an inch. Discount, 10% four times, 15% thirteen times.

Take advantage not only of RADIO WORLD'S circulation, but also its cash-thru-the-mail pulling power.

Be represented in RADIO WORLD'S National Radio Week Number, and reach the many thousands who actually want your goods and are ready and willing to pay for them.

EARLY COPY GETS BEST POSITIONS.

RADIO WORLD, 1493 Broadway, New York

# Radio-Wire Tables

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

## No 4—Single Silk-Covered Wire

Showing the Number of Feet in a Pound and Fractions of a Pound

APPENDED is the fourth of a series of five tables which the radio amateur will find useful for many purposes. The fifth table—"Double Silk-Covered Wire"—will be published in an early number of RADIO WORLD.

Size	1/8 lb.	1/4 lb.	3/8 lb.	1/2 lb.	3/4 lb.	1 lb.
20	39	78	156	234	319	398
21	48	96	192	288	398	497
22	63	126	252	378	504	630
23	80	160	320	480	645	816
24	99	198	396	594	795	994
25	125	250	500	750	1004	1255
26	155	310	620	930	1240	1550
27	201	402	804	1206	1615	2019
28	252	504	1008	1512	2023	2529
29	328	656	1312	1968	2625	3281
30	416	832	1664	2496	3335	4161
31	477	954	1908	2862	3820	4771
32	609	1228	2436	3654	4876	6091
33	770	1540	3080	4620	6243	7701
34	969	1938	3876	5814	7757	9691
35	1207	2414	4828	7242	9660	12071
36	1488	2976	5952	8828	11967	14881
37	1884	3768	7336	10812	13764	18841
38	2064	4128	8256	12384	16516	20641
39	2782	5564	11128	16592	22261	27821
40	3368	6736	13472	20208	26947	33681

The following tables have already been published:

- No. 1—Enameled Magnet Wire, RADIO WORLD, No. 34, dated November 18.
- No. 2—Single Cotton-Covered Wire, RADIO WORLD, No. 35, dated November 25.
- No. 3—Double Cotton-Covered Wire, RADIO WORLD, No. 36, dated December 2.

## To Harmonize Radio Activities

National Radio Chamber of Commerce Claims There Are Too Many Broadcasters and a Concrete Study Must Be Made

PLANS for the organization of chambers of commerce in the principal cities of the country as a step towards harmonizing, on a nation-wide scale, all radio instrumentalities—the efforts of which, because of the rapid development of the industry, are producing confusion and disorganization—are announced here by the National Radio Chamber of Commerce, 165 Broadway, New York City.

The first of these chambers, which will operate under charters from the National Chamber, will be established in Chicago. A meeting to discuss organization plans was held on Friday, December 8, at the Union League Club in that city. A national gathering of broadcasters will be summoned in Chicago to take up a national policy of broadcasting.

The National Radio Chamber of Commerce, it is said, has undertaken the leadership in this direction after conferences with the Navy Department, the Department of Commerce, the United States Bureau of Standards and other public and private agencies. Kenneth P. Gregg, of New York, one of the managers of the National Chamber, now in process of organization, will represent this body at the Chicago meeting. Establishment of a Chicago Radio Chamber, he said, was a link in a general plan to federalize the National Chamber by the formation of similar chambers in the cities comprising the nine regional districts into which the chamber has divided its activities. With New York as the headquarters

of the parent body, Chicago has been selected as the starting point from which other chambers will be brought into being. Radio representatives from all over the country will attend the meeting.

Once the Chicago chamber is organized, it is planned to set up similar chambers in other cities of the ninth radio district, which, besides Chicago, includes Milwaukee, Indianapolis, St. Louis, Kansas City, Omaha, Denver, Minneapolis, St. Paul, Duluth, Louisville, and Davenport, Iowa. The States comprised in this area are Wisconsin, Indiana, Kentucky, Illinois, Missouri, Nebraska, Minnesota, Iowa, North and South Dakota, and Kansas.

This general plan, the organizers of the National Chamber believe, will accomplish an essential union of national and local effort. In this way, Mr. Gregg said, local interests will be conserved and property represented in the national body, under whose charter the regional chambers will come into existence.

In a statement issued by the National Chamber it was said that entirely too many radio stations are operating in this country. A great many of these are very small-powered stations. A concrete study must be made, it was said, to determine where these stations should be located, and what class of service they should broadcast without interference.

A study just completed by the National Chamber shows that the total area covered by broadcasting stations in the United States is 179,500,000 square miles.

## American Radio Exposition Offers Prizes to Boys and Girls

IN order to stimulate interest in the wonders of radio among school boys and girls, prizes aggregating \$200 in gold and a few additional prizes other than cash are being offered by the management of the American Radio Exposition at the Grand Central Palace, December 21 to 30.

To the boy or girl in school or high school who enters in the contest the most ingenious home-assembled set of radio apparatus, a prize of \$100 in gold will be awarded. The second prize will be \$50 in gold; third prize, \$25; fourth prize, \$15; fifth prize, \$10. There will be also several other prizes worth competing for, including ten tickets of admission to the exposition for sixth prize; eight tickets for seventh prize, and six tickets for eighth prize.

To be eligible, contestants must be bona fide amateurs and bring their entry to the exposition to be exhibited. The parts may be home made or assembled and the ingenuity and original ideas embodied in such assembly will count as the chief factor. An inexpensive layout will have just as much chance of winning first prize as an expensive one.

Pupils of public schools, high schools and private schools within a radius of one hundred miles will be eligible. Special prizes for amateurs under twenty-one years of age, who are no longer in school, will be offered.

Prospective contestants must make their entry by letter (not in person) to the American Radio Exposition, 120 Broadway, New York, on or before Saturday, December 16, and they will receive particulars relative to exhibiting the apparatus. The management reserves the right to exhibit or not to exhibit any entries. A jury of competent impartial engineers in no way connected with the management of the Exposition will make the awards.

