

Issued Every Seven Days
FOR BEGINNERS AND EXPERTS 15c A COPY

RADIO WORLD

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

I L L U S T R A T E D

MAY 13th. 1922
15c
A COPY
1 year, \$4.00
6 mos., 3.00
3 mos., 1.50



(c. Underwood & Underwood)

Mrs. Martin Scott Hare, singing into the transmitter at broadcasting 5-station WVP, of the United States Army Signal Corps, Fort Wood, Bedloe's Island, New York Harbor. The transmitter is the disc-shaped object. It attracts every little tremolo of a singer's voice. It is known to radio experts as the "phonotron." Its delicate construction renders it so keen to pick up even the most minute noise that perfect quiet must be maintained in a room while the broadcasting is in operation, as it conveys to the transmitter every smallest degree of energy. To the amateur it is known as the "soup plate." The phonotron is fully described in a special article in this number of *Radio World*.

The Radio Primer

—
"My Practical
V-T Detector
and Two-Stage
Amplifier."

By
Frederick J. Rumford,
A. I. E. E.

Our Aim Is
Service

A New Series on Radio Telegraphy, By Walter J. Howell, A. M., I. R. E.

Deliveries Made at Once

VACUUM TUBES

Moorhead A. P. and Radiotron Detector and Amplifying Tubes for immediate delivery.

Amplifying Vacuum Tubes \$6.50
 Detector Tubes 5.00

Send Money Order or Certified Check. No C. O. D's.

Radio Telephone Co.

DANVILLE, PENNA.

Telephone Bell 269M—United 22W

**WHAT YOU WANT
 WHEN YOU WANT**

RADIO PRODUCTS

of

Acme	Jefferson
Adams-Morgan	Klosner
American	Riley-Klotz
Everready	Thordarsen
Works	Tuska
Brach	Westinghouse
DeForest	Electric &
Federal	Mfg. Co.
General	(Rectifier)
Electric	Western
(Tungar	Electric
Rectifier)	

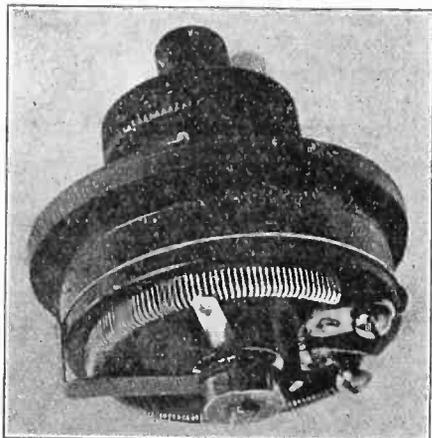
Wholesale Exclusively

A highly satisfactory service for radio dealers. Good stocks of practically all the most important manufacturers. Prompt shipments made on all items. Write for catalog and list of liberal discounts. Test our service.

WHOLESALE RADIO EQUIPMENT CO.

22 WILLIAMS ST.
 NEWARK, N. J.

RADIO WORLD is \$6.00 a year; \$3.00, six months; \$1.50, three months.



Something Entirely New Vernier Rheostat

Smallest and Neatest

Can you maintain that critical adjustment on your V. T.?

TeCo's NEW VERNIER RHEOSTAT

makes it possible for you to obtain and hold that necessary fine adjustment of filament current to render your receiving circuits in their most sensitive condition.

With our VERNIER RHEOSTAT it is possible to obtain variations of one-one thousandth (1/1000) of an ampere.

Our attachment does not interfere with any previous method of panel or table mounting. A recent development in the design of rheostats for use with receiving tubes. This instrument consists of a conventional form of rheostat, with the addition of a finely adjustable Vernier attachment. The latter consists of one turn of resistance wire wound about the bakelite form and continuously variable by means of an extra contact. This contact is operated by means of a small knob, the shaft of which passes through the hollow shaft of the larger control knob, which regulates the resistance by turns. The Vernier knob is shown at "A" in the photograph, and controls the arm "B", which makes contact with the single turn of wire "C." Knob "D" rotates the contact "E" for larger changes in resistance. The bakelite piece "F" is simply to take the place of a panel. The elements of the rheostat are so built that, with one ampere flowing in the circuit, one complete turn of the Vernier control only

changes that current one-tenth of an ampere. With such a small change, it is easy to obtain a variation of as small as one milli-ampere. The Vernier Rheostat eliminates the necessity of a B-battery potentiometer and the extra space it requires. After all, it is not a fine control of either plate or filament sources that we require for our detectors, but a finely adjustable balance of the two, which will allow us to operate on the best point of the filament-current, plate-voltage characteristic to obtain maximum efficiency in detection. This consideration is quite necessary in using the later types of vacuum tubes which are very critical in operation.

DEALERS—WRITE WETMORE SAVAGE CO. FOR DISCOUNTS AND IMMEDIATE SHIPMENT. OUT SOON—VERNIER RHEOSTAT WITH DIAL

Distributors: Wetmore Savage Co., 76-78 Pearl St., Boston, Mass.

Manufactured by

THE TeCo RADIO CO., P. O. Box 3362, Boston, Mass.

RADIO WORLD

[Copyright, 1922, by Radio World Co., New York, N. Y.]

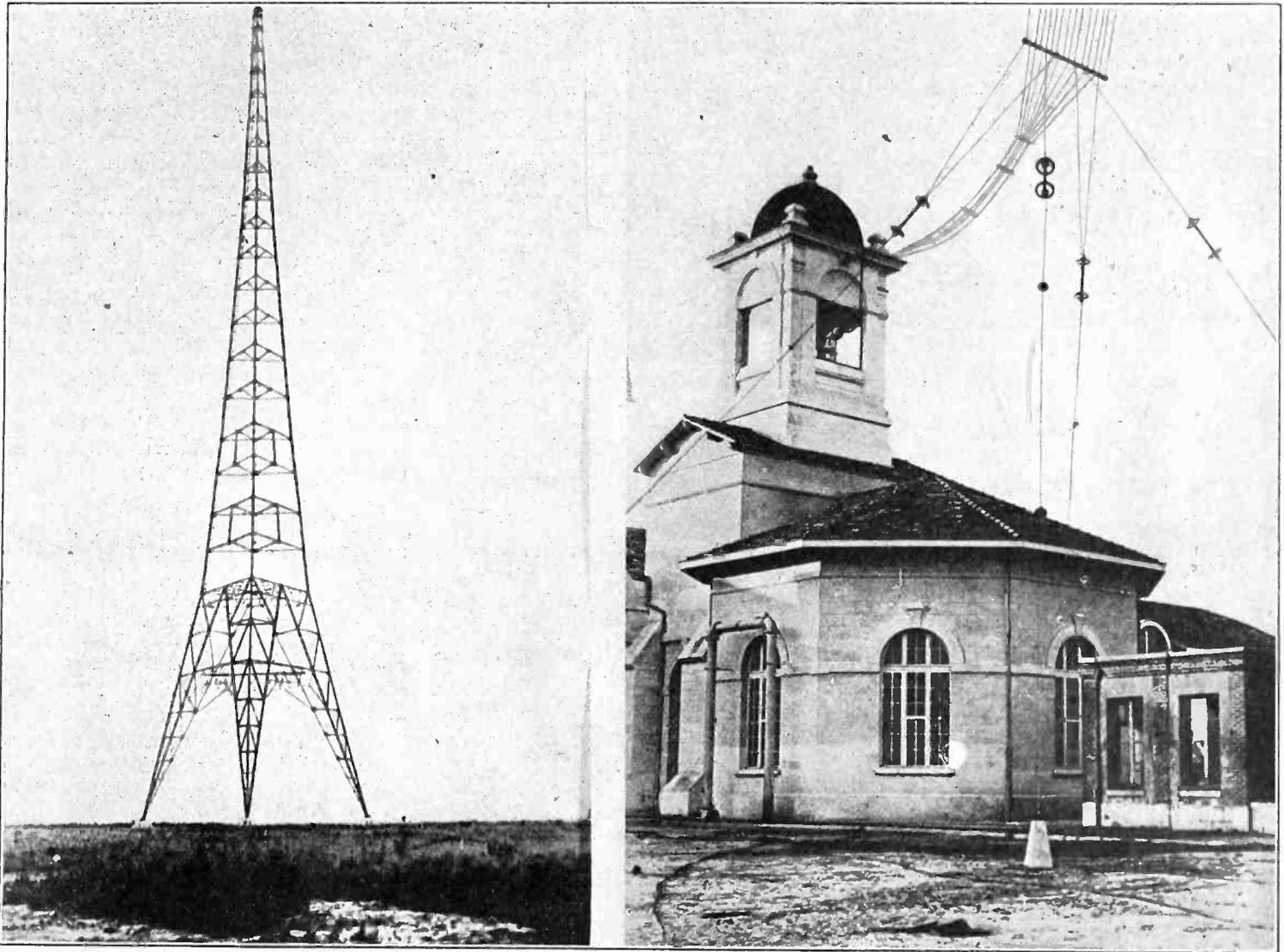
A WEEKLY JOURNAL, PUBLISHED EVERY WEDNESDAY AND DATED SATURDAY BY RADIO WORLD COMPANY, FROM PUBLICATION OFFICE, 1493 BROADWAY, NEW YORK, N. Y.

Vol. I. No. 7.

May 13, 1922

15c. per copy, \$6.00 a year

This Station Transmits 4,000 Miles!



(c. Kadel & Herbert News Service)

The great radio station at Lafayette, France. It was built by the United States Navy to facilitate America's part in the World War and, recently, was sold to France. The photograph at the left shows one of the many high towers and, at the right, the building which contains the equipment. Radio waves are transmitted from this station on a wave length of 23,000 meters, approximately 14 miles. They are heard some 4,000 miles distant, particularly between Bordeaux and Washington, and, occasionally, as far east as French Indo China, some 6,000 miles away.

WHEN you ask, "How far?" when speaking of radio in this advanced day, the adult who wondered what his boy saw in the marvel of communication a year ago—and even the boy himself—answers in miles. But it won't be long before the answer—and absolutely correct at that—will be handed out in quarter turns of a little black knob; for radio is affecting geography just as it is affecting many other fields. When one can sit before a loud-speaker and listen to speeches and concerts from faraway cities, remoteness loses much of its mystery.

Wave lengths are not an infallible index to the power of a radio station nor to its sending range, but they indicate comparative strength at least roughly.

The powerful, well-equipped station at Lafayette, near Bordeaux, France, which was built by the United States Navy to facilitate America's part in the World War, and since sold to France, operates on a wave length of 23,000 meters, approximately 14 miles. This station until recently unchallenged as the world's most powerful station, sends its radio despatches with ease, and instantaneous-

ly, of course, over 4,000 miles of water.

Lafayette's title to first place is now challenged by the commercial station at Port Jefferson, Long Island, New York, which, if it is not more powerful, will be when additional units are added. The Port Jefferson station sends on a wave of 19,000 meters—the second longest wave—nearly twelve miles, and is employed in transmitting messages as far as Germany—about 4,000 miles. The United States Navy has six powerful stations located in different parts of the world.

The Reason for the Loop Aerial

By George W. May, R. E.

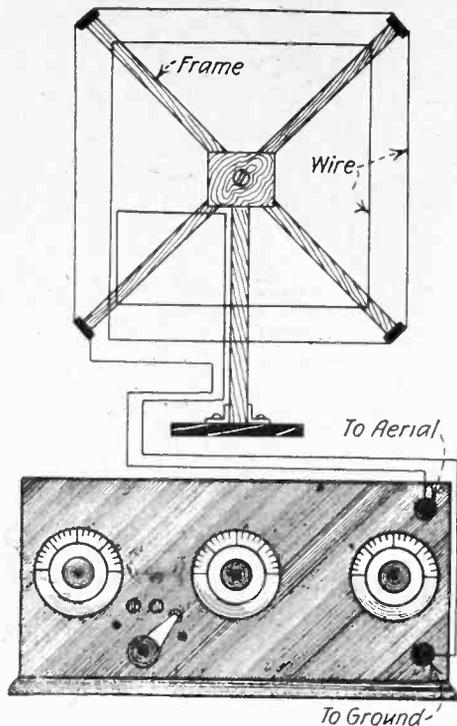
THE loop aerial is a subject about which many amateurs have asked for information. In the first place, the loop aerial cannot be used with a crystal set, and it cannot be used with only one vacuum tube unless the receiving station is very close to the transmitter, and the signals as heard on the ordinary aerial are very loud. For best results, at least two stages of amplification are absolutely necessary. Even then the signals will not be as loud as with the out-door type of aerial.

Of course, the loop is used indoors; but it is not necessary to have the windows open, as the ether waves will pass through anything. It is well to remember, also, that the loop aerial is very directional in its effects, and it must be arranged in such a way that it can be revolved about its axis. By revolving the aerial in this way, it will be found that much interferences can be tuned out, while the desired station can be made louder; but, even then, it will not be as loud as with the outdoor aerial.

The loop aerial is the same thing that is used on shipboard, and known as the radio compass. It is very easy to take cross-bearings with this type of aerial and, thereby, enable the operator to locate a sending station. It is of practically no use unless the operator has a good set at his disposal. Referring to the drawing, it will be seen that the frame itself is made up of half-inch square pine, and that the outside dimensions should be at least 4 feet.

In order that the aerial may be readily turned about, it is well to suspend it from the ceiling by one of the legs. It may also be arranged on some sort of a pivoted base to enable the operator to turn it about readily. It will be seen in the drawing that the end of each leg has a small piece of bakelite fastened to it forming a tee. This bakelite strip should have a number of grooves filed in it so that the wire may be kept in place. The wire itself should be about No. 22 double cotton-covered wire, although ordinary bell-wire will do as well. The wire is started at one of the binding posts and is run through the grooves in the bakelite strip until a total of about 15 turns are in place. The remaining end of the wire is run to the other binding post.

In connecting the loop aerial up to the receiving set, it is not necessary to use any ground connection, as the leads from the two binding posts on the loop



One of the neatest forms of loop aerial. The drawing shows how the wire is wound, also the connections from the loop to the receiving set. Suggested by George W. May. Drawn by S. Newman.

aerial will serve as both aerial and ground connection. Simply connect one of the set in the place marked "aerial," and the other to the set where the ground wire would ordinarily be connected. This will make a very handy aerial for the dweller in an apartment house; but remember amplification of at least two steps is absolutely necessary to make it work at all and that a crystal detector cannot possibly be used. The outdoor aerial is far better; but if the amateur desires to do a little experimenting with the loop aerial it may be easily made.

Loop aerial reception is accompanied by a number of distinct advantages, among which are reduction of interference from other stations due to the fact that loops will only receive from stations in the direction toward which they point; they eliminate the necessity of employing any outdoor aerial or ground connection; they do not re-radiate because there is no regenerative action; they permit very selective tuning because radio-frequency amplification is employed with them.

The most important disadvantage in the use of the loop-aerial work is that the distance over which signals may be received is considerably reduced, several stages of amplification are required, the use of a large storage battery for supplying the current for the vacuum tubes is necessary, and the complete arrangement is rather costly.

Regardless of the drawbacks mentioned, loop aerials are rapidly gaining in popularity and it is unquestionably a very satisfactory arrangement for use where reception over a distance with a minimum of interference and distortion is desired. In the congested districts of large cities, loop aerials are giving great satisfaction, even though they entail a slight increase in both of purchasing and maintaining a receiving station.

A few suggestions relative to the installation and care of a vacuum tube will not be amiss at this point. In the first place, a vacuum tube has four contacts and must be connected up correctly or the tube will not operate. By looking at the socket that comes for a tube it will be seen that there are four binding-posts. These are sometimes marked G P F F. G stands for the grid; P for the plate; and the two marked F mean that these are the points for the connection of the filament. As the tube fits into what is known as a bayonet socket, it will be found that it cannot be put in incorrectly; but the beginner must be very careful to see that the binding posts are connected up right.

Usually the beginner burns out his first vacuum tube after a very short time; or, sometimes, as soon as the set is connected up. Then there is always the attempt to get a new tube for the one burned out, and usually a few words with the dealer. These tubes are all tried out and are correct before they leave the factory. The dealer usually tests the tube before it leaves his hands. The beginner, however, does not know this and invariably thinks that the dealer has tried to "stick" him. If the tube is bought at a reputable radio house, the beginner can wager on it that the tube is all right. If a vacuum tube is used with care and connected into the circuit correctly, it should last for several years.

If the set is a home-made one, the best plan to follow is to connect the storage battery first and try out the filament. If the tube does not light, you will know at once that there is something wrong. Never connect the B battery until you are absolutely certain that the wiring is correct. If the B battery is connected in such a way that the current will flow through the filament, the filament will last just about as long as it will take you to wink your eye. When this happens the best thing to do is to throw the tube away and buy another. There have been from time to time, certain firms that make a business of repair-

The Radio Valise of F. W. Dunmore

F W. DUNMORE, of the Radio Laboratory of the United States Bureau of Standards, walked into the lobby of the Drake Hotel, Chicago, the other day, carrying an ordinary suit-case. A long line of other patrons of the Drake were waiting a chance to register, so Mr. Dunmore quietly took his place at the end to wait his turn. Suddenly—just like one of those mysterious, hair-raising moments in one of those modern "who-did-it" plays—faint but distinct sounds of music wafted through the lobby from somewhere. The clerks pricked their ears, the "bell hops" thought their days of tipping were over, the house detective scented a new case, and one troubled individual from the hayseed district ran out for the police.

But the coolest person in the crowded lobby was the indirect cause of it all; and, perhaps, if Mr. Dunmore had not been so cool, suspicion would not have been directed to him. He tried to be very unperturbed—but his valise gave him away, and, in a few moments, a small crowd had gathered about the ordinary-looking leather traveling accessory, asking the owner if it were haunted.

The Dunmore suitcase is a small one—about one-third the size of an ordinary grip. If the Drake management had asked Mr. Dunmore if it contained his wardrobe, he would have been obliged to answer, "No! But it does contain a real genuine radio set—and if you are looking for concerts and other entertainment free of cost, I'll furnish it."

Then Mr. Dunmore exposed the innards of his valise. According to one who can write radio expertly, this is just what enables Mr. Dunmore to hear all that is being broadcasted from the nearest station:

Two binding posts at the top of the suit-case represent the aerial and ground connections. The aerial binding-post is connected to the variable



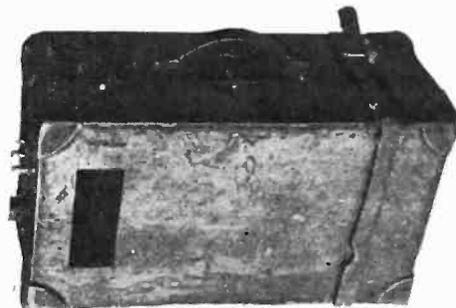
(c. Underwood & Underwood)

Mr. Dunmore exposing the "insides" of his "singing valise."

condenser which, in turn, is in series with the first coil wound on a battery through to the ground post. This coil is better known as the primary coil. The secondary coil lies directly underneath, magnetically coupled, which is connected to the grid and filament circuits of the tube.

This set has a two-step amplifier whereby the amplifying transformers may be seen at the bottom of suit-case. To the extreme right are the B bat-

teries for the various plate-circuits. In the cover of the suit-case may be seen the telephones, home-made loud-speaker, and folding or portable loop-aerial. A demonstration of the valise



(c. Underwood & Underwood)

The suitcase closed and ready to be carried to most any distant place. Note the little window to let out the music.

(Continued from preceding page)

ing burned-out vacuum tubes, but owing to the patent situation they are no longer allowed to do this sort of work. At the best vacuum tubes that were repaired in this way were very unsatisfactory and had a very short life. The beginner will do well to realize that when a tube is burned out it is absolutely useless.

In any circuit that uses a vacuum tube, it should be equipped with a grid

condenser and a grid leak. The latter piece of apparatus is not used in all sets, but it will be found that if the value is right louder signals will be received on less battery-consumption. The grid condenser is absolutely essential and cannot well be dispensed with. Remember that when a vacuum tube is used in the circuit, care must be exercised if the tube is expected to give results.

was given by Mr. Dunmore while attending a recent meeting of the American Institute of Engineers. While waiting to be called for a speech, he opened his grip, turned the aerial director towards the Westinghouse Broadcasting Station, in Chicago, and picked up the closing market reports.

The Principles of Radio Telegraphy

By *Walter J. Howell, A. M., I. R. E.*

Deputy Radio Inspector

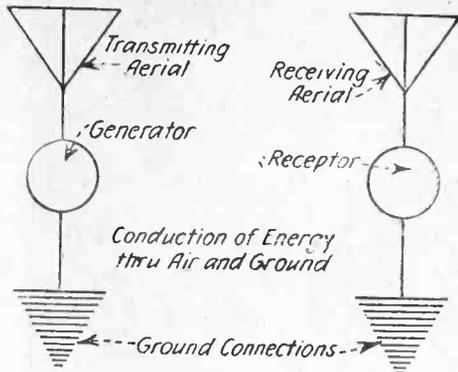


Figure 1 shows the three elements required for radio, namely generator, conduction and receptor. Drawn by S. Newman.

THE problem of conveying energy from one point to another point requires three elements which, in the case of radio, consists of the generating unit or transmitter, medium of conduction or ether, and receptor or receiving apparatus. The ether which will conduct the energy is supposed to be everywhere, so the transmitter and receiver theory will be outlined as follows.

In order to radiate electrical energy it is necessary to use alternating current of a very high frequency and, also, provide some means to radiate or throw off this energy. This sets up a disturbance in the ether—in similarity: as a stone dropped into a pond of water causes waves which grow larger in diameter but weaker in strength, radiate in all directions. Means are provided for collecting part of this radiated energy, and the receiving set, when adjusted properly, gives indication that energy has been received.

