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RADIO WORLD

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ILLUSTRATED

EVERY WEEK

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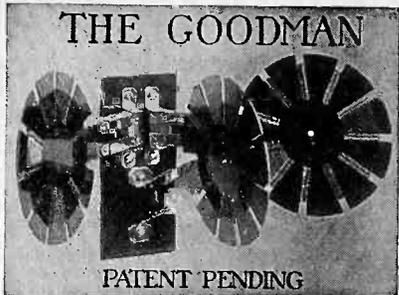


(C. Keystone Views)



(C. Kadel and Herbert)

This composite picture shows how universally people are taking radio into consideration when they plan their vacations. The illustration on the left shows two California girls enjoying a concert while roughing it in the Arrowhead Woods, 70 miles from Los Angeles, California. On the right you can see Peggy Stahl and Rona Oakley getting their set ready up in the Adirondacks, in New York State. Miss Stahl is looking for a likely place to string her aerial, while Miss Oakley is giving the tubes a careful inspection after the ride over the rough mountain roads. No trip to the country is complete these days without a radio set, whether it be a simple crystal receiver or a five-tube set with loud speaker. No matter whether it is a camping trip to the woods or a vacation at one of the large country clubs or resorts, you are always in demand when you bring your receiving set.



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Anybody Can Now Talk to Everybody by Radio

A NEW possibility and another utility of the radio was disclosed at Boston last week when it became desirable for a young man who was away on his honeymoon to return home at once, says an editorial writer in the *New York Times*. His mother had been taken desperately ill, and was pathetically eager to see him, perhaps for the last time. All that was known about the young couple was that they were "somewhere in New England," for, after the manner of their kind, they had veiled in deep secrecy the destination of their nuptial journey. They went away in an automobile and purposed to do all their traveling in it, stopping wherever fancy decided and staying there only as long as they pleased.

With no fixed address, even in their own minds, the prompt finding of the honeymooners would have been, until recently, impossible. Now it could be done simply and easily, and was. Nothing more was required than the "broadcasting" of a message to the bridegroom, telling him the facts. It reached without delay the secluded inn at Lost River, N. H., where he happened to be, not because it was sent there, but because it was sent out of Boston in every direction.

This is "paging" of a sort not even imaginable a few years ago, and obviously in the same way practically anybody in the more civilized parts of the world who wants or is willing to be found can be told without much loss of time that somebody desires to see him. Such calls will reach the far expanses of the ocean as well as of the land, for there are few of either, nowadays, that do not contain at least one instrument for receiving radio dispatches.

And before long, probably, the paging message can be an audible summons—one of spoken words, directly understandable and with the speaker's voice recognizable by the receiver. Then will the once all-conquering element of distance receive a stunning blow and give up the fight.

Already it is possible to get into direct oral communication with a considerably larger fraction of the earth's inhabitants than commonly is realized. Probably there are not more than 1,000,000, if as many, of the 100,000,000-plus people in the United States who cannot be summoned to a telephone, their own or that of somebody else willing in case of need to take the trouble to serve a neighbor. In some cases it might take an hour, or even a day, to "get" the person wanted "on the wire." It would cost money if the distance approached the transcontinental, but the price would not be prohibitive when a serious emergency was to be met or important business was to be done.

There seems to be no present probability that the radio wholly will replace or diminish materially the use of either the telegraphy or the telephony that is done over wires, but radio certainly will supplement both to an extent constantly broadening as the years go on. The prospect is not wholly pleasant to those who cherish the privileges and rights of privacy—of getting completely away, now and then, from their fellow men and women—but on the whole the balance is in favor of progress and change. That is fortunate, for neither can be prevented, and we must make the best of both.

He Had the Right Idea

TEACHER: "Johnnie Jones, explain the meaning of the expression 'multitudinous accomplishments.'"

Johnnie: "Building your own set, getting it to work and then selling it for more than it cost you and havin' the fella tell his friends that it was a bargain."