## "The Fool" Broadcast

First Theatrical Performance to Be Sent by Radio from Stage

WHEN the Westinghouse Electric Company broadcast the performance of "The Fool" from the Times Square Theater, New York City, December 14, it was the first time in the history of radio that a theatrical performance was sent from the stage of a playhouse with the audience present and participating in the event. The Westinghouse folk sent a force of engineers to the Times Square Theater Monday to install apparatus. The broadcasting began at 8:45 with introductory remarks by Channing Pollock, author of "The Fool." Two or three important scenes were played, the intermission being filled by appropriate music sent from Newark. All this involved the use of three microphones—one in the basement of the theater for Mr. Pollock's speech, one in the footlights for the performance on the stage and one in Newark. The sending was absolutely synchronized, although from places miles apart. The story of "The Fool" begins in a fashionable New York Church on Christmas eve, and revolves around the determination of one man to apply the principles taught by Christ Jesus to his everyday living. The applause of the audience was heard all over the country.

National Radio Week Number Out Next Week

**B C M  
BROADCAST RADIO  
RECEIVER**

Many people live in locations where an aerial is impossible. Others object to their premises being disfigured by poles and wires, and many doubt their ability to operate sets with such complications. Eliminate these features by using B C M Radio Frequency Broadcast receivers and inside aerial.

Dealers should write

**B C M RADIO COMPANY**  
YPSILANTI, MICH.

**Those Football Returns by  
Radio**

Being a Stenographic Report of Them  
as They Came from the Yale-  
Harvard Game

CROSS kicked off for Yale to Harvard's thirty—no—twenty-yard line—(Ray-y-y-y-y-y!—Hah-vud-d-d!—Hah-yud-d-d!—Ray-y-y-y!) Gehrke ran it back—huh?—wait a minute—that's right—Gehrke ran it back fifteen—no—about ten yards before he was downed.

It is now Yay-hul's ball—no—Harvard's ball—on Yale's—wait a minute—no—on Harvard's own 35—37—40—am I right, Eddie?—yard line—Rekety kex-ko-

ex-ko-ex; Reckety kex ko-ex-ko-ex-Yale! Yale! Yal-l-le! Harmon—no—Hammond—punted to whozatplayer—Joe—huh?—punted to Deaver—no—to Neidlinger on the (Band: Oompah-Oompah-to-rara-tah-tah-tum-crash-boom-tah)—Yale returned to kick—no thanks, Oscar, I don't care for Scotch—(Tremendous outburst of cheering: Yah-h-h-h-h—Yea-a-a-a-a—Hah-vud-d-d-d-d!—Hah-VUD-D-D—Yay-y-y-y!) and on a fumble by—huh?—whatzat, Eddie?—by one of his own men Hammond ran the length of the field—huh?—wait a minute—Owen ran the length of the field. (Deafening cheer: HAH-VUD-D-D-D-D-D! HAH-VUD-D-D-D-D!) kicked the goal—the score is Hahvudd seven—Yahul nothing—hey, Dick, give us a shot o' that, will yer?

There is time out for—hey!—where's that flask, Sid?—for injuries to a Yale—no—to a Harvard—no—to a Yale player—Cruikshank—no—O'Hearn. (Band: Umpah!-Umpah!-Ta-ta-ra-ta-ra-dum-la-ra)—is injured. Mallory—I mean Neidlinger—ran the ball back 10 yards by beautiful interference—got a match, Eddie?—by O'Hearn.

Jordan punted to Hammond on Yale's—I mean Harvard's—40-yard line—(Rah-h-h-h!—Rah-h-h-h!—Rah-h-h-h!—Yahul!—Yahul!—Yahul!). Somebody is hurt and there is time out—Hey, Damon, gimme a cigarette?—On the next play (Yay!—Whoohah-h-h!—Wow-w-w-yah-h-h-h-cow-w-w-rey!) Gordon—no—Dunker—no, think it's Eastman—went through centre—no—left end for 10—no—for 8—no—for four yards. (Band: Tum-tah-ra-ra-ratum-tah-crash-boom-m-m!).

Somebody's hurt—where's that bottle? It is very cold here and a biting wind is sweeping across the bowl and—thanks!—here's the cork, Scotty—(Hah-vud!—Hah-vud!—Hah-vud!—Rah-Rah!—Rah!—Hah-vud-d-d!—on an attempted forward—no—on a fake kick—wait a minute—on a delayed pass Jenkins—no—Owen was thrown for a loss of ten yards—where's that flask, Bozeman?—the ball is now Yale's on Harvard's 15-yard line—no—that's wrong—just a minute (Rah-h-h!—Hah-vud!—Hah-vud!—Har-vud!—Reckety-kex-koex-koex—Yale!—Yale!—Yale!—Yale!) Harvard fumbled and the ball was recovered by—thanks, Eddie!—gurgle-gurgle-gurgle—by Lovejoy or Cross—wait a minute—the ball was (hic) recovered by A'Hearn—O'Hearn—A'Hearn (Band: Blam-blam-dah-dah-crash-bang)—H. I. Phillips in "The Globe," New York.

"B" Batteries That Last for Five Years  
Send for Catalogue



RADIO EQUIPMENT MFG. CO.  
Dept. "B," 1668 JEROME AVE. NEW YORK, N. Y.

**GLASS ENCLOSED GRID LEAK**  
Guaranteed  
35c.

Values are constant. Resistances vary from 1/2 to 5 megohms.

Dealers and Jobbers: Write Us  
**LINCOLN RADIO CORPORATION**  
116 W. 65th St. Manufacturers New York City

THE ONLY GENUINE AND GUARANTEED

**"All Wave" Coupler**

TRADE MARK FLAT AND BANK WOUND

**Wave Length, 150 to 3,000 Meters**

Eliminates the use of all Variometers, Varicoilplers and Loading Cells, inasmuch as it performs in one compact unit the functions of all of these devices combined.

**For the Novice**—The six efficient hook-ups given free with each "All Wave" Coupler enables the greenest novice to attain the same results attained by the expert in building the simplest, most compact and most efficient radio receiving set possible.