Figure 1 shows the simple outline of generation, conduction, and reception. Wires elevated in the air act as one connection to the transmitter and receiver, while an earth connection is used for the other element. It is obvious that if the radiated power is turned on for a short space of time that a dot may be sent, while if turned on for a longer period a dash may be sent, so that, with the aid of a code in which each letter is a combination of dots and dashes, intelligent signals may be sent between two points.

One of the simplest ways to produce high-frequency currents is to use the discharge of a condenser

across a spark gap and through a coil of wire or inductance. Figure 2 shows how the three units are connected. The condenser is usually charged with high voltage derived from a spark coil or transformer. When the charge on the condenser plates becomes high enough, the voltage ionizes the air between the spark gap—thereby making a conductor of it—and the current jumps the gap which, through heretofore, had been an insulator. This current in traveling through the coil of wire sets up lines of force about the coil; and the moment that the condenser ceases to supply current, these lines of force, or magnetic field, collapse upon the coil and generate a current owing in the same direction as the original current and thereby charge the condenser in the opposite direction.

This second charge then flows back again and the process is repeated a number of times. The original current oscillates back and forth until voltaic pressure is equalized, and while there are only a few oscillations and they take place in an exceedingly short period of time, we have the required high-frequency current. This current can be radiated by coupling a coil of wire to the first coil and extracting part of the energy which is then radiated by means of the aerial and ground connection.

Figure 3 shows the general layout of a spark-transmitting set, a key being provided in the power line to turn the current off and on in the form of dots and dashes.

A sixty-cycle current supply to the power transformer will give 120 sparks per second across the spark gap. Each spark will consist of a number of high-frequency oscillations, so it will be seen easily how it is possible to transform a low-frequency current

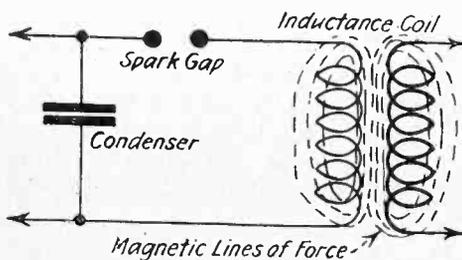


Figure 2 illustrates how the magnetic field acts about a coil of wire. Note the lines of force about the coil as to direction. Drawn by S. Newman.

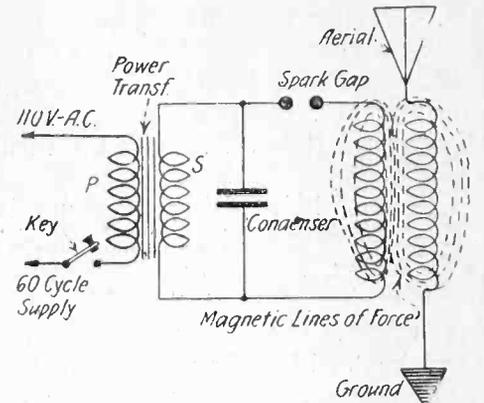


Figure 3. A circuit of a plain transmitter is here shown, explaining the power needed also the equipment. Drawn by S. Newman.

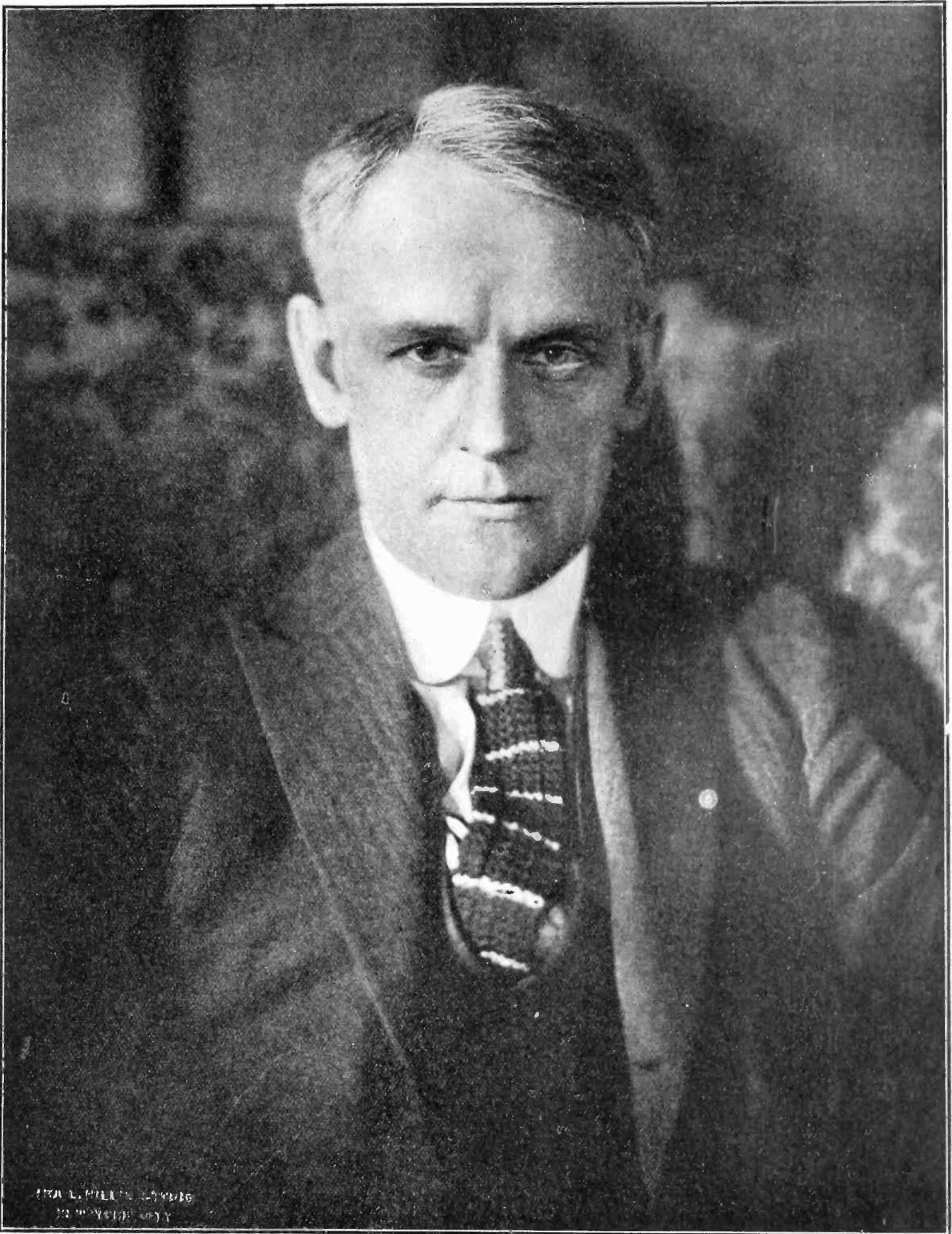
into a high-frequency current for radiating purposes.

At the receiving station, an aerial and ground connection are used to receive a very small part of the energy sent out by the transmitter which, in turn, flows through the receiving apparatus. The coil of wire connected to the aerial and ground is used to adjust the set to the same period of electrical vibration as the energy sent out by the transmitter. This is called resonance, or tuning, and is the same as adjusting the string of a violin so that it will vibrate when a certain key is struck on a piano. It is only when this condition prevails that the greatest energy will be received from a sending station.

The received current, while it is broken into 120 groups per second, really consists of high-frequency impulses which cannot be heard by the human ear because the period of vibration is too high, so that simply connecting the telephones across the tuning coil will give no results because of the high-frequency. It is necessary then to rectify these impulses and change them into direct-current impulses. This is done by means of the crystal detector.

The crystal detector allows current to pass through easily in one direction, and the energy is stored up in the small condenser which in turn, passes through the telephones and causes the diaphragm to move once for each impulse. It can easily be noted that a series of impulses, in rapid succession, would give a great many vibrations per second. A person listening would say that a buzz was heard.

Radio World's Hall of Fame



(Ira L. Hills Studio, N. Y.)

ROY A. WEAGANT

Known in the radio field as an experimenter, his objective being the elimination of static. This disturbance means millions of dollars each year to the many radio corporations and thousands of radio amateurs. He has devised a number of circuits whereby static may be eliminated to a smaller degree. Mr. Weagant is at present consulting engineer of the Radio Corporation of America. He was awarded the Liebmann prize for 1920.

My Practical V-T Detector and Two-Stage Amplifier

By Frederick J. Rumford, A. I. E. E.

THE drawings illustrating this article picture the writer's private detector and 2-stage amplifier which have been in use for over a year and from which he has obtained the very best results. This set was designed by him for the sole purpose of efficiency, simplicity, and compactness. It requires but very little work to build, and should cost about \$50. This price includes the tubes. As every amateur knows who has purchased the average detector 2-stage amplifier sets, the tubes cost extra.

This outfit is so compact that I have often carried it from city to city in my travels. It can be mounted in a cabinet, if desired. It can be easily duplicated and requires but a

but, no doubt, most all amateurs have the necessary parts laying around their "labs." It will take only a very little while to assemble this outfit when ready. Below are the list of necessary items, with their respective costs:

2 Formica panels. 7x4½x¼ inches	... \$3.00
2 Rheostats for back mounting at \$2.	4.00
2 Clapp-Eastham Amplifying Transformers at \$4	8.00
1 V-T Detector tube at \$7	7.00
2 V-T Amplifier Tubes at \$7	14.00
3 Murdock V-T sockets at \$1	3.00
3 telephone jacks at 85c	2.55
3 grid leaks and condensers, .0005 mfd. 1 megohm at 50c	1.50
1 telephone plug at 75c	.75
25 inches round ¼-inch brass stock or rod	.30
15 inches flat brass-stock ¼-inch wide ⅛-inch thick	.25
5 feet bare copper wire B. & S., No. 8	.30
Screws and bolts	.50
8 large-size binding posts at 20c	1.60
Total	\$46.75

In regard to the actual making of this set: The two 7x4½x¼-inch formica panels are given a dull-grain finish with No. 0 sandpaper, and then rubbed with oil. After this is done, the usual marking off and drilling of holes are done according to figures No. 1 and No. 4. The rheostats and jacks are mounted on the front panel as shown, and the binding posts are next mounted on the rear panel. The rear panel will be cut out at the corners, as per Figure 4. This gives the panel a distinctive appearance and also provides for air in case the outfit is mounted within a cabinet as, no doubt, some amateurs will build.

You will now cut down your round ¼-inch brass rod into four 6-inch lengths. They should be drilled and tapped at each end to take ⅛-inch machine screws. If the amateur isn't going to mount this outfit within a cabinet, it would be advisable to have these rods nickel-plated. For that matter, it would not be a bad idea to have all the metal parts that are exposed to view nickel-plated, as it will set off the outfit to its best advantage.

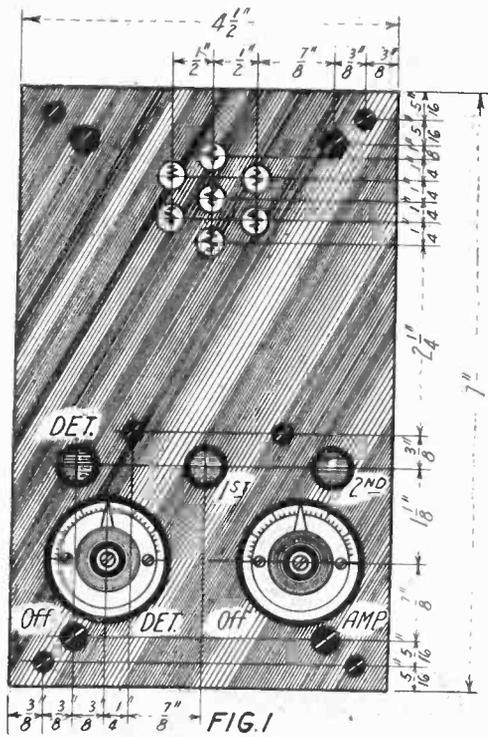
The 8 binding posts of which 4 are on each side of the rear panel, are indicated by the engraving upon the panel as follows: On the right side A is for the A battery which, in this particular instance, is a 6-volt 60-ampere-hour. Eveready storage battery B, for the B battery which happens

to consist of twenty No. 703 Eveready flashlight batteries wired in series multiple. My reason for this is that with 3 tubes functioning, the B battery will not stand up very long, and it also weakens the amplifying power of the outfit. There is a jumper wire which runs from the B battery negative to the A battery negative.

The posts on the left-hand side are as follows: No. 1 is for the tickler connection; P, plate; G, grid; F, filament. As will be seen, there are but a very few binding posts, not at all like the old amplifier sets, which had a good number of posts and were very complicated and awkward in operating. All the tubes are of the same filament voltage and the plates are of the same B-battery voltage.

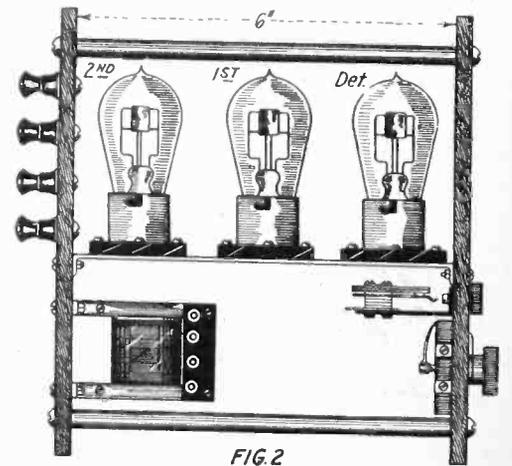
As for making of the strips for the socket shelf, this is cut, drilled, and tapped as per figures No. 2 and No. 3. The sockets are then placed upon the strips and held in place by the means of screws and nuts. Size is left to the amateur's own judgment.

The sockets are to be spaced evenly or equally apart, leaving a little margin of space at each end. The assembly in turn is mounted between the two panels as per figures No. 2 and No. 3 and held there by means of screws, which are passed through the panel and secured on the back by nuts. The brass rods may now be taken and screwed between the panels. The two Clapp-Eastham amplifying transformers can now be fastened to the back of the rear panel by means of screws and nuts which are properly spaced, as shown in fig-



Front panel with various parts mounted alongside. Correct dimensions are given. Suggested by F. J. Rumford. Drawn by S. Newman.

few tools. It is similar to the set the Westinghouse people are offering the public; but I wish to impress that the outfit described below was designed by me personally, a year or so ago; and I also wish to state that it has been made up by several prominent radio men, tried and tested for its true worth and has proved successful in every way. It is composed of all standard parts which can be readily purchased in any radio-supply store;



Side view and interior showing position of tubes, transformers, rheostats, and jacks. Suggested by F. J. Rumford. Drawn by S. Newman.

(Continued from preceding page)
 ure No. 4. As mentioned above, the holes above the jacks will give the necessary ventilation and also serve as a window, so as the brightness of the tubes filament may be observed.

Now that we have the outfit completely assembled, the next step is the wiring. This should be done with No. 8 B. & S. bare copper wire, and it is advisable to run the wire as straight and direct as possible, as No. 8 B. & S. wire is so stiff. It would be advisable to straighten the wire out making it firm and rigid.

The practical arrangement of the different parts, making most all the leads comparatively short and direct, should be noted. The wiring is extremely simple. I have connected the positive terminals of the filaments on the sockets together by one wire running straight across. I also have one wire running from the negative terminal to the front panel and across the width, having the two rheostats connected from it to one side of each. The other side goes to each individ-

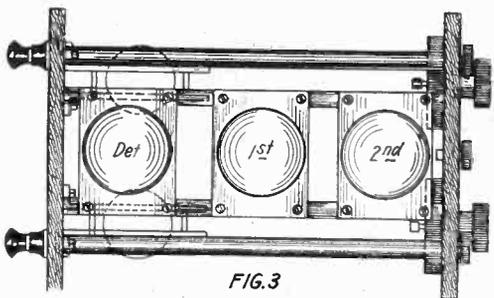


FIG. 3

Looking down into the interior from the top. Suggested by F. J. Rumford. Drawn by S. Newman.

ual tube socket, having one side of the amplifying transformer secondary connected to it. The three jacks connected on one side to the plates of each individual tube, and, on the other side to one wire which runs direct to the positive binding-post of the B battery. The two center strips of the jacks are connected to the two individual amplifying-transformer's primaries. The other side of the amplifying-transformers secondaries are connected on one side of the grid leak and grid condenser which connects directly to the tube grids of each individual tube. The end jack connects on one side direct to the plate of the last amplifying tube, and the other side connects direct to the positive side of the B battery.

The writer has omitted showing the position of the grid leaks and grid condensers which are combined. He has in the outfit described secured them to the inside of the rear panel; but he leaves that to the amateur's own judgment. They could readily be strapped underneath the socket straps.

The grid leaks of this outfit are 1 megohm, resistance and the grid condensers are .0005 mfd., capacitance. They were purchased from the General Apparatus Company. The jacks and plugs are purchased from the Federal Telephone & Telegraph Company, and the sockets were purchased at the nearest radio-supply house.

of having the receivers clamped on the head all the time will be eliminated and will make it possible to entertain any number of friends, when radio music is being transmitted. Very little adjustment is required in operating this outfit. After you have adjusted the detector and the amplifier rheostats, it is then ready to use

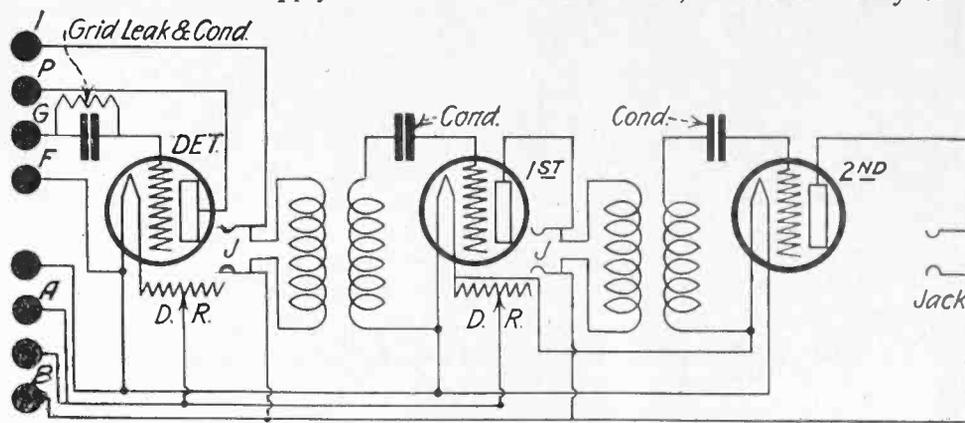


FIG. 5

The general hook-up and all of its necessary connections. Suggested by F. J. Rumford. Drawn by S. Newman.

I used the Magnavox Radio Tele-megophone with one set of binding posts connected to the extra telephone plug, and the other act of binding posts were connected to a 6-volt 40-ampere-hour storage battery, which had a rheostat connected in series, which make various adjustments and continuous service possible.

When the amateur wishes to use his loud speaker, he plugs into either jack he desires and, presto! the signals will be heard all over the room. With this arrangement, the necessity

at any time. I have used Baldwin phones for a head set.

Shunting a variable condenser across the posts marked No. 1 and F, will secure a regenerative effect; or shunting at tickler coil which may be a honeycomb coil across No. 1 and F, and a honeycomb coil across G and F will act as a secondary having the usual primary, and will make it possible to tune any wave-length from 100 to 20,000 meters with the usual variable condensers to make sharp tuning possible. It will be noted that all the apparatus is fastened to either the front or the rear panels and most all the connections are made direct from the binding posts on the rear panel, making it possible to remove the different apparatus from time to time whenever it is necessary to inspect them, for the replacing of new V-T tubes, or for the renewing of old parts.

If traveling any distance, the outfit can be easily and readily knocked down and the different parts stowed away in the corners of the bag or trunk. The complete diagram of the proper connections are shown in figure No. 5 with their proper symbols for the lettering and numbering are identical as that on the panels. To get the proper wiring for the backs of the panels, it would be advisable to reflect the drawing in a mirror—placing the drawing on top of a plain piece of paper, drawing-side up, and under this plain sheet of paper have a sheet of carbon paper with carbon-side up. This last will give the best results. Tracing the original drawing will make the proper impression on the under side of the plain sheet of paper.

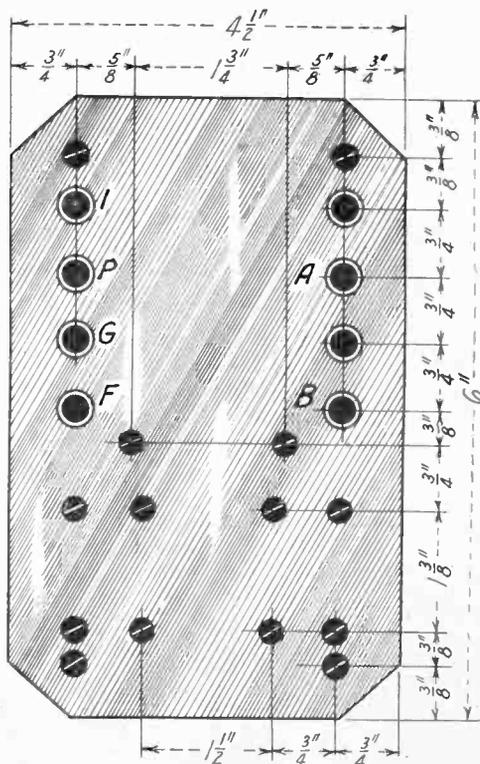


FIG. 4

The rear panel, showing the different dimensions for the placing of the binding posts and positions of the different attaching screws. Suggested by F. J. Rumford. Drawn by S. Newman.