**Be Prepared**—For the higher wave lengths that have been and will be allotted to broadcasting stations because of their ever-increasing number. BUILD a set that cannot become obsolete.

**Unusual Results Attained**—Individual users of the "All Wave" Coupler have written us that in Rhode Island it is nothing unusual to bring in stations as far south as Havana, Cuba; while in Mobile, Alabama, Newark, N. J., is brought in daily.

**Beware of Imitations**—of the "All Wave" Coupler, which is guaranteed with a money back to operate as advertised. Look for the trademark, "All Wave," on the rotor, also the six efficient hook-ups in the box.

**\$9.00** Six efficient Hook-ups sent upon receipt of 10c. stamps or Free with each "All Wave" Coupler

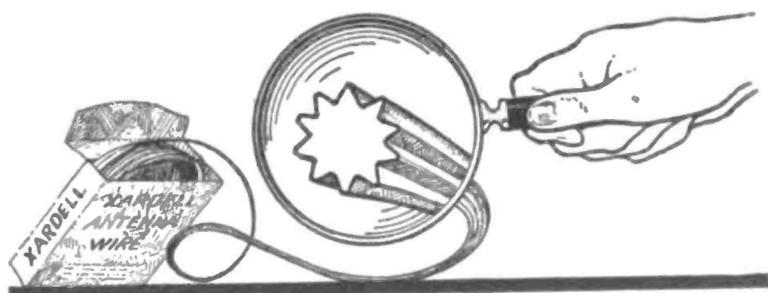
**GUARANTEED WITH AN ABSOLUTE MONEY-BACK GUARANTEE**  
THOUSANDS OF SATISFIED USERS

**Capitol Phonolier Corporation**



Patents Granted and Pending

60 Lafayette Street  
New York City



**Something Brand New  
in Antenna Wire**

**\$1.50**

PER  
HUNDRED  
FEET

That will at once appeal to you. It is different and better than any makeshifts to date, being hard drawn from the finest copper having a corrugated surface with 10 collecting points on its cir-

cumference. This gives a greater collective and gathering surface. The result is extreme sensitiveness, and an increase in the range and clearness of any set from the simplest crystal type to the finest V. T. Receiver.

Packed in neat cartons of 100 feet, 200 feet and 500 feet.  
Dept. C. Postage paid.



UTICA, NEW YORK

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Send sketch or model and description, for advice as to cost, search through prior United States patents, etc. Preliminary advice gladly furnished without charge.

My experience and familiarity with various arts frequently enable me to accurately advise clients as to probable patentability before they go to any expense.

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## RADIO SALESMEN!

**A Rare Selling Opportunity  
For Live Wire Men**

Handle Grewol Detectors in territories not opened.

Write for full particulars

**RANDEL COMPANY**

8 Central Ave. Newark, N. J.

Do You Like Clear Tone—Sharp and Distinct? If so try

**MARSH'S**

**Vernier Variable Condenser  
AT LAST**

Made in Three Styles. Dial Knob and Screws Complete. Fully Guaranteed.

27-Plate ..... \$5.00  
22-Plate ..... \$4.75  
11-Plate ..... \$4.25

Mail orders promptly filled.

F. P. Marsh, 145 Nicoll St.  
NEW HAVEN, CONN.

## TOBACCO HABIT BANISHED

QUICK, SURE, LASTING RESULTS

Tobacco Redeemer banishes the habit completely, almost before you know it. An absolutely scientific, thoroughly reliable treatment. No matter how long the habit, or in what form used, you will have no craving for tobacco after you take this pleasant, inexpensive treatment. This we positively guarantee. Your money returned without argument or question if not satisfied. Write for free explanatory booklet and proof of what Tobacco Redeemer has done for men addicted to the tobacco habit. Send post card or letter today.

Bowell Pharmacal Co., Dept. 971, St. Louis, Mo.

## PRICES SMASHED

Each sale has created new friends and customers with the result that we now announce drastic reductions in our quality lines. All goods guaranteed. Send card for complete price list. You'll be surprised. You'll tell your friends. A sample order follows:

### REGENERATIVE VACUUM TUBE SET

Approximate range—1,000 miles.

	Our Price	Others
Fund—Rehoffer—7"x12" drilled.	\$1.75	\$2.50
Cabinet of 3-ply wood to fit panel.	1.50	2.50
Two dials—each \$25.	.70	1.40
10 switch plates with out. No. 10.	.10	.40
4 switch stops with out. No. 10.	.04	.12
2 binding posts. Nickel plated @ 20.	.24	.45
2 switch levers @ 25c.	.50	.90
1 filament rheostat. Highest grade.	.65	1.10
1 variac coupler. Fourteen taps.	2.25	4.00
1 25 plate variable condenser.	1.05	3.00
1 tube socket—Menthol.	.45	.85
1 grill condenser and leak.	.10	.25
1 phone condenser.	.10	.25
1 tube socket support.	.15	.25
12 feet spaghetti tubing @ 4c.	.48	.84
15 feet copper connecting wire.	.30	.45
Blueprint showing details to assemble.	.10	.25
	\$11.42	\$26.12

Other articles taken at random from our lists prices not are—

Detector tubes—Cunningham—NOT rebuilt.	\$5.00	\$5.00
Transformer—Audio frequency.	2.00	4.50
Variometer—Hardwood centers 4 1/2".	2.25	4.00
Foot Pump—2000 ohms.	2.00	5.00
Kalogen—2400 ohms.	6.75	12.00
Western Electric 2000 ohms.	6.25	12.00
Blueprints giving detail of 2 step amplifier or regenerative receiving set.	.10	.25
Two step amplifier—knocked down Panel drilled.	12.00	25.00
Two step amplifier assembled. In cabinet.	16.00	35.00
Vacuum tube set in cabinet 7"x12" Wired.	17.00	35.00

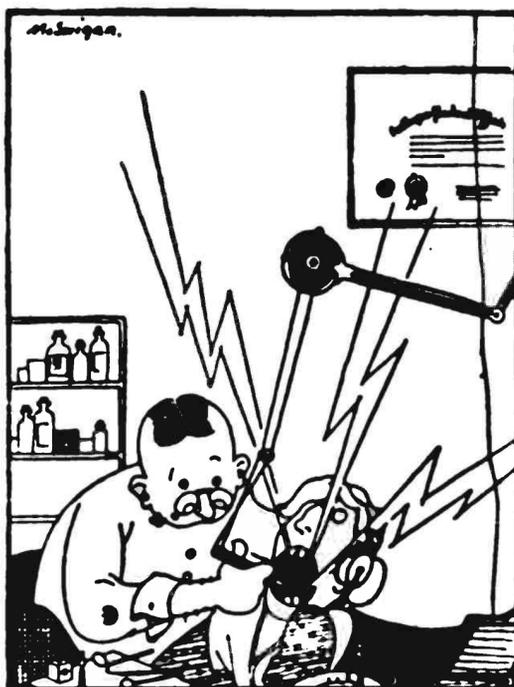
Send for list today or order direct from above. Goods sold subject to return for rebate or exchange. YOU MUST BE PLEASED.

Radio Parts Manufacturing Co.  
15 Park Place West Detroit, Mich.

## Broadcast Bill's Radiolays

By William E. Douglass

DOC McDOUGALL (he's our dentist) thinks a lot of me; an' Doc, he's wise on sev'ral things besides plain dentistry. Why, me an' him will sit for hours discussing radio. Course, I'll admit I ain't no whizz but what I'd like to know is how he kin remember all of that there highbrow talk with oscillatin' heterodynes, he beats me at a walk. Not long ago he says to me in kind a braggin' way, "Well, Bill I got Havana with my outfit Saturday." He's got a fairly decent set of which he's pretty proud. It took him down a peg when I saz, "Yes, they come in loud." But all the same Doc's waitin' room is strictly up to date, an' while you're parked there in a chair bemoanin' unkind fate, his office girl will offer you a pair of them receivers. These doctors have some clever tricks (the bunch of "gay deceivers"). She helps



"Doc got out his tools an' started diggin' in my jaw."

you put the harness on, an' then adjusts the phones, so while you're listenin' you can't hear his other patient's moans. Doc says that this new stunt of his keeps 'em from gettin' nervous, and when they're calm an' peaceful he can give 'em better service. The other day my tooth ached so, I thought I'd stop an' see, when I went down to get the mail, what Doc could do fer me. I had to wait a while outside before he called me in, and all the time my blamed old tooth wuz hurtin' me like sin. When he began to work on me he sez, "I s'pose you know, my patients always have their choice—some gas or radio." Then, lookin' at the clock, I saw 'twuz quarter after three. "Let's get the latest tunes," I sez, "from station JAZ." So Doc got out his tools an' started diggin' in my jaw. I asked, "How far you goin'?" and the band played "Arkansas." "That's far enuff," I sez, and groaned. The set kept right on hummin'. Doc luffed an' sez, "I think they'd ought to play 'The Yanks Are Comin'."

Copyright, 1922, Westinghouse Electric & Mfg. Co.

### No Free List

RADIO WORLD has no free list. The only copies sent out by the publishers are to fill the ever-increasing orders of the American News Company, the large numbers of subscription orders received at the office of publication, and one voucher copy to each advertiser and advertising agent represented in current issues.

RADIO WORLD, 1493 Broadway, N. Y.

A Partial List of the Impressive Array of Exhibitors at the

# American RADIO Exposition

The Official Exposition for American Manufacturers

Grand Central Palace  
New York

December  
21st to 30th

(Sunday excepted but Christmas Day included)

- Western Electric Co., Inc.
- Radio Corp. of America
- National Carbon Co., Inc.
- General Insulate Company
- Parent Electric Company
- DeForest Radio Tel. & Tel. Co.
- Sleeper Radio Corporation
- C. Brandes, Inc.
- Sound Wave Corporation
- J. Burgess Davis
- Davis Radio Company
- Hutchinson Radio Company
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- Neve Manufacturing Company
- Henry Hyman & Company
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- Clapp-Eastham Company
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- National Airphone Corporation
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- American Radio Relay League
- Coto-Coll Company
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- Malone-Lummen Laboratories
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The Exposition is being organized with the endorsement of the NATIONAL RADIO CHAMBER OF COMMERCE and sanction of the Radio Apparatus Section of the ASSOCIATED MANUFACTURERS OF ELECTRICAL SUPPLIES.

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Mahogany Phenograph Quality Finish. No Drilling of panels for attaching required. Hinged top.  
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 If your dealer cannot supply you, order direct.  
**THE R-C MILLS**  
 Executive Office, 30 E. 23d St., New York, N. Y.  
 (Mention RADIO WORLD)

**Answers to Readers**

*IS it possible for me to change my set (diagram enclosed) so that I can get further distances without spending money for an entirely new set?—Leslie Roberts, New York City.*

By putting variometers in your plate and grid circuits you can make your set regenerative and increase your range. This is the easiest way unless you wish to add radio-frequency amplifiers. According to your diagram you are not using any transformer between your detector and your second bulb; therefore we don't understand how you can get any amplification.

\* \* \*

*I enclose diagram of my apparatus, which consist of following: loose-coupled tuner, crystal detector, and phones. I wish to hear concerts coming from Cuba. Can I accomplish it?—Alonso Aheirs, New York City.*

Absolutely not. In order to receive that station, as well as any of the other radio-telephone stations located at a distance greater than 30 miles (approximately) from your home, you must employ a very sensitive bulb set. There are a number of good ones on the market.

\* \* \*

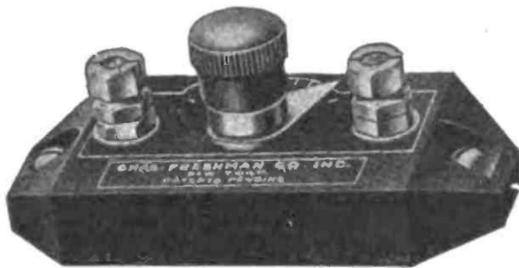
*I recently purchased a receiving unit, and, at the advice of the salesman, put a variable condenser in my aerial circuit. When this is turned over a certain spot I get a loud and troublesome click in the loud-speaker. Explain the trouble.—Joseph Turner, Laredo, Texas.*

From the way in which you explain your trouble it is evident that your condenser is "shorted" (short-circuited). Take the condenser to the store where your purchased it and let them look it over and test it out.