Official Wave Lengths Favor Fans

Secretary Hoover's Radio Conference, Held in Washington, Declares Radio a Public Utility. Broadcasting Clearly Defined. Advertising by Radio Transmission Prohibited. Standing of the Amateur to be Fully Established by Law

By Carl Hawes Butman

WASHINGTON, D. C.—Radio communication is a public utility and should be regulated and controlled by the Federal Government in the public interest. This was the opinion set forth in the final report of the Radio Telephonic Committee, appointed by Secretary Hoover, in connection with the recent Department Conference on Radiotelephony. The committee recommended that an advisory committee to the Secretary of Commerce be appointed, to consist of not more than twelve members, six in the Government and six from outside.

Practically duplicating its preliminary report, the Committee made recommendations as to wave-length allocations by classes, giving the amateur the band between 150 and 275 meters, and suggested the assignment of specific wave-lengths to each broadcasting station—except those operated by the Government—within the bands designated for such use. Experiencing great difficulty in providing even part of the general service demanded, the conference disapproved of the introduction of direct advertising at the expense of essential communication.

In connection with technical methods intended to prevent and reduce interference, authority for Secretary Hoover to prevent unnecessary interference was sought, and it was suggested that the Bureau of Standards make special studies of operating difficulties, ranges, width of wave bands, etc.

With the report in its final form, the legal sub-committee is now putting the finishing touches on a bill intended to give Secretary Hoover authority to establish and enforce regulations, which will shortly be introduced in both houses of Congress, and, it is hoped, rushed through. The committee, recommended that the Secretary of Commerce be vested with authority to control the establishment of all radio transmitting stations except amateur, experimental and Government stations, and the operation of non-government transmitting stations, all receiving stations being excepted. The Committee also passed

a resolution to the effect that the types of radio apparatus found most effective in reducing interference be made available without restriction.

The assignment of 22 wave bands for radiotelephony was made as follows:

Allocation of Wave Bands

Transoceanic experiments, non-exclusive, 5,000-6,000 meters.

Fixed service, 2,850-3,300.

Mobile service, non-exclusive, 2,500-2,650.

Government broadcasting, non-exclusive, 1,850-2,050.

Fixed station, non-exclusive, 1,550-1,650.

Aircraft radiotelephony and telegraphy, exclusive, 1,500-1,550.

Government and public broadcasting, non-exclusive, 1,050-1,500.

Radio beacons, exclusive, 950-1,050.

Aircraft radiotelephony and telegraphy, exclusive, 850-950.

Radio compass service, exclusive, 750-850.

Government and public broadcasting (200 miles or more from the seacoast), exclusive, 700-750.

Government and public broadcasting (400 miles or more from the seacoast), exclusive, 650-700.

Marine radiotelephony, non-exclusive, 650-750.

Marine telegraphy, exclusive, 525-650.

Aircraft radiotelephony and telegraphy, exclusive, 500-525.

Government and public broadcasting, exclusive, 485-495.

Private and toll broadcasting, 285-485.

Restricted, special amateur radiotelegraphy, to overcome barriers, non-exclusive, 310.

City and State public safety-broadcasting, exclusive, 275-285.

Technical and training schools (shared with amateur), 200-275.

Amateur telegraphy and telephony, (exclusive, 150-200 meters.) (Shared with technical and training schools, 200-275 meters), 150-275.

Private and toll broadcasting, exclusive, 100-150.

Reserved, all below 100.

The committee established the following definitions:

Government broadcasting as that done by departments of the Federal Government; *public broadcasting*, that carried on by institutions, universities, and such stations as are licensed to disseminate information and educational service; *private broadcasting*, signifying broadcasting without charge, by a station owner, communication company, store, newspaper, organization or individual licensed to disseminate news, entertainment and

other service; *toll broadcasting*, where a charge is made for the use of the transmitting station.

Private detective agencies desiring to operate radiotelephone broadcasting stations, it was recommended, should be required to cooperate with municipal or State services in the use of the wave band 275-285.

In view of public demand for broadcasting, it was not deemed desirable to send messages over wide areas for point-to-point communication, except where communication could not be effected by other means. It was recommended that for this purpose other means should be used. An immediate study of geographical distribution of broadcasting stations was urged to secure the best service with minimum interference. Where congestion of radio broadcasting existed, it was recommended that the Secretary of Commerce assign suitable hours of operation to stations. When conflict occurs, consideration for the public not otherwise reached was recommended, and the priority of stations was established as Government, Public, Private, and Toll.

Advertising is Prohibited

Direct advertising by radio broadcasting was prohibited and indirect advertising limited to the statement of the station's call letters and the name of the concern responsible for the matter broadcasted.

Recommendations that the transmission of signals tending deliberately to interfere with the reception of official time-signals, constitute grounds for the suspension or revocation of a license were advocated in the report. Licenses for operators of radiotelephone transmitting stations, should also require a knowledge of receiving and transmitting apparatus and the International Morse Code sufficient to receive at a rate of not less than ten words per minute.

It was agreed that the operation of Government stations be conducted in such a manner as not to interfere with the commercial traffic and broadcasting, and that whenever Government-owned stations were used for the transmission of commercial traffic and

The Remarkable Ear of Radio

It Is Called the "Phonotron" or "Soup Plate" and Is Used Exclusively By the U. S. Government

By Peter Williams

A QUESTION that seems to puzzle almost every novice is "What shall I do so I can get in on the broadcasting?"

Evidently he becomes excited and starts "digging out," thinking he will learn something before the day is over. He may have something in mind, probably going around a bit, most likely getting in on some demonstrating set; and by the time he has covered a number of places he has a good idea of what is in store.

At night, looking over some pamphlets he was given, he notices a particular circuit that represents some high-class set that he had heard and seen. Finally, he answers his own question, with, "I think I will build myself a good receiver."

Immediately plans are under way. The point is soon reached whereby the necessary parts are to be purchased. On getting the gear, the assembly and lay-out are started; and, before many moons, the set is completed. Excitement follows as to what the result will be. Doubtless when the test is finished everything is working satisfactorily. This follows with a word from the experimenter how clearly the concerts are.



(c. Underwood & Underwood)

Miss Joan Wood, of Toronto, playing a piano solo at the Radio Station of the United States Signal Corps. The music she produces is caught by the phonotron.

The big hitch now looms up. It concerns the transmitting station—one of the most important elements in broadcasting. Everything at the receiving

end depends on the transmitter for clearness, tone, and volume.

In the first place, the transmitter that records the voice or music is the first element in play. So why not start right here with this. The accompanying photograph shows one, if not the best known, type of transmitter in use to-day. It is called the "phonotron," sometimes referred to as the "soup plate," and is used exclusively at the United States Station, at Fort Wood, Bedloe's Island, New York Harbor, in its broadcasting. Not only does this instrument record, but it picks up every smallest particle of energy in the transmitting room, whether it be voice or music, and, in turn, sends it on to the radio transmitter to be broadcasted. The phonotron may be used also as a receiver. It will give out sound as thoroughly as it picks it up.

With all this in view, one can readily assume that for clearness of signals, good tone quality, everything depends upon an excellent transmitter and receiver. One should not think that any receiver will give clear signals, but if a receiver is well designed there is no reason for noisy sets as the broadcasting stations try their utmost to send out clear signals.

(Continued from preceding page)
broadcasting, they should conform to the regulations established.

The final report recommended that the status of the amateur be established by law and that the limits of the wave band allotted to the amateur as given above (150-275) be specified in the law, and that the amateur continue to be under the jurisdiction of the Department of Commerce.

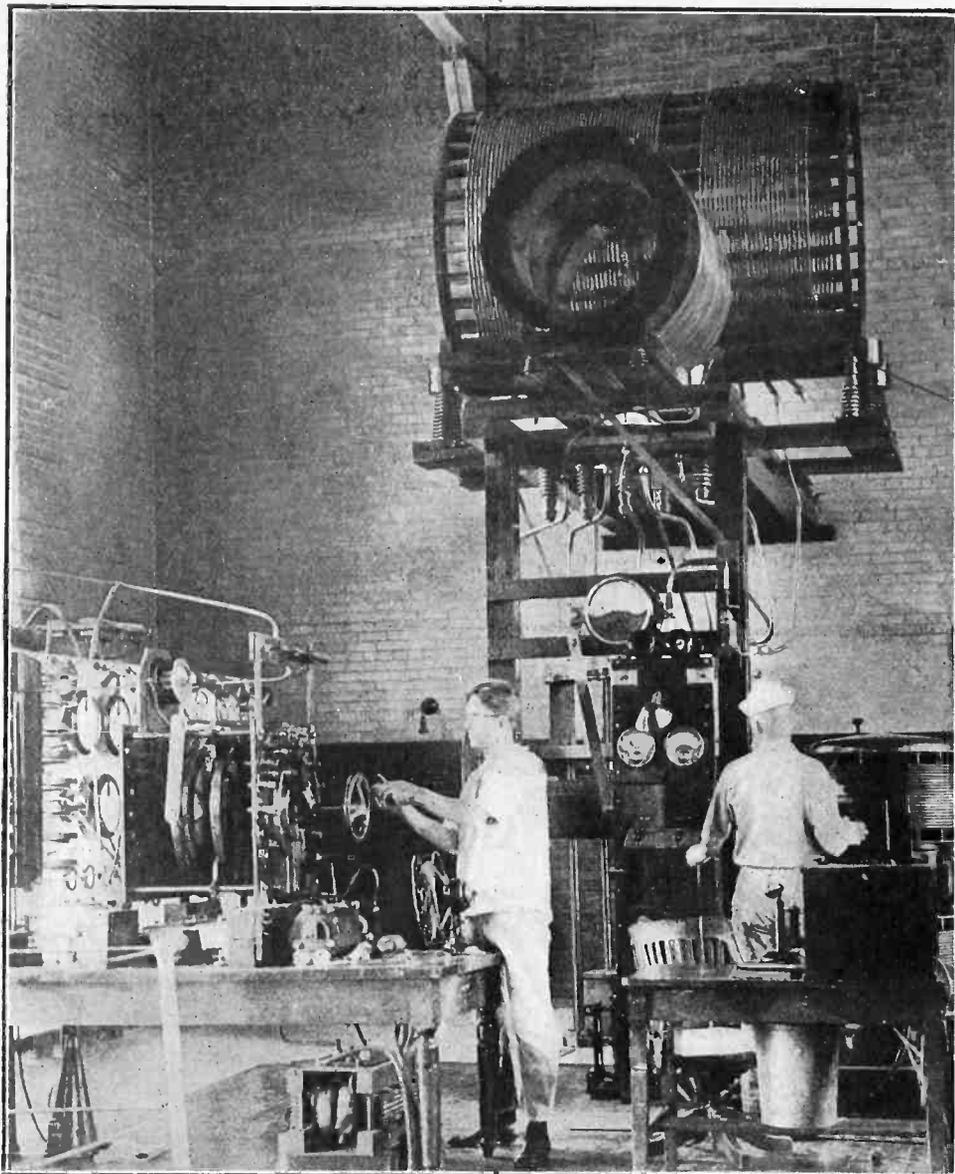
For the purpose of self-policing among the amateurs, the creation of amateur deputy radio inspectors, elected from their number in each locality, was approved; that upon receipt of notice of such election the radio inspector in charge of the district appoint the person chosen a deputy radio inspector, serving without compensation or for the sum of one dollar a year; that the duty of amateur deputy inspector should be to endeavor to the best of his ability to accomplish, under the direction of the district radio inspector, observance of the Radio Communication Laws and

the Regulations of the United States, and the observance of such local cooperative measures as are agreed to in each community for the minimization of interference between the various groups of the public interested in radio; that such amateur deputy inspectors be clothed with whatever authority might be necessary in the opinion of the district radio inspector.

It was also recommended that the waves assigned to amateurs, between 150-275 meters, be divided into bands according to the method of transmission; damped wave stations being assigned the band of lowest wave lengths, interrupted or modulated continuous wave radio telegraph stations the next band; radiotelephone stations the next band, and finally unmodulated, continuous wave radio telegraph stations the band of highest wave lengths. That amateurs be permitted to carry on broadcasting within the wave-length band assigned to amateur radio telephony, was recommended.

Uncle Sam's Big Naval Radio Station

By Fred. Chas. Ehlert



(c. Underwood & Underwood)

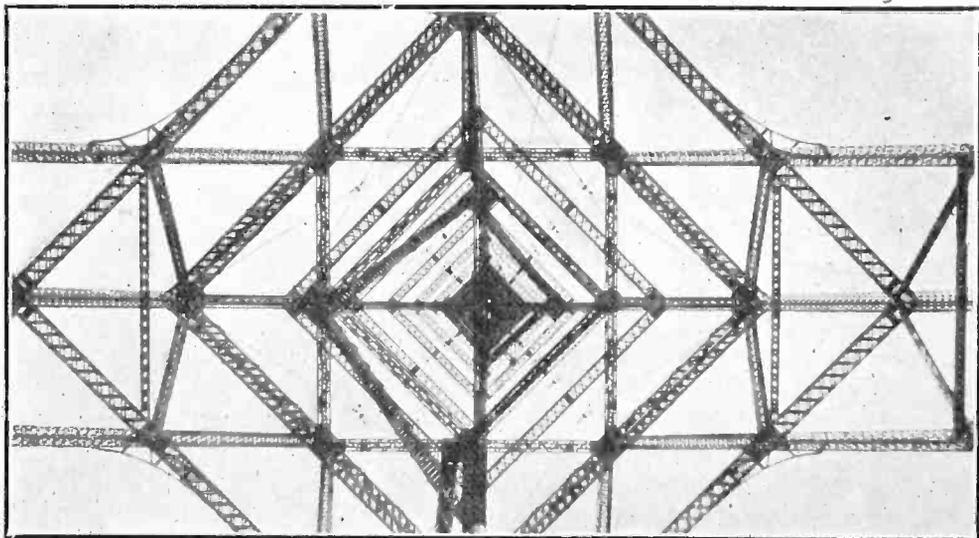
Interior of one of the transmitting rooms of the Naval Radio Station, Arlington, Virginia. On the left is a five-kilowatt spark set for working local traffic on wave lengths between 600 and 2500 meters. On the right, is a thirty-kilowatt arc-transmitter to send out continuous waves from 2500 meters, and higher, to the ships of the Atlantic fleet. It is operated by Chief Radio Electrician Weyand

MANY radio enthusiasts have heard the United States Navy radio station at Arlington, Virginia, sometimes spoken of as "Radio," but better known to the experienced radioman as NAA. This station, the largest operated by Uncle Sam, lays just across the Potomac River from Washington. Three huge towers, ranging from 450 to 600 feet high, are set in a position so as to form a triangle. A number of mighty antennas, represent, so to speak, the "mouth of the government." The buildings located near the base of the towers, are equipped with all the ne-

cessary gear, the rooms, being arranged so that various sets can be handled without the hindrance of trouble. A five-kilowatt spark-set,

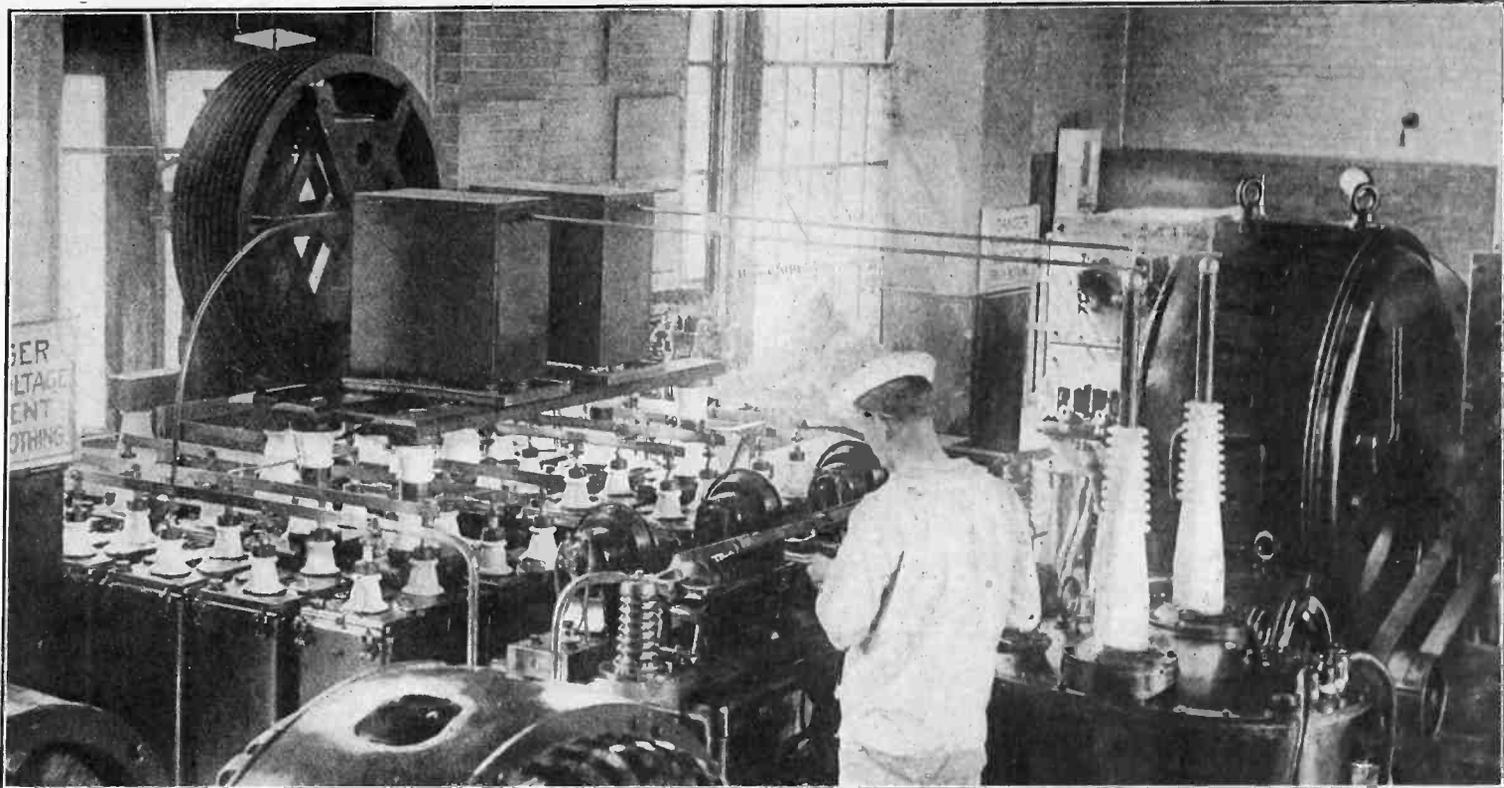
thirty kilowatt-arc, one-hundred-kilowatt spark-set make up the main equipment while a sixty-kilowatt German Telefunken-spark, with other smaller sets make up the reserve equipment should trouble arise.

The upper left-hand picture shows a five-kilowatt Navy standard transmitter, whereby all local traffic may be handled on from 600 meters to 2,500 meters. The set is mounted neatly on the table shown, plenty of room is available in case of utmost emergency. The operator is shown watching the hot-wire ammeter for highest reading, accomplished by the proper coupling he is trying to secure. Just left of his hand, is the Ford wheel, which operates various wave lengths, with the fan blowing on the spark gaps to keep them cool. Under the table is a five-kilowatt transformer, with the inductance-coils at the extreme left of the set. On the right of the upper left-hand picture, is a 30-kilowatt arc. In operation, this set sends forth continuous waves of great power. Large inductances are used. These, a study of the photograph will show, are mounted on a rack, to carry continuous waves to wave-lengths which vary in excess of 2,500 meters. It can be seen here that sets of the damped and undamped type are available at a moment's notice. The upper right-hand photograph is a view of a sixty-kilowatt, Telefunken spark set, which is held in reserve in case the hundred-kilowatt spark-set fails the operators. One must bear in mind that all of the above sets are operated by remote control from the central control station at Washing-



(c. International)

Looking up through one of the mighty steel towers of the high-powered radio station at Arlington, Virginia. This tower is 450 feet high. With the aid of its antennas, signals are sent out thousands of miles.



(c. Underwood & Underwood)

This Telefunken sixty-kilowatt spark set used by the Germans, before the World War, in their trans-Atlantic station at Sayville, Long Island, is now being held in reserve by the United States Government, but ready for immediate operation should the large one-hundred kilowatt set become incapacitated. Chief Chambers is here shown adjusting the quenched spark-gap which is the most essential element of the transmitter.

ton. This means that the operator at the Washington control station operates any particular set by simply being connected in on the proper relays. Below shows the control-board where distant operators are connected in by relays, thence to the operating or transmitting set. Once the distant operator has the control of the wire, he tells the operator, what wave he desires, and power, when in a few seconds, other switches are thrown and the distant operator has control of the set. This is an unusual feat, as the sending operator is never disconnected from the antennas, making reception possible at all times, even during transmission. The same arrangements are made for control at the Navy Observatory, where the "time tick" is sent thousands of miles to be picked up by the operators of vessels for navigation purposes, or by jewelers for regulating watches.