\* \* \*

*Publish hook-up of set using one stage of radio-frequency, detector, and two stages of audio-frequency in connection with set using*

**The Latest and Most Essential Part of an Efficient Tube Set**



**Variable Grid Leak and Micon Condenser (Combined)**

Obtainable in an unbroken range from zero to 5 megohms—all intermediate points. Fixed capacity—.00025 M. F. Improves your set wonderfully by

**Clarifying Signals  
 Lowering Filament Current  
 Increasing Battery Life  
 Eliminating Hissing**

**Price Only \$1.00**

At your dealers—otherwise send us purchase price and you will be supplied without further charge.

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*Have You a Friend Who Is Interested in Radio as an Amateur or a Fan?*

**I**f so, you must know that such a friend would welcome a yearly subscription for RADIO WORLD from you. Send us \$6.00 and we will place the name of your friend on our mailing list for the coming year, and also we will send a special notification to your friend to the effect that RADIO WORLD will be sent for 52 weeks to his address with your compliments. Send in a yearly order, so that the first copy and our acknowledgment of your courtesy to your friend will be received before Christmas.

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**RADIO WORLD,**  
 1493 Broadway, New York, N. Y.

Enclosed find \$6.00 for which send Radio World (52 numbers) for the coming year, 1923, to the following address:

Name .....

Address .....

City and State.....

My Name.....

Address .....

Send notification to the name given that RADIO WORLD will be sent with my compliments for the coming year.

If you wish to send more than one subscription, write additional names and ad-

**A SURPRISE FOR XMAS**  
**VARIOCOUPERS 65c**

With every one sold, we will give a hook-up for using the variocoupler with one tube, which others are using with good results for receiving from 250 to 800 miles.

**SOMETHING NEW**

**4-WAY TELEPHONE PLUG**

Takes the Place of 2 Plugs and a Jack—\$1.20

**ANTENNA PLUG**

Just Attach to Electric Light Socket.

Guaranteed—40c

No More VT-1 W. E. Tubes. Those Who Have Already Ordered Will Receive Them Before Xmas. UV200 and UV201 Are List Price, Less 10%.

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**LATEST EDITION**

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Above Map Given Free with \$5.00 purchase until Xmas.

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**RADIO DISTRIBUTING & AUTO SUPPLY COMPANY**

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Phone Columbus 8584

Broadway-7th Avenue Subway  
 6th or 9th Avenue L

*variometers, vario-coupler, and 43-plate condenser.*

You will find a treatise, as well as two hook-ups, in RADIO WORLD, No. 37, dated December 9, under the heading "Why Radio-Frequency Amplifies Signals," by Donald Van Wyck.

\* \* \*

*I have a two-step amplifying set. When I turn on my second step I am bothered with a howl in my phones and loud-speaker. How can I remedy this?—Charles Peters, Liberty, N. Y.*

Try putting your amplifying transformers at right angles to one another and shielding your bulbs with some light screening  
 (Continued on next page)

- Condensers**
- Finest 23 Plate.... **\$1.00**
- Finest 43 Plate.....**\$1.25**
- Variometers**
- Baldwin Type..... **\$2.00**
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- Phones—3000 Ohms.... \$3.52**

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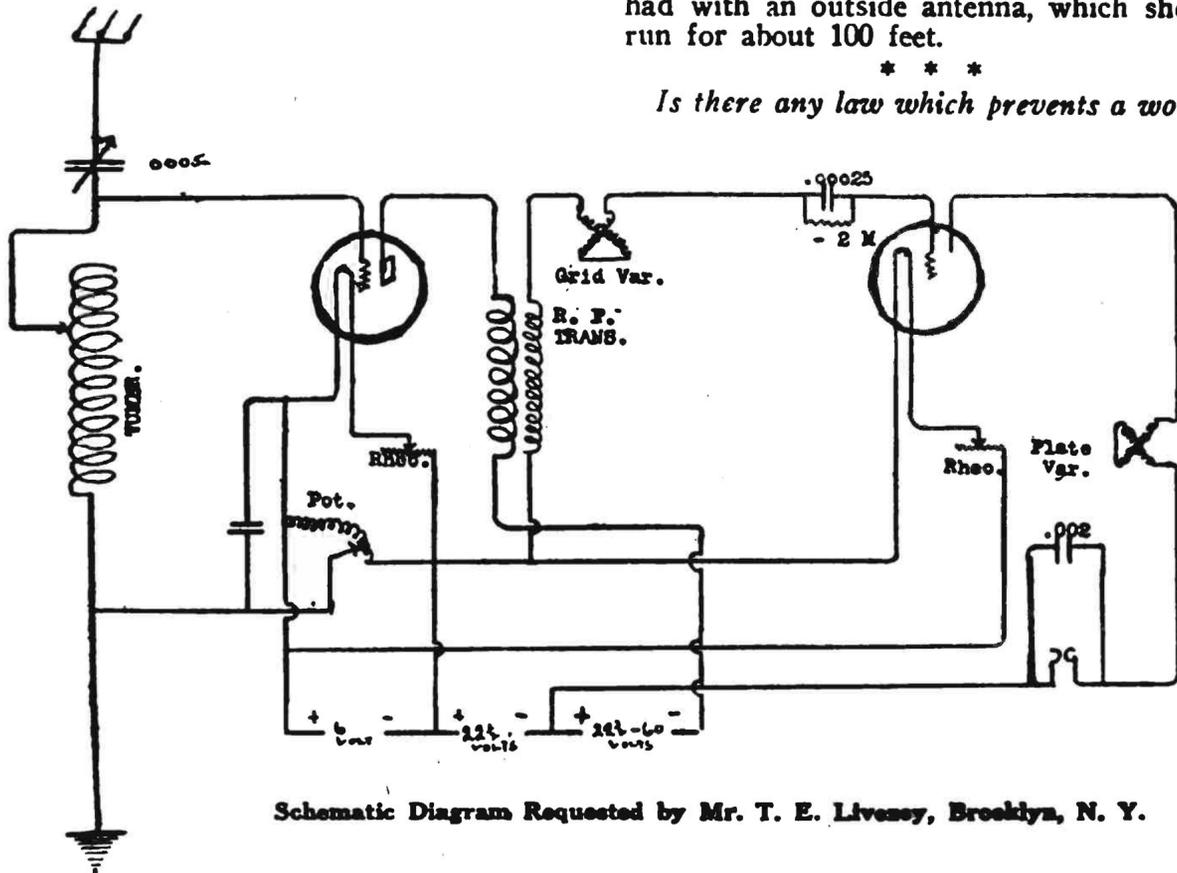
52 Weeks for \$6.00

**Complete Your File of RADIO WORLD**  
 Copies of Radio World No. 1

If you did not get a copy of Radio World No. 1, send us \$6.00 and we will send you this paper for one year, and start it with our first issue, which will be

**Answers to Readers**  
(Continued from preceding page)

made in the form of a cone. Maybe you are using too much B battery. Try reducing it. Don't burn your detector bulb too high. Go over the wiring of your second step to see if you have made any errors.



Schematic Diagram Requested by Mr. T. E. Livesey, Brooklyn, N. Y.

Kindly publish diagram of tuned radio-frequency, showing all values. Can a set of this kind be combined so as to incorporate the units of a regenerative set that I have?—T. E. Livesey, Brooklyn, N. Y.

We publish herewith the diagram you request. You will notice that we are using two variometers and tuner. If you will refer to the article in RADIO WORLD dated December 9 you will find a full treatise, as well as two very fine hook-ups, by Donald Van Wyck. You can use this hook-up as you suggest, but it will necessitate rewiring all of your set, as all the wiring will have to be made as short as possible for the highest efficiency.

I have a crystal set, but do not get signals loud enough. Could I add an amplifier to bring them in better?—S. Wolkin, New York City.

You could, but it would not be advisable. Why not build a bulb detector and amplify it from that? A crystal is not steady enough.

Why can't I use iron wire on a tuning coil? Iron has more resistance than copper. Are telephones wound with resistance wire?—James Oakley, San Antonio, Texas.

It is not resistance that you want, but inductance. This cannot be obtained with iron. Telephones are wound with very fine copper wire. No. 40 is used mostly. Some

firms selling a cheap phone have tried using German silver; but you cannot get the phones so treated to work, as the internal resistance of both German silver and iron wire dissipate the minute energy in heat.

Is it necessary to have an outside antenna for use with a crystal set? How long should it be?—Jerome Llayng, Port Chester, N. Y.

With a crystal set better results will be had with an outside antenna, which should run for about 100 feet.

Is there any law which prevents a woman

from applying for a radio license? What is the best type of receiving apparatus? Where can they be purchased? Do I have to apply for a license before I can purchase my apparatus?—Miss A. Winterbottom, New York City.

There is no law preventing anybody, male or female, from getting a license to operate a radio-transmitting station. The only limitations are that the applicant know the laws pertaining to radio, and transmit and receive signals at a fair rate of speed (10 words per minute). The best type of receiving apparatus is a regenerative bulb set. Follow the advertisements in RADIO WORLD. A license is not necessary in order to operate a receiving station.

**5 Instruction Books of the RADIO READING COURSE \$1.97**

Learn how to design, construct, install, operate and maintain all kinds of radio apparatus. No tedious study. A complete radio education. Course edited and approved by Prof. J. H. Mercereff. Up-to-date, accurate, complete. SEND NO MONEY. Just send your name and address and pay postman only \$1.97 and you own this five-book Radio Library. Write today, Dept. RW4.

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Everyone is Because  
**WE REPAIR**  
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**VACUUM**  
**TUBES**  
and Guarantee Them!  
Your dealer should know, but if he does not, send direct to  
**HARVARD RADIO LABORATORIES**  
Boston 9, Mass.  
Tubes returned Parcel Post C.O.D.

**Let Radio Radiate Your Home**

Western Electric Phones .....	\$7.95
Made for U. S. Government with Ear Mufflers and Extra Caps.	Special
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**SEND US THE NAME OF YOUR RADIO CLUB**

Also the names of your president and other officers. We want to add these to a list of radio clubs and officers we are preparing for publication in an early issue. RADIO WORLD, 1493 Broadway, New York.

**Attention! Fans and Amateurs!**

Have you built your own receiver?  
Are you experimenting with any particular hook-up?  
Are you improving your set?  
Are you doing any interesting constructive work in radio?  
Why not share this knowledge with your thousands of brother fans who read RADIO WORLD every week?  
We want pictures of receiving sets with descriptions of how you overcame some difficulty, or of any additional part or unit that you have added to obtain better results. These are the things that, probably, the other fellow is looking for. Send in your information; pictures or whatever you have done to improve the art.

Remember the beginner is looking for them.  
We intend to print in this paper, each week, pictured information and description of value to radio amateurs. If you have found a newer or better way of doing anything, don't keep the secret but tell it to your thousands of brother fans.  
Send in a photograph of your set with or without accompanying diagrams and measurement. State whether you figure in the picture yourself, or not, and without any expense whatsoever to you we will make an engraving and publish it. Be sure to write your name and address plainly on photograph.  
Send in your picture at once, or if you have not made a set or done anything else in making radio material, tell the boy next door all about this offer.

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All sizes of formica panels and tubing. Formica, \$2.00 a pound. Cut and engraved to order.