These time signals are sent out every day on a 2500 meter wave length (spark) in which the one-hundred kilowatt transmitter is used as a means of supply. At 11:55 a. m., every morning and at 9:55 p. m., every night, these powerful dots are broadcasted on their long journey, terminating with a long dash at the finishing hour, such as 12 noon and 10 p. m. exactly. This last tick signifies the exact second of each respective hour, previously described, whereby the observer automatically knows when the sun is directly centred over

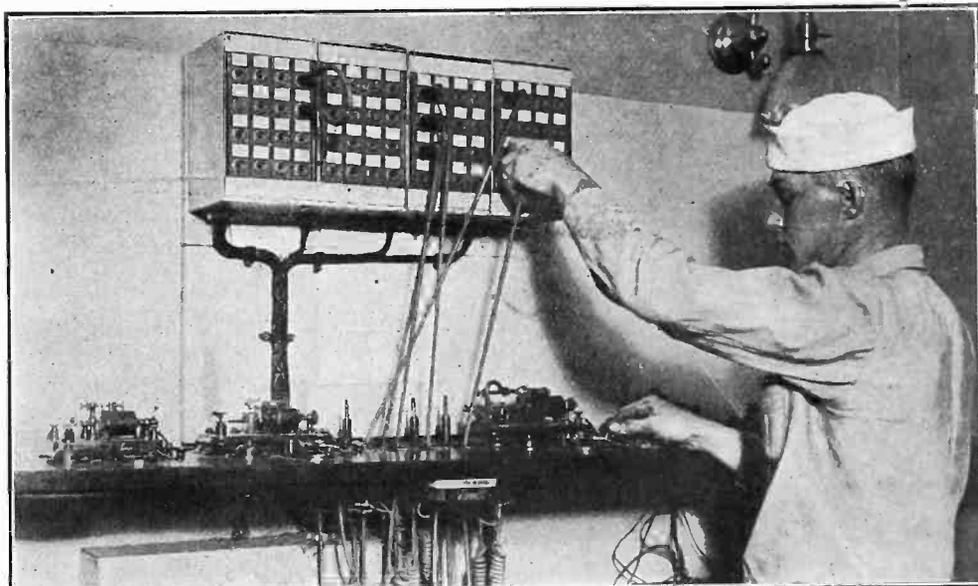
the 75th meridian during the noon period.

This task is of vast importance. While expert observers are at their stations to send forth these signals, captains of all vessels equipped with radio are standing by with their chronometers for a check with the time tick from Arlington. Time represents a large factor in navigation. One error is liable to result in disaster; so it may be realized how important the tick really is.

In the event of a breakdown, which may be of a serious nature, arrangements are made so that the time tick is sent through every naval station using

this so-called remote control, as the lower right-hand picture shows.

After the time tick is finished, the control operator transmits the various weather reports of the different localities along with storm warnings and "dangers" to navigation. This valuable information is issued to all navigators equipped with radio, and has proven itself of great importance. Besides the above, messages of importance are sent to vessels, which may be out of communication from shore stations in case Uncle Sam has news to be broadcasted, and, at all times, it is available for transmission to outlying stations and the Atlantic fleet.



(c. Underwood & Underwood)

How the sensitive beats from the Naval observatory clock at Washington are relayed through various delicate instruments to the giant transmitter at Arlington. Chief Weyand is connecting up the relay to send out time signals from the Radio Naval Station.

The Radio Primer

A. B. C. of Radio for the Beginner Who Must Have all Primary Facts Put Plainly and Accurately, and all Terms Fully Explained

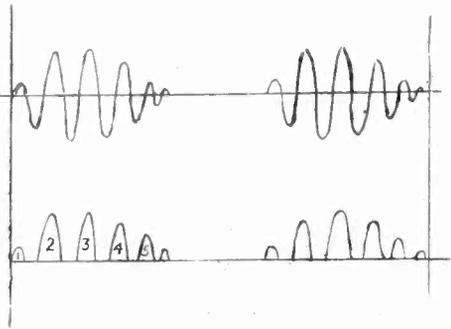
The Beginner's Catechism

By Edward Linwood

If the frequency of incoming waves is 830,000 a second, and the detector eliminates one half of them, the frequency is still far too high for the ear to hear. How is it reduced?

After the detector has eliminated one half of each wave, it has done all that it can do. The remainder of the action must be carried out by the telephone receivers.

Every time an operator at the transmitting station presses the telegraph key, a series of little sparks jump a gap and travel to the antenna. To a listener it sounds as if the spark were



Figures 1 and 2, respectively, show the radio impulses as they arrive at the detector in trains. No. 2 shows the same impulses after passing through the detector. One half of the waves have been discarded by the rectifying action of the crystal.

a single one, but it is really made up of hundreds of little sparks that start without much power and gradually grow to their highest power then decrease to zero again. If we had a pen that could move fast enough it would trace a series of curves, such as in Figure 1. It is the sparks that leave the gap and pass up the aerial wire and down to the ground connection. In general, the spark impulse can be considered as having the same form until it strikes the receiving antenna passes down through to the tuning coil, thence to the detector.

What happens to this wave when it meets the detector?

As described in a previous answer the detector refuses to pass the entire

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

wave. It will, however, allow one half to pass through. After going through the condenser, the wave has the form shown in Figure 2.

Will these waves make sound in the phones?

No; because they are still travelling too frequently. They must be slowed down many more times before the little diaphragm in the phones will transmit their message to the ear.

How is this done?

This is really done through the mechanical construction of the phone. In Figure 2 the little waves have been marked 1, 2, 3, 4, 5, 6. If we assume that the diaphragm is not moving when these waves strike it, then wave 1 will draw it down toward the magnet through whose winding the waves are passing. But the diaphragm is a sluggish creature; it hates to start working. So wave 1 barely moves it. By this time, though wave 2 has come along, and before the diaphragm has had a chance to return to its normal position, it is given another yank downward. It always gets there in the end, but its laziness makes it hang behind the waves.

Just as it gets ready to spring back to its position of rest another wave glides through the magnets and gives it another pull.

As a result, the motion of the magnet is something like Figure 3. Thus, while we have been describing it, a whole train of waves has passed but the diaphragm of the phone has made but one movement. When the series of waves ceases, the diaphragm will return to its first position where it will wait for the next train of waves. The sluggishness of phones will vary, but the most sensitive of them cannot begin to travel as fast as the waves. Perhaps there are 200 little wave-im-

pulses to each set of waves. Our frequency, then, which started from the sending station as 830,000 a second, was cut in half to 415,000 by the action of the phone diaphragm. This frequency is well within the range that can be heard by the human ear, and, as a result, we can now listen to the message sent into the air many miles away.

If it is so difficult to move the diaphragm in the phones, why is not some other instrument, such as an ammeter, used?

An ammeter would be less suitable than the phones. The little needle on these meters would take so long to indicate the wave, and so long to return to their first position, that there would be no way of knowing whether the signal being received was a dash or a dot.

Sometimes a small condenser is used between the tips of the phone cords. What is this for?

The fixed condenser at the phones is used principally to improve the tone of the incoming signals.

How can a fixed condenser improve the tone if the phone diaphragm is already moving in agreement with the impulses?

If you look at Figure 3, you will notice that between each wave there is a space during which nothing happens. The phone is not vibrating

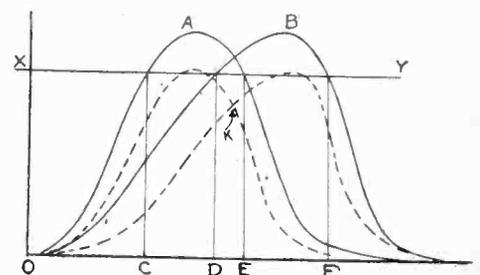


Figure 3—Tight coupling is represented by the heavy lines, loose coupling by the dotted lines.

because there is no current flowing through the circuit. A condenser makes it possible to fill up these dead spots with the impulse it has stored up. When this happens, the tendency of the diaphragm to return to its first position is overcome and the note of the signal is evener and clearer.

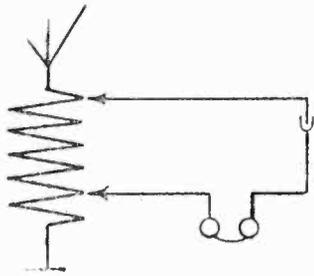
The Radio Primer (Continued)

Tuning and What Is Meant By It

By E. L. Bragdon

AFTER the detector circuit of the receiving set has been tuned to resonance, as described in my article in RADIO WORLD No. 6, dated May 6, it may happen that several other stations are also sending messages making it impossible to distinguish the station with which it is desired to maintain communication. In that event, it becomes necessary to employ some means that will filter out the offending impulses without destroying those we wish to hear. This can be done in most instances by selective tuning.

Suppose, as an example, that two transmitting stations are sending out waves with slightly different forms as in Figure 2. The frequency of the waves are the same; that is, they start at the same time and return to zero simultaneously. But one of them rises to its maximum value quicker than the other. By taking advantage



Stand-by radio circuit making use of the principle of broad tuning. Drawn By E. L. Bragdon.

of this fact, it is possible to eliminate either one of the conflicting waves.

It will be necessary to further assume that the telephone receivers which are being used, require a flow of current with a value equal to the distance OX and corresponding to the line XY. A simple interpretation of these curves and lines means this: that if our receiving circuit is tuned to the frequencies between O and C we would hear neither station. If the circuit were tuned to frequencies between C and E, we would be able to hear the station sending out wave A; while if a further change in tuning accommodated frequencies between D and F we could hear only the station sending wave B. But, if through carelessness, or any one of a number of other reasons, we happened to arrange our loose coupler secondary and our variable condenser so that the circuit containing them was in

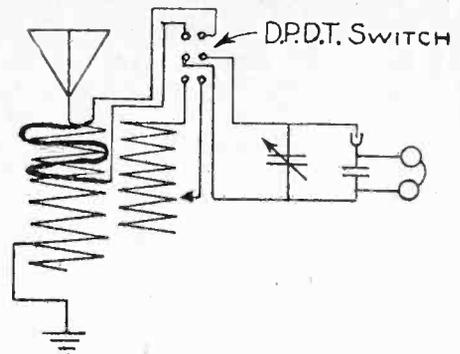
resonance at frequencies E and D, we would hear both stations in proportion to their power and distance.

It would seem at first glance, then, to be impossible to tune out one station or the other so long as their wave forms were similar to those indicated in the drawing and as long as our phones refused to increase their sensitiveness. But because of the characteristics of the loose coupler this selection of stations is made readily.

When a circuit is coupled loosely to another, the effect is the same as if the transmitting station were carried further away from the receiving station or vice versa. The amount of current induced in the receiving circuit will be reduced, and although the wave forms will be the same their peaks, or maximum points, will not be as high. This is indicated in the drawing by the dotted lines. It will be noticed from the drawing, that when the resonance has been gained at a slight sacrifice in induced currents, the current line required to operate the phones has not been changed and is, therefore, nearer the peaks of the curves. But between the points E and D, where formerly there was only interference there is now a point K where the waves do not clash. Thus by merely loosening the coupling between the tuners it has been possible to find a spot where reception may be carried on without interference from stations working on the same wave length. This is why all text books and other instruction guides suggest to the beginner that, as soon as he has heard the station he wishes to "listen-in on," he should pull out the secondary of his loose coupler until the interfering stations have either been eliminated or greatly reduced in their intensity.

As may be seen readily, a receiving station should not be sharply tuned if the operator is desirous of listening in to the general run of aerial conversation. With his set loosely coupled, he might listen all evening without hearing more than a station or two which happened to be attuned to his particular style of coupling. When he is reaching out looking for action, he wants his receiving circuits as broadly tuned as it is possible to make it. He can then make selection of a station and proceed to tune

inset to resonance for that particular wave. The receiving circuit used for broad tuning is called a "stand by" or "pick up" circuit. There are many methods of attaining the same end and only a few will be mentioned here.



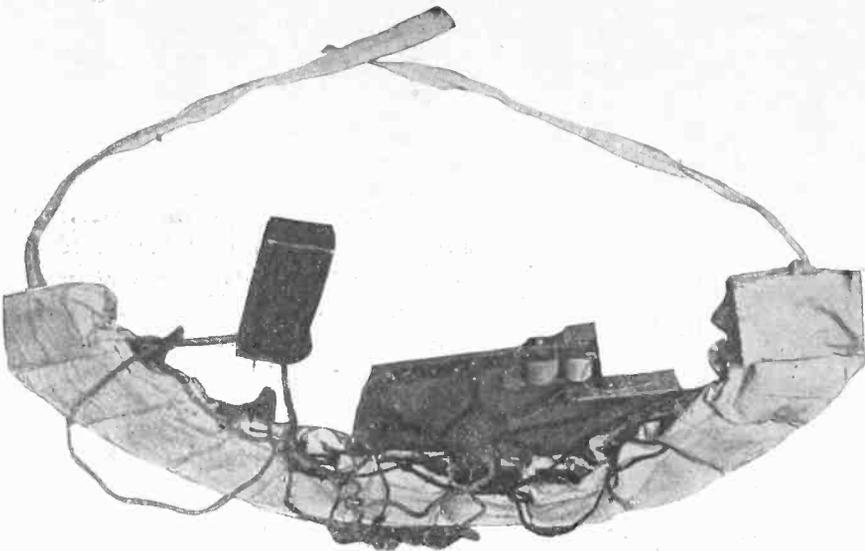
The loose coupler and primary includes an extra coil of wire which embodies the pick-up circuit. Drawn By E. L. Bragdon.

Probably the simplest stand by circuit is the one published in RADIO WORLD No. 6, dated May 6, which consists of a simple single-slide tuner, a detector, and a phone.

The second circuit is a double or triple slide-tuner with the detector and phones in series around the coil. Although connected to the tuner, the detector circuit is really a secondary circuit and the waves induced in the aerial can pass through the inductance to the ground without encountering the high resistance.

The third "pick up" circuit would consist of a loose coupler which has been tightly coupled. The secondary coil would be inserted into the primary until the windings on each correspond. In the United States Navy this same effect is obtained by the simple scheme of winding several turns of wire around the primary coil and connecting the ends to a switch. The same switch is also connected to the terminals of the loose coupler and, also, to the detector circuit. By throwing the switch in one direction, the operator may listen in on a broadly tuned circuit to the general conversation passing about him; but if he is called by a station or wishes to listen to a particular ship he needs only to throw the switch in the other direction. This connects his detector circuit instantly with the loosely coupled regular receiver. The advantage of this layout is obvious.

Newsy Photographs of the Week Show



"Close up" of a cleverly designed wireless belt. This apparatus, which was recently seized by the San Francisco police, is intended to be worn around the waist. The device consists of a pocket radio-system to be carried concealed in a coat pocket, a belt of high-power batteries strung around the waist, connected with a mute telegraph-key buzzer. It is claimed that it will flash by radio waves secret information of the business marts to a central station. It was used for listening in advance information regarding the stock market.

(c. Keystone View Co.)

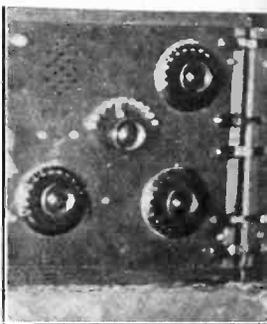


Mrs. Carl Lynn, Ma... for having... ries one n... came ove... her husba... layed by... would no... very late... tening in... Mrs. Berg... regardin... (c. Underw...



(Left) Radio operators of the Auburn Polytechnic Institute, Alabama, considered one of the largest amateur stations in the Southeastern United States. Top row, (left to right, sitting:) Thomas Neely, T. G. O'Connor and Arthur Dunstan. Bottom row (standing, left end:) J. C. Dickinson. Seated: V. C. Ilvaine chief operator; H. S. Brownell, F. W. Breedlove. Extreme right (standing:) J. C. Bailey.

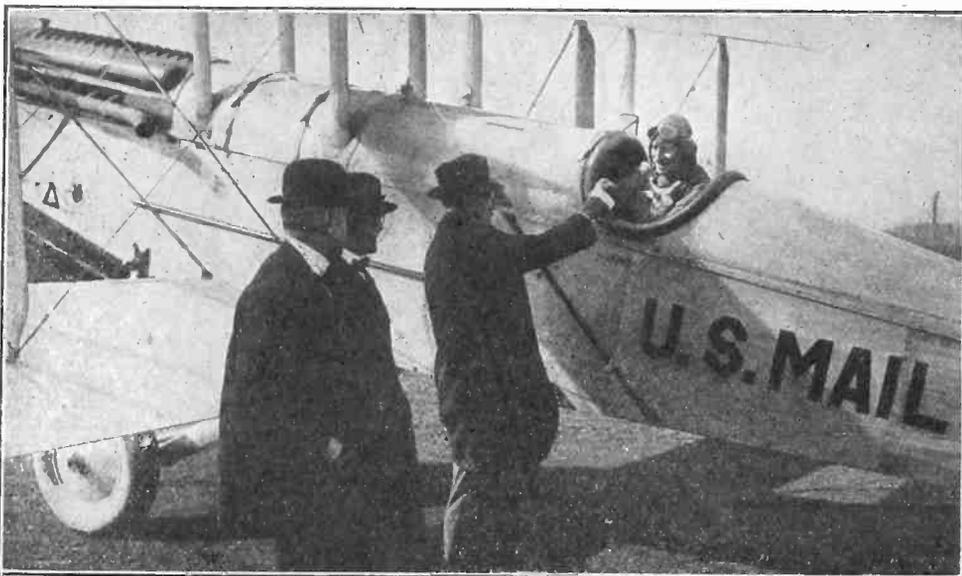
(c. Kadel & Herbert News Service)



"Close up" of a radio lar set, with attractive who found that it bro It rested on a table r

(Below) E. H. Lee, pilot of the United States Air-Mail Service, who made a record run from Chicago to Washington in six hours and two minutes, all the time keeping in touch with the head of the Air-Mail Service, in Washington, by means of a radiophone which will be installed in the air-mail planes for signalling purposes. Pilot Lee is handing a letter to Post Master General Work, just after his record-breaking trip. John H. Bartlett and Paul Henderson, First and Second Postmasters General, are also present.

(c. Underwood & Underwood)



Radio Used in New and Diversified Ways

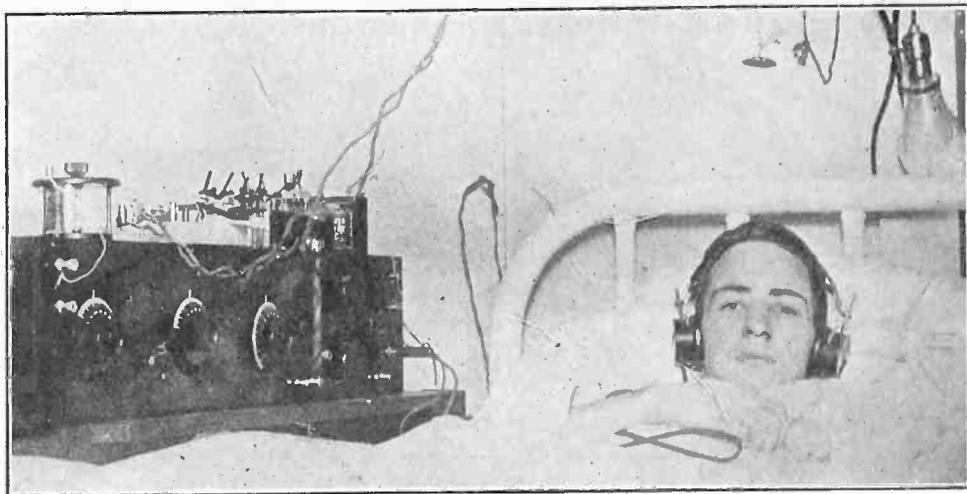
erg, of East
anks radio
d her wor-
A message
ether that
no was de-
tant work,
ome until
s while lis-
ncert that
d the news
husband.

(Underwood)



(Right) perhaps this is the first you have heard of 6AJH, San Diego, California, or understand how much radio means to him. It is practically his life. He is Lester Picker, 16 years old, and he would have been graduated from High School this June had he not fallen and suffered a broken back while erecting his radio aerial.

(c. Underwood & Underwood)



ng-set for use in a parlor or bedroom. This particu-
-speaker, was photographed in the boudoir of a lady
ner much surcease after she had retired for the night
er bed, and was tinted to harmonize with the room.