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VARIABLE CONDENSERS—  
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## "BECO"

Radio Frequency Sets

### A REAL DX SET

TUNED TRANSFORMER TYPE

200 to 500 Meters 2 Audio Frequency  
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All on 3 Tubes

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**\$1.25**  
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We also make 6 other styles  
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Jobbers—Dealers—Agents  
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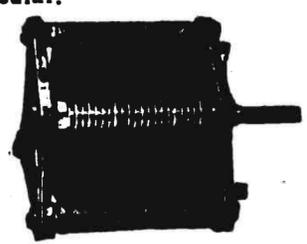
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ON HIGH GRADE

### Variable Condensers

Direct from Manufacturers

Take the middleman's profit and selling costs for yourself. We sell you direct. These extremely accurate instruments made by experienced condenser people are minus the decorative frills that add to cost. Price reduced to rock bottom without sacrificing quality in the least. Satisfaction or your money back. Write today for very interesting circular.



**PRICES:**  
21 Plate  
**\$2.55**  
48 Plate  
**\$2.95**  
Complete with  
Mounting Screws

Year Order Filled by Return Mail

No checks or money orders needed. Pay postman. Send the order TODAY, enclosing 5 two-cent stamps to cover mailing cost and receive your condenser in a day or two.

**MANUFACTURERS' RADIO ASSOCIATION**  
60 East Kinney St. Newark, N. J.

## That Armstrong Circuit

So much interest has been displayed in the special article, "TESTED INVENTION OF MAJOR ARMSTRONG AMPLIFIER SET 100,000 TIMES," by John Kent, that appeared in RADIO WORLD No. 13, dated June 24, 1922, the publisher decided to put aside a number of copies for those who were not able to get this issue when published. Copies will be sent, postpaid, on receipt of 15c, or send your subscription, \$6.00, for one year (52 issues) in advance, or \$1.50 three months. A copy of the issue about Major Armstrong's circuit will be sent with the issue of RADIO WORLD, 1493 Broadway.

# QRM Preventers

**SMALL BOY**—"Say, mister, you remember you sold me a set last week?"  
Salesman—"Sure, sonny; what's the trouble?"  
Small Boy—"Well, I put up an aerial outside my window, and I got the wire coming in through the top. Do I have to keep my window open to get signals? It's gettin' awful cold now."

clock. Sure they work, especially when the clock needs winding, and they make the chimes ring." "A single wire is best." "Use two wires at least seventy-five feet long." "It should be at least one hundred and fifty feet long." "The best aerial is an indoor loop." "Why put up an aerial when all you need is a bed-spring."

One of our subscribers claims he has found a novel way to keep his wife quiet for an hour at a time. It is this: Tune in and get the station that is broadcasting the latest fashions. She becomes so interested in it that she forgets to ask him why he stayed out so late the night before.

### First Night of the Set

**A**ND do you really get wireless messages with that thing?"

### Times Have Changed

**W**HERE is the boy—the family pride and wonder—who used to be called on to exhibit to all the neighbors and callers the set that "He made all by himself!" and then would show a table filled with a lot of useless switches, doodads, polished brass, and a score of different knobs?  
Like the old Negro's horse and buggy, he "jest ain't no mo."  
In his place you will find the efficient young man who talks fluently about "radio-frequency," "superheterodyne," "CW," and whose set is an efficient regenerative tube-circuit with which he is hearing over half the world.

"What's that funny whistle? Sounds like a bird."  
"How much longer are you going to charge that battery?"  
"How is my tone?"  
"This will conclude the evening concert."  
"Vy, QSA hr can hear u all over the house."  
"Does the lamp light when a message comes in?"  
"What does all that funny buzzing mean?"  
"Why do you call him O.M.?"  
"Why do you turn all those knobs?"  
"Isn't it wonderful?"  
"How can more than one talk at a time?"  
"Guaranteed twenty-five per cent. more power in the aerial."  
"How do you get me now, George?"—  
QTC.

### Telling the Beginner

**F**OUR wires or nothing make your aerial a matter of pride and not a personal regret." "Oh, shucks, Charlie, such advice! Don't take a bit of notice. Do what I'm doing, and connect up your set with the springs on grandfather's

### A Record for WGE

**W**GE, "The Constitution," Atlanta, Georgia, was picked up on December 5, by the radio operators of the fleet of destroyers of the United States Navy, cruising off the coast of the State of Washington. The distance is over 2,600 miles, and establishes a record for WGE.

## Spirola GIVE A SPIROLA CHRISTMAS!

and let the whole family listen to REAL MUSIC all the year through! Nothing adds so much to a two-stage set as a high-grade loud speaker. SPIROLAS are

### BETTER LOUD SPEAKERS

REAL CABINET TYPE—not just the usual horn enclosed in a cabinet. Powerful, beautiful, with an INCOMPARABLE TONE. We make a complete line—of the highest class construction throughout, with fine hand rubbed finishes. SPIROLAS are and have always been sold under money-back guarantee to equal in volume and far surpass in beauty and tone any other up to twice their price.

**SPIROLA DUPLEX**—for use with any headset. Separate tone chamber for each phone, eliminating interference. Satin black finish, nickel-plated fittings (DB)..... **\$3.85**

Oak (OO) or mahogany (DM) finish, bronzed throat..... \$4.85

**SPIROLA SIMPLEX**—for use with Baldwin or other unit. Black (SB), oak (SO) or mahogany (SM) finish, same prices as DUPLEX.

**SPIROLA CONCERT**—complete with built-in unit and cord ready to attach in place of phones. Oak (CO) or mahogany (CM) finish, bronzed throat..... \$12.50

At dealers or postpaid (C. O. D. if preferred). If desired we will send in holiday packing direct to recipient, carefully following your instructions. DEALERS—We can fill holiday rush orders!

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Amber Royal Perfume.....	\$4.00
Eye Lash Grower.....	\$1.00
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Prices F.O.B. Red Bank, N. J.

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Variometers with dial, \$2.38

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**STANDARD HEADSET**

2,500 OHM

Guaranteed to be equal or any phone on the market listing at \$8.00. **\$5.75**

Dealers and jobbers write.

**Standard Electric Sales Co.**

848 Broad Street Newark, N. J.

Just your common detector spring or establisher and  
**INCREASE YOUR CRYSTAL RANGE**  
BY USING A "FT" ULTRA-SENSITIVE CONTACT IN YOUR CRYSTAL DETECTOR

1. It locates a sensitive spot instantly.
2. Brings music and code in louder.
3. Withstands hammer jolts without jarring out.

Price, with instructions, twenty-five cents.

"FT" CRYSTAL CONTACT COMPANY  
Box 1641 BOSTON 6, MASS.

**RADIO MAILING LISTS**

2270 Retail Radio Dealers, United States ..... per M. \$7.50  
1124 Radio Manufacturers ..... per M. 15.00  
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-plex sets ..... per M. 4.00  
200 Radio Stations ..... per M. 4.00  
10000 Radio Amateurs and Man-  
-agers of Radio Stations ..... per M. 7.50  
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102 W. ADAMS STREET CHICAGO, ILL.

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SATURDAY OF SAME WEEK)  
FROM PUBLICATION OFFICE,  
1493 BROADWAY, NEW YORK, N. Y.  
BY HENNESSY RADIO PUBLICATIONS  
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and Editor  
M. B. HENNESSY, Vice-President  
FRED S. CLARK, Secretary and Manager  
1493 BROADWAY, NEW YORK, N. Y.

**ASSOCIATE EDITORS**

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Receipt by new subscribers of the first copy of  
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the act of March 3, 1879.

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While every possible care is taken to state  
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This statement is made in good faith and to save  
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**What a Real Spider's Web  
Did**

RADIO engineers employed by the  
"Post-Intelligencer," Seattle, Wash-  
ington, to discover the cause of the er-  
atic transmission from that newspaper's  
broadcasting station finally discovered a  
spider's web near the top of one of the  
poles—a spider's web covered with car-  
bon from soft coal. Swayed by the  
wind, the web had been swinging against  
the antenna wires, causing momentary  
short circuits which had disturbed the  
transmission.

**With Mr. Ehlert's Hook-Up**

EDITOR, RADIO WORLD:—I am getting  
fine results with the hook-up of Fred.  
Chas. Ehlert which you published in  
RADIO WORLD, No. 27, dated September  
30. To anyone desiring good, clear con-  
certs, I heartily recommend this hook-  
up. With it I have received Havana,  
Cuba; Washington, D. C.; and twenty-  
two States, including Texas, Iowa, Ne-  
braska, Florida, Illinois, Missouri, Mas-  
sachusetts and New York.—T. J. Bow-  
man, Altavista, Virginia.

**Tri-Boro Club News**

THE Tri-Boro Radio Club, Parnassus,  
Pennsylvania, holds regular meetings  
at the Lindsay Radio Shop in that city.  
The members are working for the wel-  
fare of the community as well as in the  
interests of radio. All amateurs in the  
Tri-Boro observe the "quiet hour" from  
7 to 10:30 p. m. The officers are: Clyde  
Hichew, president; R. E. Lindsay, secre-  
tary; C. R. Ackliss, treasurer



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**BATTERY**  
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5 Units in 3

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Bank Windings are interchangeable for  
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Set includes two Federal Transformers,  
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molded variocoupler, three V. T. sockets,  
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tive cabinet and drilled panel;  
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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 ads. if copy is received at this office ten days before publication. RADIO WORLD CO., 1493 Broadway, N. Y. C. (Phone, Bryant 4796).

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Conference on Radio Standardization

Bureau of Standards Calls Important Meeting to Be Held in New York City, January 12, 1923

THE Bureau of Standards of the Department of Commerce has called a conference on radio standardization to be held on Friday, January 12, 1923, in New York City. The desirability of calling a general conference on radio standardization has been apparent in many ways. This call is issued by the bureau at the specific request of the following

associations and organizations: Institute of Radio Engineers; National Radio Chamber of Commerce; Radio Apparatus Section, Associated Manufacturers of Electrical Supplies; National Retail and Dry Goods Association; American Radio Relay League; Radio Corporation of America.

These organizations have pointed out that there is need for greater uniformity in the methods of describing, rating, and testing of performance of radio apparatus.

Invitations are being issued to all of the national associations of an engineering and technical nature which are known to be interested in radio standardization.

The representation of radio manufacturers will be through the trade associations of which they are members. While it is desired to make the conference thoroughly and broadly representative, it is expected that the organizations invited will limit their representation to one or two persons in order that the conference may be as effective as possible.

The purpose of the conference is to consider broadly (1) whether a formulation of standards for radio apparatus and service shall be made; (2) if so, what general classes of apparatus or service should be included, and (3) what procedure shall be recommended for carrying out the conclusions reached by the conference. If the conference decides that radio standards should be formulated, it is expected that they will be prepared with special consideration of the wide range of interests which are concerned with the subject, and that these standards may ultimately be adopted with the approval of the American Engineering Standards Committee as an American Standard.

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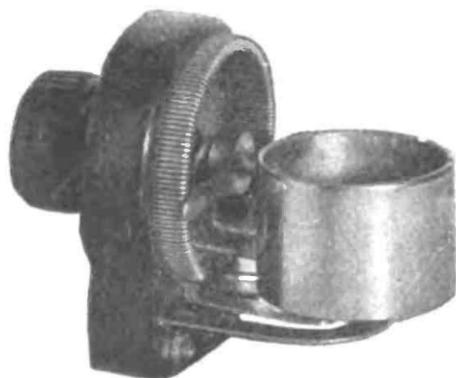
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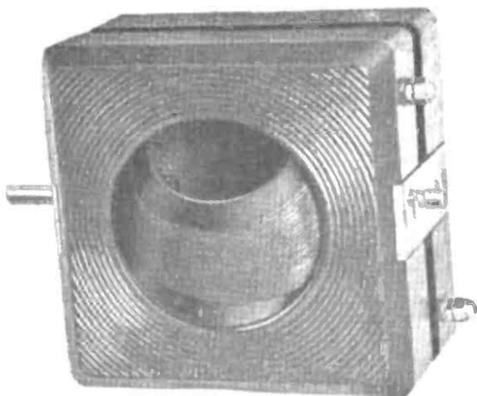
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