(c. Kadel & Herbert News Service)

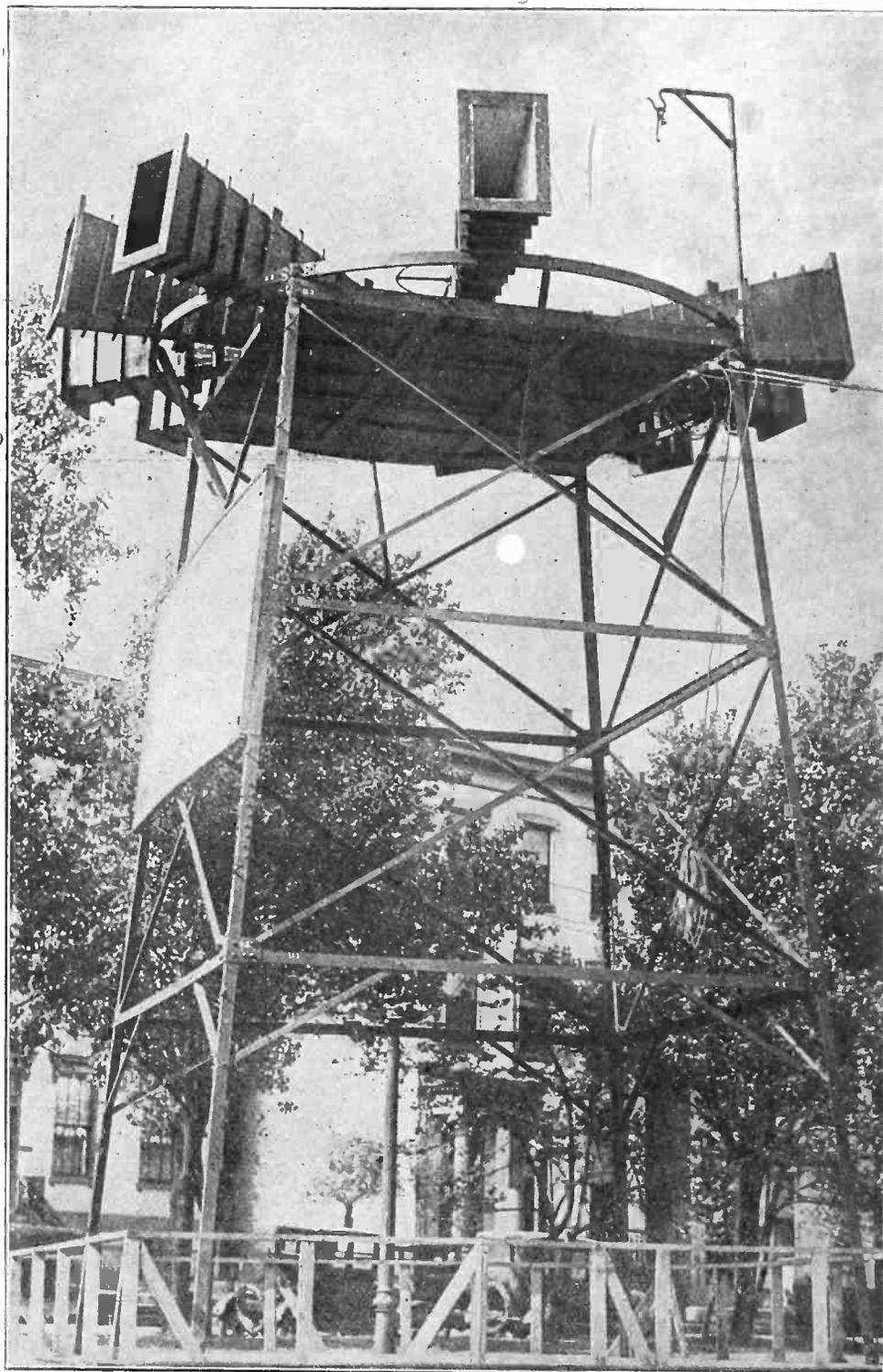


(Right) This gigantic amplifier, the largest and most powerful ever constructed, was erected in Lytle Park, Cincinnati, to enable President Harding's address during the Grant Centenary Celebration to be heard clearly by thousands who were present.

(c. International Newsreel)

(Left) Corp. C. Thompson, U. S. A., is proudly exhibiting the latest thing in "parlor aeri-als." It is in the form of a lyre, and was designed by Quartermaster-sergeant G. M. Dusenberry, Signal Corps, U. S. A., at the Fort Wood, N. Y., wireless laboratory.

(c. Underwood & Underwood)



Radio and the Woman

Latest Gossip About the Feminine Enthusiasts

IN a certain southern town, a trained nurse who believes in combining efficiency with expediency, receives reports of the physical progress of one of her patients, through her receiving set. Each morning and night, she tunes up her instrument with even less effort than ever she used in opening her medical case.

* * *

That radio is a subject which occupies the scientific minds of thousands of women who, for years, have made it a business and study, is, of course, a well-known fact; but that it is a topic of almost equal interest to women writers in this country is revealed by a notice at hand which states that, at a future meeting of the League of American Penwomen, a receiving set made by one of its mem-

bers is to be displayed and the technical side of radio thoroughly discussed.

* * *

A woman who has devoted many years to the study and practice of wireless, states that soon it will be possible to see as well as hear by means of radio transmission. Her authoritative opinion is that when we talk to another at a great distance, we shall be enabled to see our listener's face.

* * *

A friend who possesses a handsome "chow" dog says that when she adjusts the head-set on the animal he appears to enjoy the program he hears quite as much as she does when she listens in.

* * *

When I hear complaints that radio broadcasting permits of no secrecy, I always feel like asking what assurance any one has that their conversations are not overheard on telephone or that confidences are not shared when voiced otherwise than over a sending set.

* * *

Air, you know, is no less a practical means of communication than wire, and it is a limited mind that does not grasp the fact that there is nothing mysterious about radio. It's the newness and greatness of the thing that puzzles people.

* * *

It is to be devoutly hoped that the wedding ceremony which took place in an airplane, 5,000 feet above Times Square, the bridegroom did not drop the wedding ring just previous to partaking of the nuptial kiss sent broadcast and heard by thousands of radio fans.

* * *

The outer portals of a house of prayer on St. Nicholas Avenue, New York City, bears the sign, "Chapel Radio Services Here."

* * *

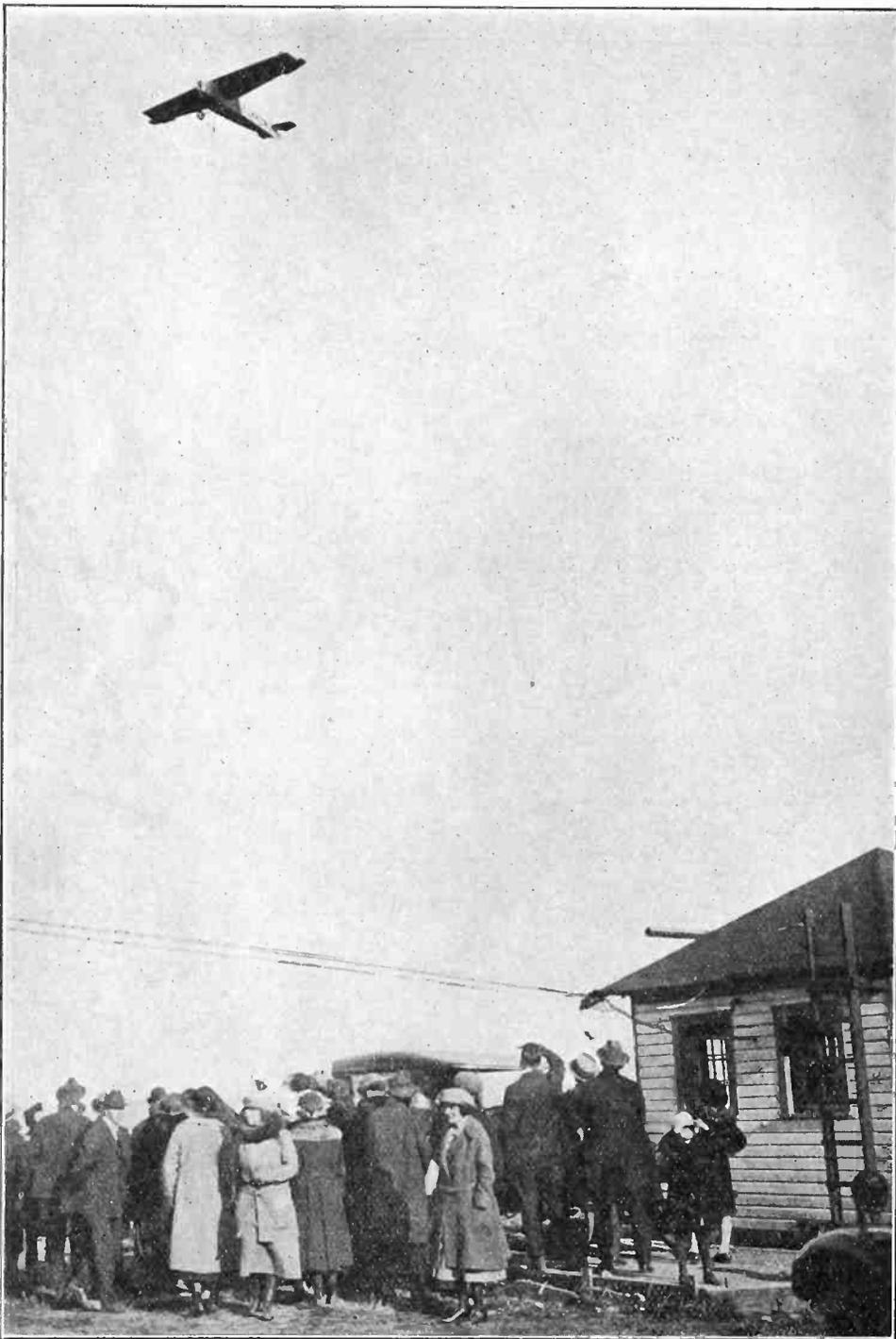
Three words which are spelled quite differently, but which have the same meaning, formed the basis of a recent argument.

My English friend claimed that "amplifier" is the correct term to use when referring to the tube that increases voltage, whereat a petite French miss spelled, and pronounced it, "*amplificateur*."

My more snappy American word, "magnifier," for the moment offended their foreign sensibilities.

* * *

An amateur fan writes that, on different occasions she hears at least two wireless stations broadcasting. She judges from this that the artists on respective programmes must enjoy dispensing good entertainment quite



(c. Underwood & Underwood)

Curtis Field, Mineola, Long Island, on the sunny afternoon of April 22, when Rev. Belvin W. Maynard, known as the "flying parson," performed an aerial wedding in the Fokker machine toward which the people in the photograph are gazing. The groom was Albert P. Schlafke, athletic director of the Veterans' Mountain Camp; and the bride, Sarah Cockefair, a Brooklyn nurse. In the Fokker, besides the parson and the interested couple, were little Mary Louise Cobb, flower girl; Bert Acosta, pilot, and a radio operator. The spectators heard the marriage ceremony. It was transmitted by radio.

as much as those who listen in, enjoy hearing it. Well, maybe they do.

* * *

"A landlord so unprogressive as to prohibit aeri-als on the roof, can't have me for a tenant!" exclaimed a spirited woman friend following an interview with the apartment house owner referred to, "for if he's as un-enterprising as that, he'd probably be equally backward in other improve-ments!"

* * *

An anxious husband writes to ask if his wife's acquired knowledge of radio means that the purchase price of wrap or gown with which she might become enamored while on some future shopping tour, could be guaranteed by identification of his voice over the costumer's radiophone. I'm sure many of us haven't considered wireless from this angle, but maybe it isn't too much to say that it is something that will be established in the future.

* * *

Very recently our dark-eyed Cuban neighbors danced to music broad-casted from Schenectady, New York, a distance of 1,455 miles.

* * *

I'll wager that one self-sacrificing little mother did without a new Easter hat, so that her children might have their receiving set.

* * *

To the girl who drives her own car, a flat tire holds no terrors if her machine is equipped with a sending set.

* * *

The fact that, before long, another big wireless station will begin opera-tions in New York City, suggests that sooner or later, representatives of broadcasting stations will be obliged to get together and arrange a definite program. It is hardly likely that such a meeting will lack a woman's sug-gestion regarding the future enter-tainment of American homes.

* * *

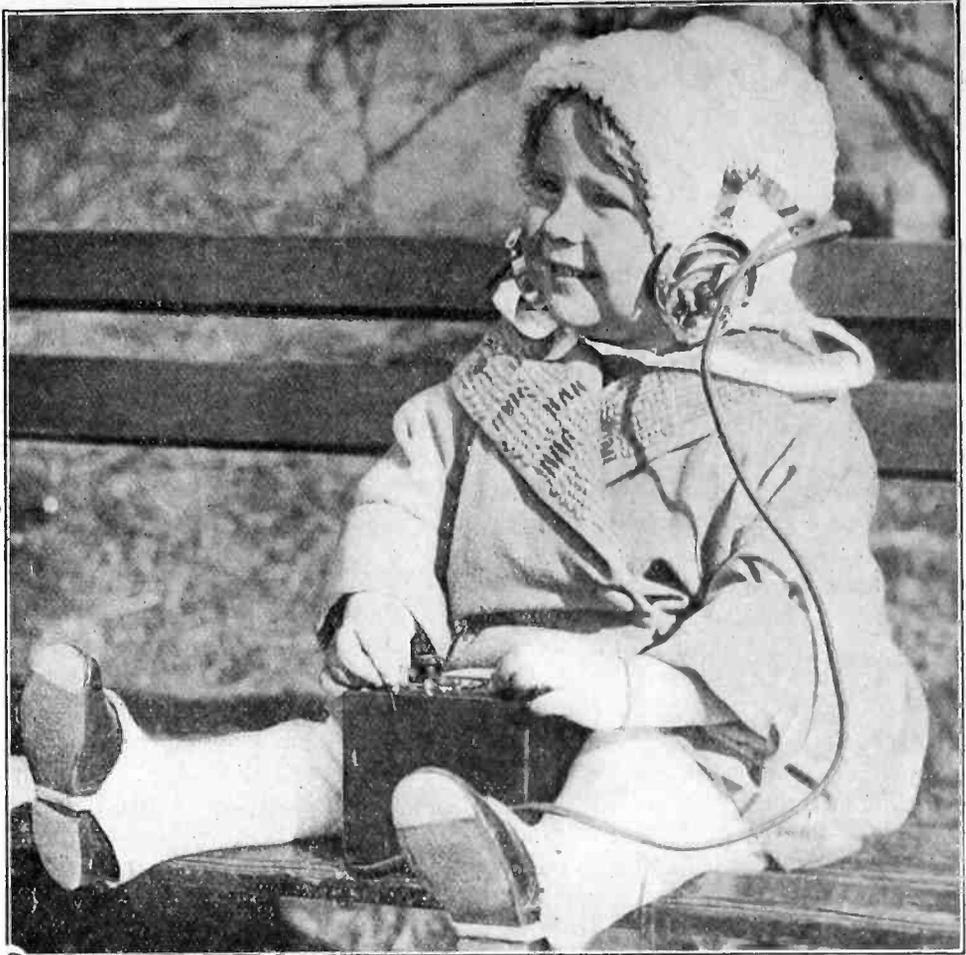
A New England housewife proudly states that the new radio broadcast-ing station at Hartford, Connecticut, will be completed shortly

* * *

"When radiophones are installed in subways, will the wireless announce-ment, 'Gentlemen, rise and give the ladies your seats,' secure us the ad-vantage of comfort?" I am asked.

* * *

Mothers of girls of high-school age should have been particularly in-terested in Dr. W. Burnham's talk on the advantages and special features of the co-operative High School, which was broadcasted from Wana-maker's.—Rose R. G.



(c. Photograms, N. Y.)

This is possible. There are no aeri-als to show that baby is hearing anything; but radio is advancing so rapidly that the day will come when little ones will be entertained during their outings.



(c. International)

Alice Daly is only a girl, but she is one of the crack amateur radio operators of the Pacific Coast. She learned the code from her father who was a tele-graph operator in India.

The Good Radio Is Doing the Country

By Henry F. Vortkamp

President, National Motor Accessories Corporation

MANY people seem to think that the radio receiving-sets were created only recently because they came into such prominence on such short notice. The truth of the matter is that the inventors have had receiving sets for some time, but they did not become the profitable commercial proposition they are today, due to the fact that the great broadcasting stations were not in existence, and, consequently, there was no music to be had from the air. However, the large electrical companies found that they could commercialize receiving sets by erecting their own broadcasting stations, with the permission of the government. This was done. The result is that millions, today, are hearing music, and the daily companies are selling their sets in vast quantities.

As president of the National Motor Accessories Corporation, it has been my good fortune to feel the pulse of the entire country. Our dealers, in every part of the United States, are sending in information constantly, so that all the tricks of the trade are brought to my notice. Also, the progress of radio and the mistakes made. With my sources of information, I am sure I am in a position to give the public facts as they really exist.

It would surprise the people to know that most every boy from twelve years old, is making his own set. The parts they are buying; and they are constructing the best they know how. They do hear Morse code, but are not clearly successful in getting the music. However, there are some here and there who are the exception to the rule. Therefore, the demand for radio parts has far outreached the supply. Each and every one of these boys will purchase completed crystal-sets after he tires of his makeshifts.

The crystal sets need no batteries or dry cells or tubes, yet they give a very clear and distinct tone to the voice or music from the city broadcasting stations. After they have had the crystal sets they yearn to have the tube sets because, as boys, they want to hear Pittsburgh and other distant points. However, they find that the application of electricity to the receiving sets gives them louder music and louder talking; but it has not that healthy human sound that is produced by the crystal sets. Yet the tube sets are convenient, due to the fact that

you can hear from points of a great distance.

It is wonderful to note the progress of the radio all over the country. It gives the mind the picture of a wave going farther inland, covering more territory until it has covered all. First it started in New York, then Pittsburgh was reached—Newark being the New York station—then Detroit, then Chicago, then Denver, and, finally, San Francisco. It is gradually spreading over the Southwest and Southeast. Broadcasting stations are shooting up here and there. This in itself means an enormous number of people added to the radio army of receivers. Each one must have a set. The factories must supply them all, but they cannot. The natural result is that prices on parts and sets will rise for some time until the factories catch up with the demand. This has given employment to a large body of men and women. While the financial depression has hit most every other line of business, thousands rushed pell mell into the radio business. Some will lose ultimately, but it is an assured fact that most all will prosper.

It appears that the best move on a prospective radio-set purchaser is that he purchase a crystal set and learn all the rudiments of radio, generally speaking. Then he should purchase the larger sets, such as tube sets. If he does not, he will be burning out his storage battery and dry cells, blowing out his tubes, which is surely very costly and does chill the enthusiasm of the radio fan. The radio fans who purchase the large sets, or distance sets, are like the child who sees a big piece of cake, and tries to get the whole piece down its throat at once.

Everything must be done gradually.

Transmitting Is Costly

RADIOTELEPHONE stations that transmit the various concerts, are very expensive to conduct, owing to their complicated apparatus. The power input ranges from 50 watts to 1,500 watts, but their range is not proportionate to the power input. It is known in radio circles that some broadcasting stations have an unusually wide range from 1,000 to 2,000 miles. The latter distance is extremely long.

You will hear many people say that the crystal sets are obsolete. You can be sure that after the public has had all its trouble with the larger sets they are going to use the crystal sets because the crystal sets use neither dry cells or batteries. No electricity. Simply hitch your sets to the aerial, turn the knob on the dial and you have the music for the rest of the day. If the voice or music is dim, then simply keep touching the wire on your crystal detector until you find a sensitive spot, which makes the voice louder.

Stay there! I have heard many amateurs say that they heard Pittsburgh and many other points on their crystal sets. This is almost impossible except when you happen to have the most ideal atmospheric conditions. I personally have heard Pittsburgh on a crystal set, and it was distinct and plain; but it seemed at a great distance although I understood each word spoken. The program in Pittsburgh did check up with the concert as heard by me on that night; but that is so seldom that it is best not to give the matter much consideration. However, the concerts at Newark surely are the best in the land, and why should one wish to go to Pittsburgh for music of less quality. If you can hear the music so plainly and pleasingly on a crystal set, why use the larger sets which have so many technical conditions? It is my opinion that the "city sets," namely crystal sets, will be in far greater prominence and in greater demand a year from now than they are to-day.

Many improvements are being held in abeyance by manufacturers of radio sets, which will assist materially in making radio still more desirable to have in the home. The factories are not wasting a minute along these lines.

The sudden advancement of radio, commercially, has caused money to be put in circulation, besides it has employed people who were on their last legs. The money it has circulated has helped prosperity to return. Because of radio everyone has caught the spirit of the times, and instead of that constant "hang-dog" look, that remark, "Things are bad," we have smiling people who are looking forward to years of happiness. Radio has made our country feel its power, and, past assured, in time it will be more powerful.

Forget the Flash of Lightning

By Thomas J. McElroy, Jr.

RADIO, to-day, is getting more free publicity than was ever given to any other industry or art. Newspapers and magazines, all over the country, have installed radio sections or columns which have taken the utmost attention of their readers. Editorially and otherwise, radio is being written or talked about to such an extent that even the World War now seems to be but a flash in the pan.

However, although well-known writers are doing a wonderful amount of good towards educating the public in the art of radio, there is still one thing that many have overlooked: signifying radio by a flash of lightning.

Wherever we look, whether a magazine advertisement, a newspaper heading—as a matter of fact, wherever radio is pictured, we see the same old detrimental flash of lightning.

Those of us who were acquainted with wireless before the days of broadcasting, know very well that radio does not travel through the ether as does a lightning flash. But it seems that the new men in the field, both advertisers and editors, are under the false impression that the flash so often pictured has a tendency to put life into the article or "ad" about radio. This is entirely

and woefully the wrong view to take. On the contrary, instead of boosting radio, it does unestimated harm to the industry so far as the layman is concerned. The first thought of a new owner of a radio receiving-set is safety to himself and home. He wonders if this brand new household contrivance will give him an electric shock—whether it will shoot forth a flash in the middle of the night and do harm to himself and home. If we are to take that main and important fear from his mind, we surely cannot do so by constantly putting before his eyes such a danger signal as a lightning flash.

The word, "Radio," at this time is in, itself, sufficient indication of what it implies. We don't need to put the old death sign of a flash alongside it. All of us are trying, in our respective way, to do all the good possible for radio and in no other way can we do it until we first cease to do it harm. Let us then, if we desire to tie up art work with the running head of our "ad"—let us use other means of attracting attention of the reader. There are innumerable other ways of using this necessary art work so it will build up radio instead of knocking it down. The only way we can accomplish it is by country-wide co-operation. Let's start now!

Radiogleanings

BECAUSE Yosemite Valley, California, is—as certain writers have expressed it—merely a "hole in the ground," some wireless experts were entirely against the successful operation of a station there. Though Yosemite's granite cliffs rise 5,000 feet in the air, broadcasting has been heard distinctly from aerials strung from two giant trees on the Valley's "floor."

The University of Wisconsin announces a course in radio. Lessons will go by air route to residents of the Middle West.

The Rock Island Railroad is the latest to announce that it will install radio for the benefit of passengers.

Wave length for broadcasting entertainment is 360 meters. Daily weather, market and crop reports and other official and semi-official announcements are sent out on a wave length of 485 meters.

There are now, in the United States, 71 licensed broadcasting stations, of which 7 are department stores. Of the 7, Philadelphia is the location of 3; New York of 1; Newark, N. J., of 1; St. Louis of 1 and Los Angeles of 1.

Although the transatlantic radio service of the Radio Corporation of America has been in existence only two years, it handles

approximately one-fifth of the total traffic passing between America and Europe, and an even greater proportion of the trans-pacific traffic.

Forty-eight hours after a description of a youth who fraudulently obtained two wireless sets from Pittsburgh electrical houses was broadcasted, relatives of the fugitive went to Pittsburgh and paid for the instruments. It was estimated that more than 10,000 amateur operators received the call.

The first American steamship to be equipped with a radio telegraph station was the Philadelphia, in 1902.

Concerts broadcasted in Newark, N. J., have been heard plainly by amateurs in Cleveland, Ohio.

Edward T. Stotesbury, head of the banking firm of Drexel & Co., Philadelphia, has had a "set" placed in his new palatial home near Chestnut Hill.

"Here's How!"

The radio creates a new world. It's a wonderful invention. Think of the joy of being able to connect up with Cuba and hear our friends drink!—*Evening Telegram*, New York.

Old Windmill Becomes an Aerial Tower



(c. Kacel & Herbert News Service)

The radio craze which has been spreading across the American continent has not stopped, but carried itself, by radio, across the Atlantic. The accompanying photograph shows how radio is becoming popular in England. An elementary school, at Haslemere, England, has, probably, one of the most up-to-date wireless and radio equipment sets in Great Britain. Rather than build an aerial, the boys of the radio class converted an old windmill with great success.

Keep Your File of Radio World Complete

If you did not get the first six issues of RADIO WORLD, you can get them through the American News Co. and its branches, or send 15 cents per copy to RADIO WORLD CO., 1493 Broadway, New York, N. Y. (Adv.)

RADIO WORLD

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

BY RADIO WORLD COMPANY

ROLAND BURKE HENNESSY, Editor and Proprietor - - - - - 1493 Broadway, New York
FRED S. CLARK, Manager - - - - - 1493 Broadway, New York

ASSOCIATE EDITORS:

ROBERT MACKAY - - - - - FRED. CHAS. EHLERT
CENTRAL-WESTERN ADVERTISING REPRESENTATIVES:
W. B. ZIFF CO., 608 S. Dearborn St., Chicago.

SUBSCRIPTION RATES

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

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

ADVERTISING INFORMATION

MECHANICAL REQUIREMENTS:

Size of page: 12 inches deep—9 inches wide.
Size of type page: 10 1/2 inches deep—7 1/4 inches wide.
Three columns, 147 lines each—441 lines to the page.

CUTS:

All plates should be mounted. We can use screens up to and including 133. We prefer 120 screen half-tone. We cannot use matrices.

ADVERTISING RATES:

One page: One time—\$150.00.
Half, Quarter, Third and Two-thirds pages at proportional rates.
One inch, one time—\$5.00. Per agate line, \$0.40.
On four consecutive issues, 10% discount.
On thirteen consecutive issues, 15% discount.
Terms: 30 days Net. 2% 10 days.

CLASSIFIED ADVERTISEMENTS:

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

Cover and preferred position rates made known on application

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

IMPORTANT NOTICE:

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

PHONES—
OUTFITS and PARTS
On Hand.

"C" RADIO JACK
158 Fulton St., N. Y. C.

VARIOMETERS
UNWIRED

Mahogany wood turned cup, white wood ball ready for wiring. Range 175 to 600 meters. Ready for immediate delivery in any quantity. Workmanship guaranteed.

SAMPLE SET, \$1.10

The Ever Ready Woodworking Co.
810-12 East 5th St., New York City
Phone Orchard 5585

Distributers of Everything in

RADIO

Mail us your orders

CITY SUPPLY CO.

56 Warren St., N. Y. City

Dealers!

We Offer for
Immediate Delivery
in Quantity Orders

FEDERAL JR.

With Head Sets

DE FOREST EVERYMAN

With Head Sets

DE FOREST RADIOPHONE

With Head Sets and Tubes

Radio Stores Corp.

150 W. 34th Street,
NEW YORK CITY

Dampness Essential to Ground Plate

AS the ground is fully as important as the aerial system, care should be taken in making one, says the Springfield, Mass., "Union." The first thing that is necessary is a good-sized piece of sheet copper. This should be at least 18 inches square, and more if possible. Look around the yard and pick out a spot where the ground is most apt to remain damp and dig a hole there. This hole should be from 3 to 4 feet deep in order to have the ground retain its dampness during a dry season. In order to make the ground hold its moisture better, it is sometimes a good plan to dump a bag of charcoal into the hole so that it is packed about the copper plate. Charcoal has the property of holding moisture very well. After it is in place, pour a couple of buckets of water over it. Fill in the ground again and pack it down tight. Be sure that you have a good heavy copper wire soldered to the plate before it is buried; or, better yet, solder a length of copper tubing such as is used for the gasoline lines of an automobile.

SEND US YOUR ORDERS FOR

Variable Condenser, Variometers, Variocouplers, Loose Couplers, Tuning Coils, Amplifying Transformers, Sliders, Switches, Switch Points, Binding Posts, etc.

We are large manufacturers. Gorton machine engraving or manufacturing special parts to order.

F. JOS LAMB COMPANY

1970 Franklin St. Detroit, Mich.

Direct or through newsdealers.
Subscribe for RADIO WORLD. \$6 a year, \$3 for six months, \$1.50 for three months.—(Adv.)

GREBE SETS

including their Latest Creation
C—R—10

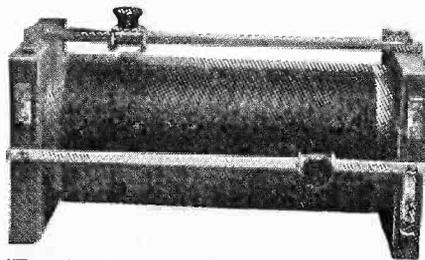
MURDOCK Phones and Condensers

MOULDED Variometers Variocouplers

Panels drilled for above—no extra charge
Mail orders shipped in 24 hours

**Brooklyn Wireless
Installation & Supply Co.**

876-A Flatbush Ave., Brooklyn, N. Y.
Tel. Flatbush 2012



"Essex" Tuning Coils—Double Slide—
Enameled wire—Good for loading coils.

LIST PRICE, \$3.00

ATTRACTIVE DISCOUNTS TO DEALERS

3/16" Sliders, 3/16" Slide Rods, Mounted Crystals, .001 Fixed
Condensers, Crystal Detectors, Lightning Arresters.

ESSEX MANUFACTURING COMPANY

NEWARK

117 Mulberry Street

NEW JERSEY



"Essex" Polished Wood 3-inch Rotors
LIST PRICE, 50c

Answers to Readers

I AM informed that I should use No. 4 wire from my lightning switch to the ground. Why should this wire be larger than the lead-in? Is it all right to connect this wire on the outside of the water meter. If this wire cannot be connected to a water pipe outside the house, is it safe to run it through the wall into the cellar or could I bury a metal rod and connect my lightning wire to this?—C. M. P., Philadelphia.

According to the rules of the National Board of Fire Underwriters, your ground wire must have a three-quarter inch periphery for lightning protection. The best way to protect your set is to use a lightning arrester which will pass the Board of Underwriters requirements. Never connect your lightning ground to the house side of the meter. If you cannot connect to the street side, then use a driven ground-rod which will be much safer.

Can I receive concerts with an aerial 20 feet long, two stories above the ground? The aerial will be closed in by a number of buildings.—H. M. Weehawken, N. J.

You can receive concerts, but you will either have to enlarge the aerial or you will need an elaborate set with the small aerial.

Which is the most efficient for loose couplers, the slider or the units and tens system?—P. E. C., Brooklyn, N. Y.

The efficiency of a loose coupler depends on the care used in its construction. Either the tens or unit system of tapping or the slider will give a single-turn adjustment and will work equally well.

We are in the market for a high-class receiver. As we have no experience, we would like your advice as to the best? What is a good book on this subject?—M. J. H., Washington.

No particular set can be suggested here. We advise you to purchase a good regenerative vacuum-tube outfit as this will meet with all of your requirements. Your local dealer, no doubt, has various books pertaining to radio.

I have a short-wave regenerative set and a terrible amount of static. Would a longer aerial, much higher, eliminate much of this static?—R. M., Rochester, Ind.

By inserting a variable condenser in shunt to the primary winding of your variocoupler, or loose coupler, may cut down some of this static; but getting higher into the breeze creates much more static. As this is the season for static, only by proper tuning can some of it be eliminated.

Is it necessary to obtain a license to erect an aerial for receiving purposes only?—K. L., New York City.

No license is necessary for the above. If transmitting is attempted, a license must be taken out.

Where are the following stations located? WOR, NOF, WWZ?—D. S., Coney Island, N. Y.

WOR—Bamberger's station at Newark, N. J. NOF—government station, Anacostia, D. C. WWZ—Wanamaker's, N. Y.

Where can I get information regarding a good circuit for a radiophone set?—J. P., Manchester, Conn.

Owing to the large numbers of questions received from readers it is impossible to answer all in this number. Your replies will appear in the next or future numbers of Radio World.

RADIO WORLD publishes weekly the various circuits and hook-ups. This is the only practical suggestion we can give you.

How can I tune out a local broadcasting station situated within two blocks of my set? I am using a Clapp-Eastham, with two stages of amplification; but, somehow, I am unable to tune in for any other station while the local station is broadcasting. Is there a remedy?—F. F. F., Charlotte, N. C.

You do not explain your question fully especially regarding wave lengths. It is a sure gamble that you will be unable to tune him out, as he is so close that forced induction is made possible. No doubt some of his signal strength could be reduced by inserting what is termed a trap; but, in the long run, the strength from this broadcasting station would interfere regardless of the finest tuning—just enough to spoil any other program going on.

I am building a regenerative vacuum-tube receiving set. In order to keep my storage battery properly charged, I must carry it, on a street car, to the heart of the city, which is bad business. Why can't I use four gravity-cells, commonly called "crow-foot" cells, such as are used in railroad signalling, telegraphy, and telephoning. I have a limited amount of cash to spend. Advise me what to do.—R. S. W., Cincinnati.

You did not let RADIO WORLD know whether or not you have available electricity in your home. If you have alternating current, we advise you to purchase a home-charger and connect this up to your battery. This would eliminate the trouble of carrying it downtown. Using blue-vitriol batteries would be unwise as they do not possess a large capacity for filament lighting. Stick to the storage. Read carefully the article by George W. May, R. E., in RADIO WORLD, No. 6, dated May 6, page 14.

Tell me of a good book on radio and radiophone building, something that will give complete specifications of prints suitable for an experienced electrician to work from. I do not want one devoted to theory and explaining the elementary principles, but something similar to what would be sent from the engineers to a shop intending to build one.—G. S. M., Salem, Mass.

In issue No. 3 of RADIO WORLD, page 18, is a list, "Books for Amateurs." According to your letter, either "Practical Wireless Telegraphy" by Elmer E. Bucher, or "Design Data for Radio Transmitters and Receivers," by M. B. Sleeper would solve your question.

Is there a school where I can take an evening course in the theory and practice of radiotelephony, other than those classes maintained by the Y. M. C. A., and the K. of C. Is there a course covering this in three months or less?—R. T. C., New York.

Besides the above-mentioned schools are the Radio Institute of America, 98 Worth St., New York City, and the Seaman's

Church Institute, 25 South St., New York City.

How reasonably can I purchase a receiving set that would pick up Washington, D. C., Newark, N. J. and Pittsburgh. I live in a private house and the nearest broadcasting station is 75 miles away.—H. P. J., Philadelphia.

A tube receiver, including a two-step amplifier of the regenerative type, with a good aerial, should prove sufficient for your purpose. Be sure you get a regenerative tube outfit. Prices range from \$100 to \$300.

Is it possible to use a variocoupler in conjunction with a tuning coil in a receiving set (crystal set) If so, is there any advantage using just a tuning coil. My set consists of crystal detector, fixed condenser, and a variable condenser with tuning coil.

Is it possible to use a loud-speaker attachment with a phonograph, or any other kind of loud speaker in conjunction with this set?

Is a two-wire aerial, 100 feet long, as good as a single wire aerial of the same length?—S. W. B., Union Hill, N. J.

You cannot use a variocoupler in conjunction with a tuning coil as both play the same part in a set. You can either use your coupler with your detector or your tuning coil. Try out each and find which gives the best results.

You cannot use any type of loud speaker with a crystal detector. If you wish a loud speaker, such as a magnavox, you will have to get a tube set and a two-stage amplifier.

With this arrangement you can connect up to most any phonograph.

A one-wire aerial, 100 feet long, will answer just as well as a two-wire the same length.

I am using a variocoupler, variometers in plate, grid circuits, vacuum-tube detector, and Murdock 2,000-ohm phones. I have gone over my lead-in, etc., and find that everything is properly insulated; but everytime the telephone rings. I can pick up the receivers and listen to the ordinary telephone conversations. Please suggest a remedy for this trouble, as it interferes with radiotelephony.—H. P., Revnoldsville, Pa.

Carefully look at your antenna. Does it lie in parallel with any telephone line? See that no telephone feed-line runs in back or around your receiver. If a telephone line lies in close proximity to your antenna and ground circuit, it is probable that you are amplifying signals from this feed line.

RADIO WORLD further suggests that you look over your connections carefully for feed telephone-lines. If you locate any, try to run your wires at right angles. Inform us as to results.

Where do I connect a fixed condenser using a crystal detector? Must I use a loose coupler, or can I use a variocoupler?—F. A., New Brunswick, N. J.

The fixed condenser is simply connected into the receiving set in such a way that the head telephones simply bridge the condenser. Either may be used. Would advise you to try out each for efficiency, then use the one that seems most satisfactory.

Letters to the Editor

Would Join Radio Pioneers

Editor, RADIO WORLD: In your issue of April 22, I noticed your article suggesting the organization of a Radio Pioneers' Society, and I believe it would be a fine thing. I am especially interested, because I think I could qualify as a member.

I first became interested in radio in 1903, when I was a country telegraph-operator up in Skowhegan, Maine. In 1904, I enlisted in the Signal Corps, being assigned the Fort H. G. Wright, Fisher's Island, Conn., wireless station where we used a 1 kw. Fessenden set with the liquid bar-reter-detector and twenty-wire harp antenna. During my enlistment in the Signal Corps, I was promoted to sergeant and operated about all of the makes of sets in existence at that time, including De Forest, Massie, Stone, Clark, Shoemaker, Telefunken and Sloby-Arco.

My next job was with the United Wireless Company in the AX station at Atlantic City, N. J., also on the cable-repair ship, "Relay."

In 1910, I went with the De Forest Company as operator in the Metropolitan Tower station. While there, I operated the receiving instruments for Hudson Maxim and several New York City officials so they could listen to Madame Tetrassini sing over Dr. De Forest's phone-set in the laboratory on Park Avenue. I was also given credit by the New York papers for establishing a world's record for overland transmission when we sent a message direct to Milwaukee, Wis., from the editor of the New York "Herald," to the editor of the Milwaukee "Sentinel."

During the summer of 1910, I was one of the construction engineers installing stations for the Great Lakes Radio Telephone Company, and was just finishing the installation of their Sault Ste. Marie, Michi-

gan, station when they stopped operations completely. After that, I worked for Walter Massie a short time, but finally decided that there was a broader field for me in power-plant work. But I have never been able to get the radio bug out of my system. I am now employed as radio engineer with the Bear Cat Battery Service, Lemoyne, Pennsylvania.

I shall watch your future editions for further information of the Pioneers' Society; and if my qualifications will permit, I want to be on the list of members. —Charles C. Heselton, Bear Cat Battery Service, Lemoyne, Pennsylvania.

Another for Mr. Garrick

Editor RADIO WORLD:

Who is this Ralph Garrick whose wail greets us from the inside cover? Did somebody step on his pet corn badly?

Ralph must take great pleasure in living and I suppose would like a large slice of the ether preserved for his use.

I will admit that I am only a "ham." Six weeks ago, I didn't know that radiotelephony existed except in the experimental stage. To-day I have four different receiving outfits and can read and send code fairly well for a "ham."

Some of the rest of us might ask Mr. Garrick just how the public would benefit by the most meritorious work of the worthy amateur if all broadcasting was eliminated.

Possibly my education and business experience have been so limited that it is I who am taking the narrow-minded view; but if the condition is the reverse, we might suggest that Mr. Garrick go to some other country that is doing more for the amateur than is the United States. A man cannot be wholly selfish in this world. —H. D. Abbott, New York City.

A Bit of Radio Gossip

Editor, RADIO WORLD: *** You were mistaken about it being only thirty minutes that the steamer "America" "talked to land." I heard them talking about two hours. Also, that week—Wednesday, Thursday, and Friday nights—the "America" was talking to land stations, principally QXY.

For a little bit of gossip: A great deal was said about someone on the "America" sending "Ethel," in New York, a kiss. I did not hear that kiss, but I heard a fellow whistle from the ship to land.

And, that time, I heard this man tell "Ethel" what he brought her from Paris. This was the conversation:

"Hello, Ethel!"

"Hello, Charles!"

"Your voice doesn't sound natural, Ethel."

"I have a cold, Charles."

"I have brought you the latest thing in porter, from Paris, Ethel."

"I'll see you in the morning, Charlie."

I wonder which she likes best—wireless kisses or porter from Paris?—Fred Conant Epping, New Hampshire.

He Likes Westinghouse

Editor, RADIO WORLD: I have just been reading the letter from Ralph R. Garrick in RADIO WORLD, No. 4. I must say that I agree with him in all things he says but one, and that is in regard to what he calls "Wonderful Westinghouse."

Well, it is a wonderful receiver. I would like friend Garrick to know that I have copied stations from every district but one—the 7th. The 8th and 9th, he speaks about "roar in" all over the room. I handle traffic with 1, 2, 3, 4, 8, and 9 every night, and have cards to show for it.

I wonder if friend Garrick knows that "ole" IZE uses a "RC" Westinghouse?

Lets hear from other DX men who use the "RC."

I have been interested in the game for seven years, and have had a set since the days of the lil ole galena and loose coupler.—D. B. Fancher, Radio Station, 1 BVB, Westerly, Rhode Island.

Chicago Elevated Roads to Use Radio



(c. Underwood & Underwood)

If the present plans of the Chicago Elevated Railroad do not miscarry, the patient straphangers will gladly pay the present fare. The elevated is figuring on installing a radio system on its lines to furnish passengers with news. The photograph shows a radio equipped train under test.

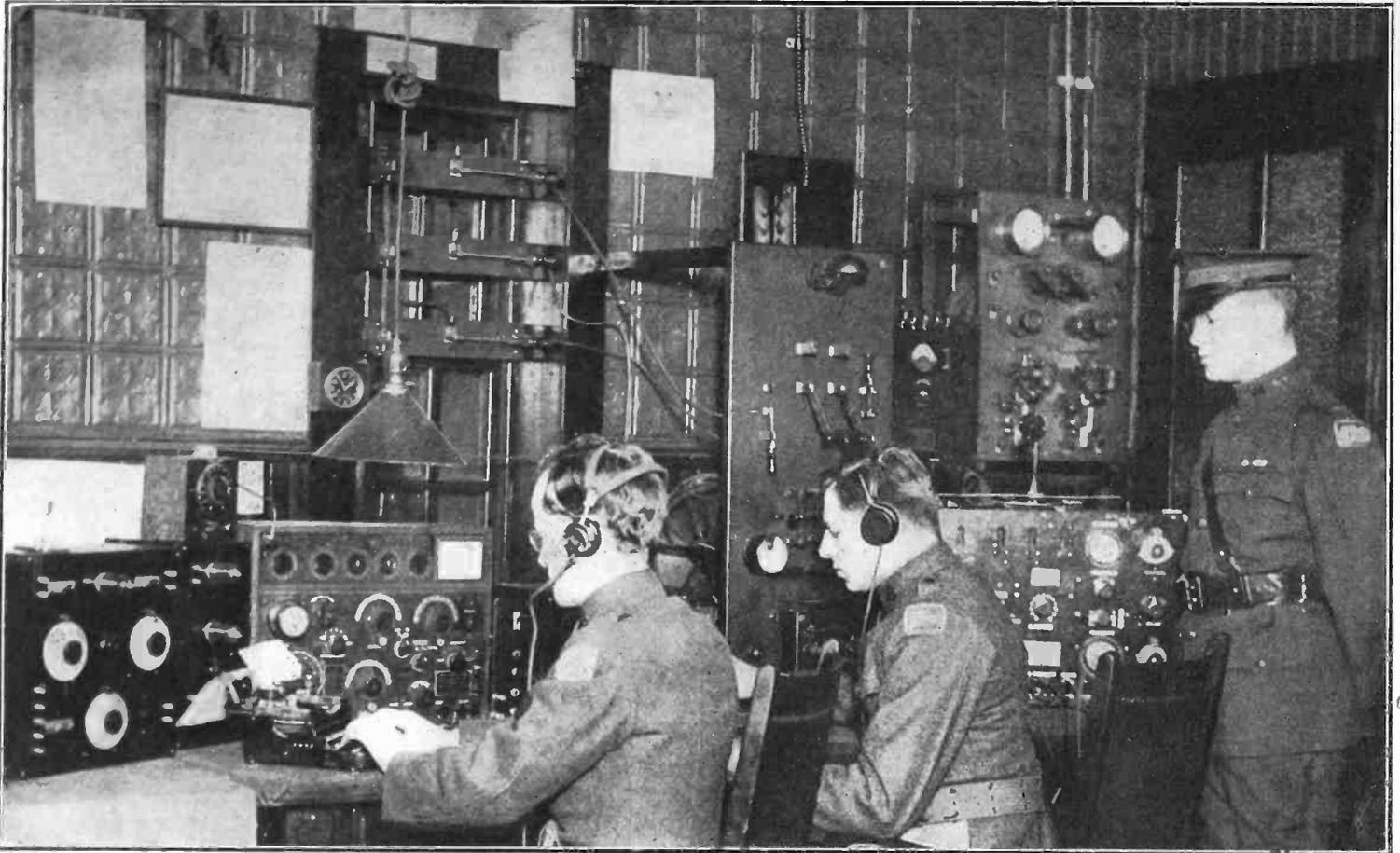
We'll Not Overlook Him

Editor, RADIO WORLD: Our school is one of the largest in the world, and many of our radio "bugs" read your paper because it is written so they can understand it. Inasmuch as there are more young people than adults with minds sufficiently plastic to take up radio work, your paper will prosper in the radio it can hold the young people up to high-school and college age.

Such articles as those in The Radio Primer are needed to make your paper invaluable to the millions of radio "bugs." Young people are hungry for information and they have the plasticity of mind to take it up. As a teacher, I talk from experience. I know any number of prosperous businessmen who have spent upwards of \$50 for radio apparatuses, but are already tired of radio because they have neither time nor inclination to go deep enough into it to really understand. Therefore, look out for the American boy. There are millions of him.

—Dr. H. V. Bucher, Teachers Council of the Elijah D. Clark School, 425 E. 145th Street, New York City

Radio Class, 101st Signal Corps, N. Y.



(c. International Newsreel)

Interior view of the radio station at the armory of the 101st Signal Corps, N. G. N. Y., showing a complete radio equipment. Operators copying various messages under the supervision of Lieutenant H. G. Martin, who is standing.

THE combination of national military service and expert radio-instruction is now offered by the 101st, Signal Corps, New York National Guard, at its armory, Park Avenue and Thirty-fourth Street, New York City. This organization has drawn scores of amateur operators into its ranks. Classes are conducted regularly. The men are instructed thoroughly in the theoretical and practical problems of radio and Morse telegraphy. Instructors who have qualified as experts in their respective lines, are in charge of the various classes; and the men of the battalion are enabled, therefore, to enjoy the best instruction and training. While the chief interest lies in the radiotelephone, no opportunities are overlooked to provide those who wish an extensive course in Morse telegraphy which offers excellent remunerative positions.

The 101st, Signal Battalion, is part of the second corps area which operates from Fort Wood, Bedloes Island, is fully equipped and able to offer the most thorough and intensive course of instruction, free of charge. When the men are declared proficient, they are assigned to operator's duty at the transmitting and receiving sets that

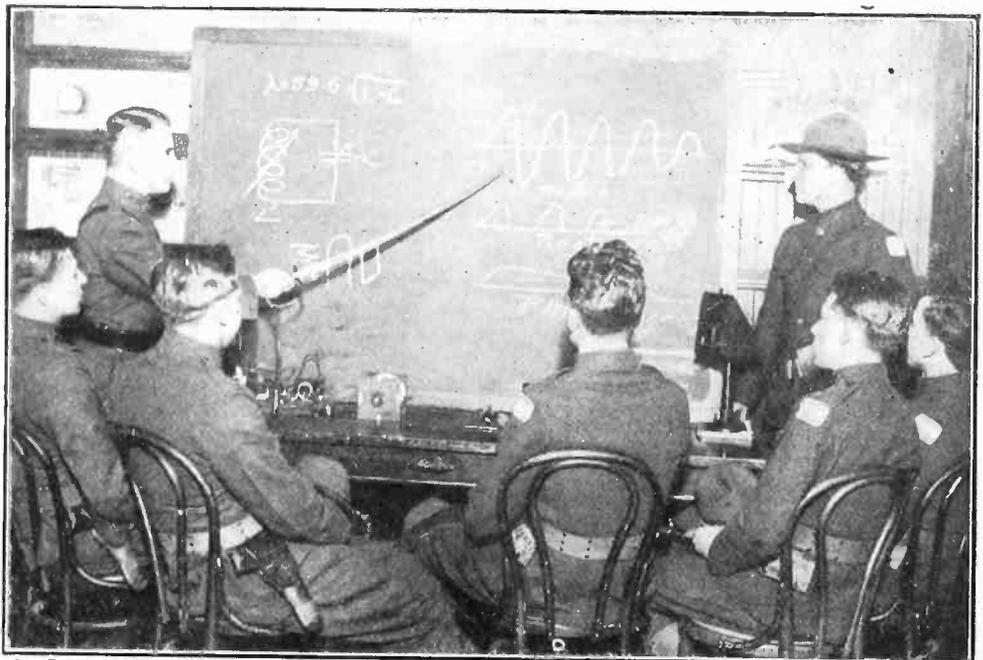
comprise part of the battalion's equipment.

Captain Gorman, the officer in charge, states that besides instruction in radio, enlistment in the National Guard units carries with it many other opportunities.

Members of the National Guard units are free to experiment with the

modern equipment furnished by the war department. Located in the tower of this armory is a workshop where the men may construct any part of apparatus that may be wanted.

The armory is open every Wednesday evening to the public. Concerts are received from the various broadcasting stations.



(c. International Newsreel)

What Uncle Sam is doing in radio instruction can be seen here. Lieutenant Martin telling a class about the underlying principles of radio communication.

Radio Merchandising

Look the Way You are Going

By Fred S. Clark, Business Manager Radio World

If you are going forward—look forward. Look for new customers, and more of them. Suppose you have more orders booked now than you can fill in a month, what does that mean?

Present radio orders are fictitious. If I want, say, an audion-bulb tube, and find my nearest dealer "sold out," I keep going to possibly a dozen places till I get it, thereby making a demand for a dozen tubes while only one is really wanted.

Most every manufacturer is doubling—quadrupling—output. New radio companies and factories are springing up like mushrooms. In a few days or weeks the market will be flooded with radio equipment.

"Bull Durham" knew they couldn't fill an order during the War but that did not stop them from advertising—and get this: they have since found out that it paid them big to advertise when they knew they couldn't fill an order for a year.

Now is the time to look forward; make your name or brand known now. Does Mr. Wrigley stop advertising because he has taken more orders for gum this week than he can fill next? Did Mr. Douglas stop showing his picture, or the Smith Brothers deprive us of admiring their whiskers just because leather was scarce or sugar unobtainable?

Listen, brother! Now is the time to create good will, to look the way you are going, to look forward, to advertise, for all advertising is cumulative. It's the everlastingly keeping at it that brings success. I quit buying cheap hats and now wear a "Stetson," but it took Stetson years of advertising before he "sold" me. Think this over. All those who have kept right on advertising both in good times and bad are millionaires today. Try it, and you will be one too.

Must Kill Certain Evils

Editor, RADIO WORLD: Every week a copy of RADIO WORLD is put on the writer's desk for both present and future reference. We sell a number of your magazines getting them from the News Supply Company.

We began the sale of radio in the years when the customer's query was "Will it get Arlington," and the sales in a year, then, were less than a poor month now.

Owing to the scarcity of "good receiving sets," we feature the books dealing with the "make 'em" radio. The magazine best-sellers are those that tell how to make 'em. They sure do eat up books and magazines.

We also feature all the parts that enter into the making of receiving sets and these parts are many, both little and big, cheap and expensive. It takes one man's time to keep all the parts in stock. There is a scarcity in parts, also, but this is catching up just a little.

With these parts we give a lot of free advice.

Strange as it may seem, the selling of parts seems to help the sale of the ready-made receiving sets.

We think your idea of a dealers' association or organization is excellent. The mushroom growth of the last few months while bringing abnormal sales, at the same time has brought with it certain evils that must be done away for the good of radio.—Smith Novotoy Electric, Inc., by S. J. S., Charlotte, N. C.

New Dubilier Corporation

Wall Street hears there is to be formed a new corporation to be known as the Dubilier Condenser and Radio Company, according to the New York "World," to take over the Dubilier Condenser Company, the Federal Mica Company and the Cambridge Manufacturing Company, all now controlled by William Dubilier, inventor of the condenser bearing his name and in use on most of the wireless telegraph instruments.

The new company will manufacture condensers and other accessories utilized in radio operations. Its proposed capitalization is \$500,000 of 8 per cent. non-cumulative preferred stock of a par value of \$100 a share and 160,000 shares of no par value common stock.

Chicago Show, June 15

Milo E. Westbrooke, of Chicago, announces that he will conduct a radio show in that city from June 26 to July 1. The show will be held in the Leiter Building. In addition to manufacturers' displays there will be shown the initial parts necessary for the beginner to put together the "Junior Radiophone." Demonstrations will be given daily on receiving and sending that the working parts may be understood.

Ford Places Big Order

SAN FRANCISCO—Henry Ford, by telegraph, placed an order for "a large amount" of radiotelephone supplies with a San Francisco firm. No indication was contained in the telegram as to the exact use Mr. Ford would make of the supplies.

Buffalo is a Broadcaster

A new broadcasting station started operations in Buffalo on April 15. It is the first broadcaster in Western New York. The station will be operated by Edward Streigel with 360-meter wave length and will broadcast news over a radius of about 30 miles.

Big Growth in Radio

One concern expects to do a business (in radio equipment) of well over \$50,000,000 this year, judging by the returns of the past few months, says "Scientific American." There is an everincreasing demand for vacuum tubes; it is estimated that by this writing 75,000 tubes are being turned out a month, and that by the time this

reaches the reader, the production will probably exceed 100,000 tubes per month. Authorities in and out of radio are of the opinion that the radio business as it is now developing is going to be greater than the phonographic industry, which has been doing a business in excess of \$400,000,000 per year.

Communicate with Them

Editor, RADIO WORLD: I am very much interested in developing some special uses of high melting-glass for industrial purposes, and am anxious to get in touch with large manufacturers of radio apparatus so that I can find out their views on the possibility of utilizing such glasses in radio work. I shall be obliged if you will forward me the names and addresses of manufacturers of the more expensive types of radio equipment.—A. E. Marshall, 3034 St. Paul St., Baltimore, Md.

Editor, RADIO WORLD:—Will you kindly furnish us with the names and addresses of a few of the largest dealers in complete radio equipment who would probably like to place agencies in Europe for their equipment. We are desirous of representing some reliable firm in Europe.—Thos. L. Garrett, 1112 East Main St., Richmond, Va.

Oidar Making Deliveries

OIDAR RADIO MANUFACTURING CORPORATION, 508 West 55th Street, New York City, is now in production on their "Oidar" variable condensers and are making deliveries to dealers and jobbers. The manufacturers claim for the "Oidar" condenser many features worthy of investigation. This company contemplates the manufacturing of a complete line of parts in the near future.

New Radio Firms and Corporations

Redifone Corp of America, Manhattan, make wireless specialties, \$10,000; M. L. and J. A. and R. P. Zobel. (Attorney, D. Harrison, 220 Broadway, New York.)

Radio Equipment Corp., Philadelphia, \$5,000. (Corporation Guarantee & Trust Co.)

Albany Radio Corp., Albany, \$10,000; J. L. and L. W. Gately, K. E. Donovan. (Attorney, L. Silberman, Albany, N. Y.)

Simon Radio Corp changes name to Ray Phone Radio, New York.

Radio Manufacturing and Rental Corp. changes name to Houck Radio Manufacturing and Rental Corp., Wilmington.

Goodhand, Smith & John changes name to Goodhand, Buckel & John, New York.

World Radio Club, Wilmington, Del., for study, \$500,000. (Colonial Charter Co.)

Sun Radio Manufacturing Co., Manhattan, \$5,000; M. H. and S. Spielman, V. Spence. (Attorney, A. B. Friedman, 38 Park Row, New York.)

A. & A., Radio Supplies, 1244 Gates Avenue, Brooklyn, N. Y.

Virginia Auto Supply Co., Richmond, Va. Distributors and jobbers in radio material.

(Continued on next page)

RICHMOND ELECTRIC CO.

Auto, Electric and Magnet Wires, Electrical Specialties
Wholesale Only
181 McDougal St.,
Brooklyn, N. Y.

FOR IMMEDIATE DELIVERY
No. 22 Enameled Magnet Wire, 35c. lb.
On full spools. (7 to 12 lb.)
F. JOS. LAMB COMPANY
1970 Franklin St. Detroit, Mich.

Special Dealer Proposition

on

Federal Juniors and all Radio parts and apparatus. Very comprehensive stock on hand.

**SIGNAL SYSTEMS
SERVICE CO.**

1 E. 42nd St., New York City

WOLVERINE AERIAL

ELIMINATE OUTSIDE AND INSIDE WIRES
Attach the Wolverine Aerial to any electric light socket in your home and receive good results from your receiving set. Fool proof and no danger. It comes ready to use; just screw into light socket and connect to aerial post of set. Save cost of wire and lightning switches. Will operate on blub or crystal sets. Guaranteed to give good results. Price \$3.50, postpaid. (\$4.00 west of Rockies.)
Dealers and Agents Wanted
WOLF RADIO COMPANY
205W Scherer Bldg., Detroit, Mich.

IMMEDIATE DELIVERY

Discounts to jobbers and dealers
AERIAL WIRE.

19 strand tinned silicon bronze
VARIABLE CONDENSERS

11-21-23-43 Plate

EISEMANN HEAD PHONES

Super-sensitive

Variometers Variocouplers
Binding Posts Contact Points

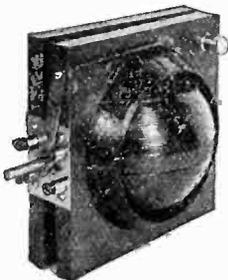
**"ECHOPHONE" LOUD
SPEAKER SETS**

General Auto Electric Co.

281 Halsey St.,
Newark New Jersey

DEPENDABLE

TESCO LINE



Unmounted
\$6.50

Panel
Mounted
\$8.50

No. 41 Precision Variometer

Mail Orders Filled From Stock

DEALERS: Write for Bulletin, R-10

Manufactured by

The Eastern Specialty Co.

3551 N. 5th St., Philadelphia, Pa.

(Continued from preceding page)

Clarkson Radio Equipment Corp., changes name to Radio Picture Corp. of America.

Visualtone Corp., changes name to Visualtone Company of America, Philadelphia.

Queens Radio Co., Winfield, Queens Co., \$10,000; S. A. Barone, J. Diblasi, G. J. Maggi. (Attorney, O. H. Droege, 47 West 42nd St., New York.)

Rosemark Radio Corp., Manhattan, radio outfits, \$10,000; L. Markowitz, J. Rosenbaum, L. Soff. A (ttorney, J. Krinsky, 320 Broadway, New York.)

Wilmington Electrical Specialty Co., apparatus, \$50,000; Willard S. Wilson, Frederick R. Gooding, Joseph H. Gooding, Wilmington. (The Company, Wilmington, Del.)

Larney Smith Radio Mfg. Corp., Man- nington, Del., equipment, \$100,000. (Colo- nial Charter Co.)

Liberty Radiofone Co., Wilmington, Del., \$500,000. wireless apparatus. (Corporation Trust Co. of America.)

Larney Smith Radio Mfg. Corp., Man- hattan, \$10,000; T. and A. C. Dunworth, C. Larney. (Attorney, J. J. Sammon, 350 Broadway, New York)

Roberts Radio Co., Brooklyn. \$20,000; G. S. Rice, S. B. McNeil, M. H. Kern, (At- torney, G. H. Boyce, 44 Court St., Brook- lyn, N. Y.)

Paramount Radio Parts and Die Corp., Manhattan, \$10,000; J. and L. Blum, J. Z. Weekly. (Attorney, F. De Vries, 97 Cedar St. New York.)

American Insulator Corp., 52 Vanderbilt Ave., New York.

Butters Horlick Radio Co., 258 Wash- ington St., Boston.

The Wireless Shop, Punxsutawney, Pa. Radio call: 3 AGV.

Pittsburg Radio and Electric Co., 130 Bedford St., Boston.

Consumers' Electric & Radio Co., 558 Knickerbocker Avenue, Brooklyn, N. Y. Dealers of radio parts and equipment.

National Radio Supply Co., 1403 H. St., N. W., Washington, D. C.

A. V. Gregory, 42 Broad Street, Red Bank, N. J.



THE
**HOME RADIO
HOW TO MAKE AND USE IT**

By A. Hyatt Vorrill

At last! A simple explanation of the mak- ing and use of a home radio outfit. Every step in construction is carefully directed and illustrated with numerous working diagrams. Get your copy to-day. Clothbound book.

Postpaid for 75 cents.

Broadcasting Guide, 25 cents.

Radio Educational Service

200 5th Ave., R. 416, New York City

48-plate Variable Condensers (.001 M.F.)	\$6.00
26-plate Variable Condensers (.0005 M.F.)	4.50
11-plate Variable Condensers (.00025 M.F.)	4.00
3-plate Variable Condenser (used as a Vernier)	3.00
Above prices include knob, pointer, and dial. Hard Rubber Panels for above. Immediate shipments from stock. Discounts to Bona Fide Dealers	
F. Jos. LAMB COMPANY 1070 Franklin Street Detroit, Mich.	

**Hard Fibre Parts
For Radio Work**

Also "Varno" Radio Tubing

In diameters from 2 1/2" to 6"
Lengths up to 12"

J. SPAULDING & SONS CO., Inc.

NEW YORK —484 Broome St.
BOSTON — 15 Elkins Street
PHILADELPHIA—141 North 4th St.
CHICAGO —659 W. Lake St.
TONAWANDA —N. Y.

**why is a honeycomb
coil set better?**

read the **RADIO RED BOOK**
25¢ 406 W. 31st St. 25¢

KEYSTONE VARIABLE CONDENSERS

21 Plate
\$3.80

43 Plate.
\$4.75

Our selection of materials and built-up type design give assur-
ance of low energy loss and high efficiency.

Agents and Jobbers write for information.

KEYSTONE MOTOR COMPANY

OAKS, MONTG. CO., PA.

EQUIP your receiving set with the Magnavox Radio—the only reproducer constructed on electro-dynamic principle. Write for booklet and name of nearest dealer.

THE MAGNAVOX CO.
Oakland California
370 Seventh Ave., N. Y.

Radio brings it
MAGNAVOX
tells it

ENCO

"B" BATTERY

No wires used in any of its construction

VARIABLE and REFILLABLE

For refills use standard flashlight unit cells **17c**

Enco Electric Novelty Co.

603 W. 130th ST., New York City

20% TO 33 1/3% OFF ON RADIO SUPPLIES

That's the club's motto
CLUB'S OBJECT

Saving of dollars and a united voice to be reckoned with in matters of interest to Radio Amateurs.

Membership fee, the small sum of 25 cents per month.

Membership blank mailed upon request.

CORUBIA ELECTRICAL PURCHASING CLUB

145-147 East 23rd St.,
Bet. Lexington & 3rd Ave., N. Y. C.

THE BEST PROTECTION AGAINST LIGHTNING

"JACOBUS" VACUUM



TYPE J. S. W. AERIAL PROTECTOR

This improved lightning arrester is absolutely positive, efficient protection against the heaviest lightning storms. Approved by the National Underwriters to replace lightning and ground switches. Its simplicity, easy installation and forget-proof feature recommends it especially for the amateur.

ELIMINATES SWITCHES

Receiving stations with JACOBUS Protectors do not require lightning or ground switches. Protection every minute of the day and night. No worry about throwing switches.

GOOD FOR INNUMERABLE DISCHARGE

Discharges of lightning or static on the JACOBUS do not affect its life. After conducting a discharge to the ground, the tube is ready for another operation. Does not weaken or in any way affect the efficiency of the set.

\$2.00 From Electrical Dealers
Sent Direct

APEX ELECTRICAL SPECIALTY CO., Inc.
77-B Orange St., Newark, N. J.

Do Insects Know Radio?

We humans who have looked upon the insect world with tolerant pity are to be roughly awakened in this boasted era of civilization, says the New York "World," for it appears that even the lowly lightning bug and cockroach have for eons and eons been on terms of contemptuous familiarity with the greatest wonder of modern science.

Supercilious homo sapiens flatters himself that only he can talk to his kind across the ether. But it is now declared that when Marconi staged his first successful experiment, one lightning bug, spreading his antenna-feelers, radioed to his mate, "Well, the poor boobs have learned the trick at last."

And a cockroach, attuning himself to the proper wave-length, called back, "Hear! Hear!"

Hamilton Bailey of Peoria, Illinois, a navy wireless operator in the war, yesterday announced that it's radio that makes the lightning bug light; and in Harrisburg, Pennsylvania, Howard Zimmerman, National Guard Sergeant, Major, disclosed the cockroach's secret.

Bailey's discovery is this: Lightning bugs are equipped with miniature audion bulbs, a broadcasting apparatus, low radio-frequency and a short wave-length. The feelers are the aerial and the result is a radio light signal station.

As for the cockroach, Zimmerman made his discovery in his barracks in Luxemburg—that's the sort of barracks they were. Experimenting at night school with a quarter-meter wave-length, he found a cockroach with a wave length of half an inch and a very low frequency interfering with the human apparatus.

Further investigation, Zimmerman says, revealed that the despised insect is quite a little electric power plant. Believe it or not.

This Advertising Goes Far

Speaking from the Westinghouse Broadcasting Station, at Newark, and using radio for the first time to describe a port and its functions, Eugenius H. Outerbridge, chairman of the Port of New York Authority, declared that the projects now under way for the development of the Port of New York, "should command the sympathy, the interest, and the support of the vast number of people who will share in the benefits to be accomplished." He said that the Port of New York had a personal significance to all in the invisible audience to which he spoke, no matter in what State they lived. The keynote of his address was the service that New York renders to the entire nation, and he emphasized its position as the center of distribution and the world's biggest market.

Be sure to get Radio World every week so you can bind your 52 numbers into one volume. Subscribe. \$6.00 yearly; \$3.00 six months; \$1.50 three months. (Adv.)

do you know how
to test a crystal?

read the **RADIO RED BOOK**
25¢ 406 W. 31st ST. 25¢

—FOR IMMEDIATE DELIVERY—

We offer the following items of our own manufacture:

Variable and Fixed Condensers.

Mounted Crystals. Crystal Detectors.

Distributors for—Grebe, De Forrest, Federal, Acme, Thordarson, Fada.

WHOLESALE ONLY—LARGE STOCKS
RADIO SHOP of NEWARK

(Telephone Market 9607)

41 SOUTH ORANGE AVE.

NEWARK, N. J.

Dealers: Forward Your Inquiries Promptly

RADIO INVENTIONS and other ideas promptly patented by reliable Patent Attorneys & Engineers. Call or write. FREE ADVICE.

ASK **MANUFACTURERS PATENT CO.** FOR 520 FIFTH AVE. NEW YORK

BOYS DO NOT FAIL

To obtain your copy of these instructions. Worth many times the small amount we ask. How to construct a variometer, how to construct a variocoupler and an amplifying transformer. Detailed instructions of either for fifteen cents or put four dimes in an envelope and get the three with diagrams of connections for your set. Save money by constructing your own. We have left no details to guess about. We enclose list of all parts how much of each to get and where to obtain same.

Newco Radio & Electrical Supply Co.

Stratford, Conn.

DEALERS

We can make prompt shipments on

Variometers	Crystals
Variocouplers	Crystal Detectors
Switch Levers	(enclosed)
Variable Condensers	Pony Insulators
(23-43 Plate)	Fixed Condensers
Switch Points	Radio Plate

CLARK & TILSON

51 East 42nd Street

NEW YORK CITY
Tel. Vanderbilt 5462

NOVO "B" BATTERIES

FOR YOUR RADIO SET

All standard sizes 22½ to 105 volts.



For Sale by Leading Dealers

NOVO MFG. CO.

NEW YORK—424-438 W. 33rd St.
CHICAGO—531 So. Dearborn St.

HAYNES TESTED EQUIPMENT

This is an exclusive radio shop. We sell nothing else. For honest values and satisfactory results call on us.

The HAYNES RADIO Shop
629 Lexington Ave., New York
At 54th Street Plaza 6301

100% BETTER RESULTS WITH

"AEROPLANE" WIRE For Aerials

19 strand silicon bronze—each strand tinned.

The Wire used by the U. S. Army and Navy during the War.

HOOK UP BLUEPRINTS

These prints are clearly drawn and each is accompanied with instructions in plain English so that any layman may readily understand them.

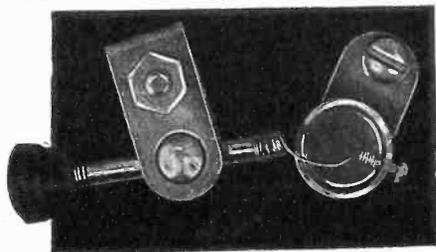
Dealers Write For Proposition.

HINTZE BROS. Inc.,

459 CENTRAL AVENUE
NEWARK, N. J.

LOOK

The "Junior" Crystal Detector



THESE

CRYSTAL DETECTORS

Are The Very Best For Constant Satisfactory Results.

Lowest of All in Price

Dealers and Jobbers Write For Proposition

WALTER H. SAMUEL

400 BELLVILLE AVE.
Bloomfield, New Jersey

RADIO WILL MAKE YOU MONEY

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

\$1.00 Per Share

Books Now Open for Subscriptions.

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

G. BOISSONNAULT CO.

26 Cortlandt St., New York.

The New Sport

THERE is a new indoor sport. It is that of forming radio companies, says the New York "Mail." Each week develops a new group. Ninety per cent. of them have the popular Delaware charter.

It has been said that when Greek meets Greek they start a restaurant. Nowadays, when promoter meets promoter they start a radio corporation. During the past week the writer saw several notices of incorporations that mentioned such ambitious figures as ten, fifteen or twenty millions. What is ten or fifteen millions? Nothing in the life of a good promoter.

Tons and tons of stock promotion literature are being dropped in the mail daily. Shares are selling for a few cents, so that "nobody can afford to miss this golden opportunity."

The editor warns his readers to investigate the claims of some of these new corporations very carefully before investing money in any of the stock.

Some people get unduly excited when they see a few patent papers. The patent is the most important weapon of the promoter. It gives him something convincing to talk about.

Navy Designs Amplifier

Edwin Denby, Secretary of the Navy, announces that the Bureau of Engineering of the Navy Department has finally arrived at a successful design of a universal amplifier for radio communication and similar purposes.

While the amplifying qualities of the three-electrode vacuum tube have long been known and used; yet, heretofore, the amplifiers obtainable would only amplify incoming signals over a narrow band of wave lengths. In the Navy, as well as with other users of radio equipment, it is desirable to have apparatus which will receive over a very wide range of wave lengths. The amplification should be as strong in one region of wave length as in another if it is to be universal or serve a wide range of communication.

Some time ago, the research organization of the Navy was directed to give special consideration to the problem of a universal amplifier, with the result that Dr. J. M. Miller, of the Navy's Radio Research Laboratory in Washington, recognized that the application of certain principles would solve the problem, and his theory in this matter has been verified by the construction of a six-stage amplifier which gives practically the same amplification from a lower limit of several hundred meters to an upper limit in the neighborhood of 20,000 meters.

have you the symbols & abbreviations?
read the RADIO RED BOOK
25¢ 406 W 31st ST 25¢

ATTENTION AMATEURS!

Special Offer for this week
Aeriola Sr. with 2 batteries and Complete Antenna Equipment\$71.75
Loading Inductance (tapped) 2.45
Dials00

Butters-Horlick Radio Co.
258 Washington St., Boston, Mass.

RADIO CABINETS

Manufactured in any Style, Size or Quantity
A. E. CHERNACK & CO., INC.
314 E. 75th ST., NEW YORK
Phone Rhinelander 2747

DEALERS

Send for free samples of our Window Display Signs and Cartoons featuring RADIO EQUIPMENT.

Attractive, snappy result getters.

Merchants Signs Service Co.,
48 Zabrlskio St., Jersey City, N. J.

RADIO SUPPLIES RADIO SUPPLIES
We Carry a Full Line of RADIO GOODS

Head Sets, Vacuum Tubes, Vario Couplers, Variometers, Transformers, Tuning Coils, Dials, Knobs, Bakelite Panels, Phones in stock.

Radio Sets Made to Order. Aerials put up.
SUNBEAM ELECTRIC COMPANY
71 3rd Ave., Bet. 11th & 12th St., New York
Phone Stuyvesant 2890 Estab. 12 Years

PAPER TUBES FOR WIRELESS

ALL SIZES ON HAND FOR IMMEDIATE DELIVERY WHOLESALE AND RETAIL
BAEHM PAPER CO., INC.
219 FULTON STREET NEW YORK
Bet. Church and Greenwich Sts.

URSA MARK

RECEIVING SETS
PARTS and SERVICE
FOR DEALERS and PUBLIC

Write us for what you want. Mail orders given prompt attention

UNIVERSAL RADIO SERVICE ASSOCIATION

300 MADISON AVE., DEPT. A.
NEW YORK CITY

Manufacturers'

Distributers of Everything

RADIO

REX RADIO SALES CORP.
1452 Broadway, New York

RADIO WORLD'S QUICK ACTION CLASSIFIED ADS

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

The rate for this RADIO WORLD QUICK ACTION CLASSIFIED AD. DEPT. is 5c. per word (minimum of 10 words including address), 10% discount for 4 consecutive insertions, 15% for 13 consecutive insertions (3 months). Changes will be made in standing classified advs., if copy is received at this office before 4 P. M. on any second Tuesday preceding date of publication. RADIO WORLD CO., 1493 Broadway, New York City. (Phone, Bryant 4796.)

"Superior Radio Sets" Consisting of inductance tuning coil, with 2 ten point switches, 23 plate condenser with Electro Dial, latest improved crystal detector, and many other new features. Mounted on 3/16" Radion Panel, grained mahogany finish, in handsome cabinet, \$25.00 without phones and aerial. \$30.00 with No. 56 Murdock double phones. Audion Detectors, Amplifiers and Parts. Quick factory shipments. 50% cash with order, balance C. O. D. Light Metal Products Company, 512 East 137th St., N. Y.

SOMETHING NEW

Keep a complete file of your Radio programs—your comments—your company—with the Radio Daily Record—100 only .50c.—postpaid. Radio Record Store, 247 West 47th St., New York.

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

Build Your Own Radiophone.—Send ten cents for Instruction book. Radio Service Institute, U. S. Bank Building, Washington, D. C.

Fifty (50) of the best and most popular vacuum-tube hook-ups profusely illustrated and described. By mail prepaid 25c. D. Rosenstein, 387 Williams Ave., Brooklyn, N. Y.

Unassembled Variocouplers—\$1.50. No. 24 enameled Wire per 1/2-lb. spool, 65c. Open 5 to 9 P. M. 2 Flights up, F. W. Camarda, 3316 Church Ave., Brooklyn, N. Y.

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

Have You a Radio Set?—If not try my system in getting one. I sell at reduced prices, batteries, tools, sporting goods, merchandise of all kinds. Try me. Anderson, 340 Park Ave., N. Y.

We buy your Radio goods. Head sets wanted. Radio Shop, 1246 Gates Ave., Brooklyn, N. Y.

We Buy second hand radio goods, any description. Columbus Shop, 874 Columbus Ave. (103d). Open evenings to 10 o'clock.

Wanted.—A few Western Electric VT-1's, VT-2's and head sets for use in our laboratory. Must be perfect. State quantity and lowest price. Reading Radio Shop, Box 6, Reading, Mass.

Wanted.—Men—Boys over 17. Become Railway Mail Clerks. Commence \$133 month. Common education sufficient. List positions free. Write immediately. Franklin Institute, Dept. E 152, Rochester, N. Y.

Wanted for spot cash. High grade Radio outfits, parts, attachments and materials of standard makes. No home made apparatus will interest us. Address F. J. Lamb, 1938 Franklin St., Detroit, Mich.

Enclose self-addressed envelope and receive free illustrated bulletin of 22 up to date Blueprints of Receiving and Transmitting designs. We are the largest firm in the country specializing solely in Blueprints. Number 349 gives full constructional and other data for building Crystal Receiver for only \$5.00. Ask for bulletin 44. Experimenters Information Service, 45 Pinehurst Ave., New York.

Bargains—Camara, \$3; Chuck, \$4; \$50 Cornet; \$28 Mele; 39 Foxom. East Haven, Conn.

Look! Supersensitive Galena! The wonderful mounted crystal. Buy the best. Satisfaction guaranteed. 50c., postpaid. Superadio Laboratory, Detroit, Michigan.

AMERICAN MADE TOYS

Manufacturers wanted for large production and home-workers on smaller scale for Metal Toys and Novelties, Toy Soldiers, Cannons, Cowboys, Indians, Buffalo Bills, Wild Animals, Whistles, Bird-Whistles, Race-horses, Prize-fighters, Wag-tail Pups, Barking-dogs, and hundreds of other articles. Hundreds and thousands made complete per hour. No experience or other tools needed. Bronze casting forms complete outfit from \$5.00 up. We buy these goods all year, paying fixed prices. Contract orders placed with manufacturers. Exceptionally high prices paid for painted goods. An enormous business for this year offers industrious men an excellent opportunity to enter this field. Write us only if you mean real business. Catalog and information free. Metal Cast Products Co., 1696 Boston Road, New York.

100 ft. 7 strand Copper Aerial Wire	.....\$ .71
100 ft. Hard Drawn Coper Aerial Wire	..... .49
Aerial Insulators	..... .23
Nickel Plated Binding Posts	..... .04
22 1/2 Volt small "B" Battery	..... .90
22 1/2 Volt large "B" Battery	..... 1.40
22 1/2 Volt large variable "B" Battery	..... 1.90
45 Volt double size Variable "B" Battery	..... 2.80
Nickel Plated Constant Points	..... doz. .20
Nickel Plated Switch Arms	..... .57
Branch Lightning Protectors	..... 2.37
Porcelain Vacuum Tube Sockets	..... .56
1/4 inch Slider and 10 inch Rod	..... .45
Coils wound on Tube	..... .75
Crystal Detectors, (N. Y.)	..... 1.20
Mounted Tested Galena	..... .25

LIBERTY RADIO CO.

Church and Liberty Streets, New York City, N. Y.
Phone Rector 3432

"Radio inventions of merit developed or financed."
H. William Baer, 162 Wood St., Waterbury, Conn.

Have Radio World sent to your summer Home

If you are moving to the country, be sure to have RADIO WORLD sent to your summer address. Subscribe now, and, in doing so, instruct our subscription department to have RADIO WORLD sent for the coming few weeks to your town address and then to your country home, during the summer. \$6.00 a year; \$3.00 for six months; \$1.50 for three months. RADIO WORLD CO., 1493 Broadway, New York City.

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 the paper for one year, and start it with our first issue, which will be mailed you as soon as possible after receipt of order. (Adv.)

Subscribe for RADIO WORLD direct or thru your newsdealer. \$6.00 a year, \$3.00 for six months, \$1.50 for three months.

NEWSDEALERS ATTENTION!

Many of your customers will want the first six issues of Radio World. Your wholesaler may have a few copies on hand. Inquire. If you cannot get back numbers write us and we will try to supply you so that your customers will have a complete file of Radio World from the first issue.

If you happen to have a few copies on hand, keep and display them and you will find that they will sell. Very shortly it will be impossible to get back numbers of these earlier issues.

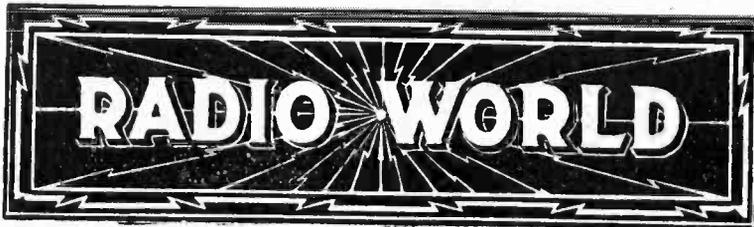
Radio World, 1493 Broadway, New York City.

Subscribe for RADIO WORLD direct or thru your newsdealer. \$6.00 a year,

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 mailed you as soon as possible after receipt of order. (Adv.)

SUBSCRIPTION BLANK



RADIO WORLD CO..

1493 Broadway, New York City.

Please send me RADIO WORLD formonths, for which please find enclosed \$

SUBSCRIPTION RATES:

Single Copy	.....\$ .15
Three Months	..... 1.50
Six Months	..... 3.00
One Year (including Special Nos.)	..... 6.00
Postage Paid.	
Add \$1.00 a Year for Foreign and Canadian Postage.	



Full Line of RADIO Sets and Equipment
 Marvel Receiving Sets. \$15.00
 3-inch Hard Rubber Dials 1.00
 4-inch Hard Rubber Dials 1.50
 Klosner Vernier Rheostats 1.50
 Dealers: Write for Discounts

NEW YORK RADIOPHONE CO.
 32 UNION SQ. - NEW YORK CITY

TRADE **H M P C O** MARK
 Reg. U. S. Patent Office
 MANUFACTURERS "H M P C O"
 DEPENDABLE RADIO PARTS
HEDDEN PLACE MACHINE CO.
 41 Hedden Place
 East Orange New Jersey

points on buying storage batteries
 read the **RADIO RED BOOK**
 25¢ 406 W. 31st ST. 25¢

"WISDOM."

Everything in Radio Is Available Here—We Are Manufacturers and Distributors of High Grade Parts and Complete Equipment.

"It is good business wisdom to place your full requirements with us"

Prompt Shipments Await Your Orders On:

- | | |
|--|-------------------------------|
| "Nerco" 2200 Ohm Phones | Binding Posts |
| Crystal Detectors | Stops |
| Variable Condensers (23 and 43 Plates) | Galena Cups |
| Fixed Condensers | Arm Contact Switches |
| Dials and Knobs | Switch contact points |
| Variocouplers | Insulators |
| Variometers | Magnet wire |
| Rheostats | Tuning coils—with two sliders |
| | V. T. Sockets |

"NERCO" PHONES ON HAND AT ALL TIMES

De Forest Sets Complete Including the M R 6's.
 Federal Sets Complete With Phones.

ASK US about our little set complete with "Nerco" phones

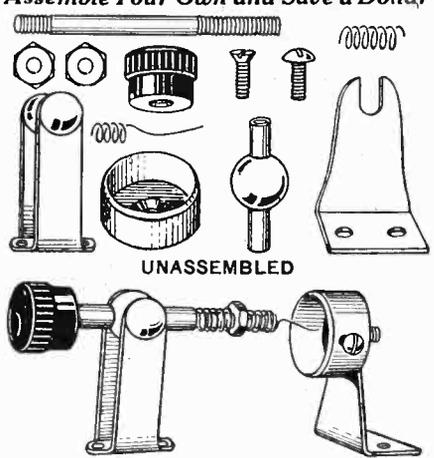
Listed at **\$11.50** It's a Marvel

Without Phones, \$5.00

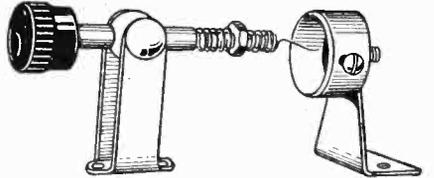
Wiener Wireless Specialty Co.

Telephone—Market 5668
 21 ACADEMY STREET
 NEWARK, NEW JERSEY

"SCOT" CRYSTAL DETECTOR
 Assemble Your Own and Save a Dollar



UNASSEMBLED



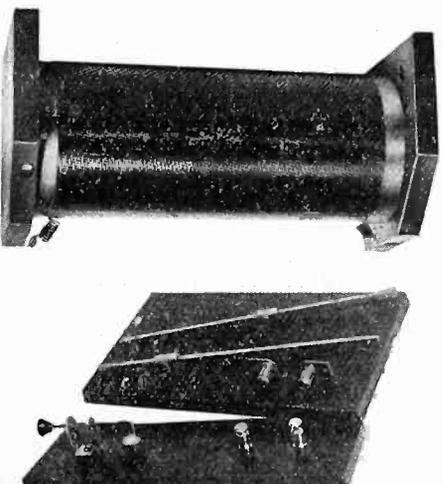
ASSEMBLED

Complete Parts As Illustrated. All Brass, Heavily Nickel Plated **40c**

ASK YOUR DEALER BY MAIL, 45c. NO STAMPS
 Manufacturer, Jobbers and Dealers write or see us for Proposition.

Scot Novelty Company
 33 SPRINGFIELD AVE.
 Newark New Jersey

MORADIO



We Manufacture Moradio Parts and Appliances for Wireless Apparatus

Moreland Sales Corporation
 30 OGDEN STREET
 Newark New Jersey

Loud Speakers \$45



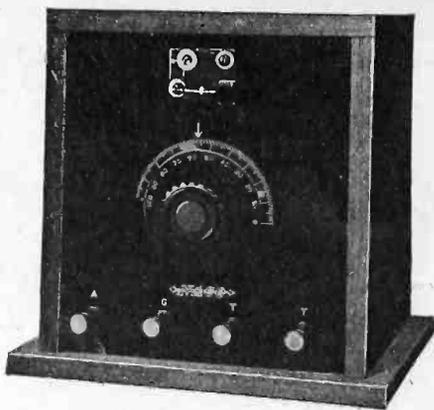
DIALS
 VARIOMETERS
 VARIOCOUPERS
 TELEPHONE HEAD-SETS

Dealers Write For Your Discount

Robin Radio Mf'g., Co.
 47 WARREN ST., NEW YORK CITY

Naco Radio Receiving Sets

\$20.00
complete without
condenser



\$25.00
complete with
condenser

For clear hearing and pleasing tone use a NACO set.

Naco Radio Accessories

Telephones. Knocked down sets. NACO long-distance sets are of the highest quality.

STATE MANAGERS WANTED.

"We are building our radio business for the future, not only for today. Courtesy and discretionate prices prevail"

National Motor Accessories Corporation

Fisk Bldg., Broadway at 57th St., New York City

Combined Tuner and Detector Type D-1 ¹⁵⁰⁻⁸⁰⁰ Metres

Handsomely incased in an Oak Cabinet, and ready to be easily hooked up and used. Specially wired for Voice and Music. Wonderful and efficient control. **\$50.⁰⁰**
Bulbs and Batteries extra

HANDSOME SOLID OAK CABINETS

SPECIALS

- Lightning Switch 600 V. . \$2.50
- Copperclad Aerials 100 ft. .50
- Federal Phones 8.00
- Rotors for Vario Couplers,
60c. up
- Black Metal Dials 3½90
- Moulded Dials 4-inch 1.50
- Moulded Dials 3-inch 1.00



Waxed finish and hinged top

Reinforced Rabbited 3/16 inches

PRICE LIST

7 x 18	.....	\$4.25
7 x 12	.....	3.25
7 x 7	.....	2.25
8 x 10	.....	3.50
6 x 14	.....	3.25
6½ x 19	.....	4.75
6 x 24	.....	6.00
7 x 28	.....	7.00

SPECIAL PRICES TO DEALERS

BEACON RADIO AND ELECTRIC CO.

246 GREENWICH STREET, NEW YORK CITY