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VOLUME THREE OF

RADIO WORLD

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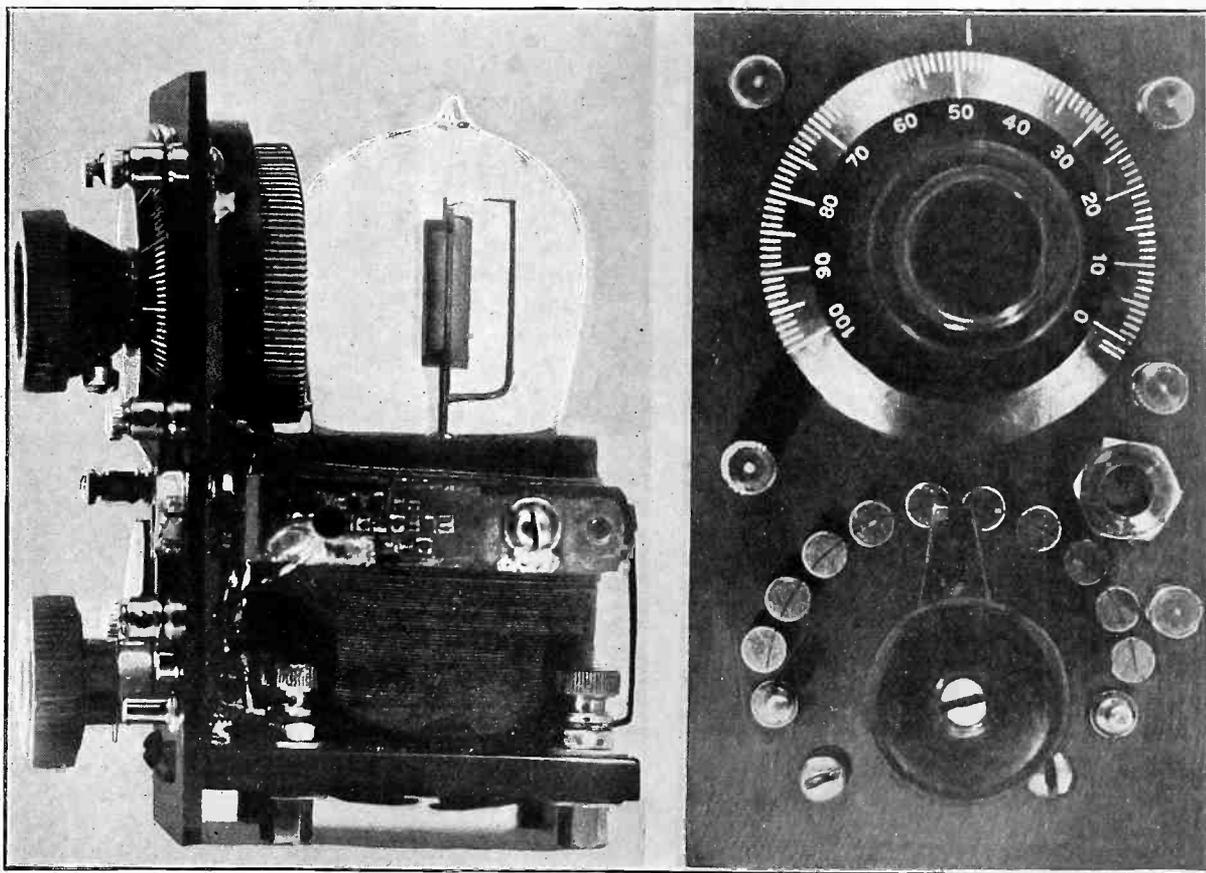
A Midget Set That Gets DX

By Dick Roberts

I HAVE seen several articles on miniature sets, all of them extremely practical and noteworthy. Being of an inquisitive turn of mind I thought I would try the construction of one of the "midgets" to see if they worked, and to satisfy myself that I could make it. Accordingly I determined to make it a tube set, and make it as small as I possibly could without seriously robbing it of its usefulness. The illustra-

The photographs were taken full size and show the construction and placing of all of the apparatus. You will note that the coil is placed over the base of the socket in such a manner that it takes up no more space than would naturally be taken up by the socket and tube itself. This is a feature that should interest the builders of small size sets.

The set uses no condensers or grid leaks whatso-



Two views of the portable midget set constructed and described by Dick Roberts. The illustration on the right is a full size photograph of the complete set, and that on the left is a side view of the receiver showing all the apparatus mounted on the base of the socket.

tion showing the front view is the exact size of the entire set, so you can see for yourself my results.

The panel is $4\frac{1}{4}$ inches high by $2\frac{3}{4}$ inches wide and $2\frac{3}{4}$ inches deep, those being the exact dimensions of the tube socket base. All the apparatus is mounted on the socket and it was all constructed of standard parts.

The coil is wound of 80 turns of No. 28 SCC wire on a tube two inches in diameter. This tube is tapped every eight turns, making a total of 10 taps. The rheostat is a Fada (without vernier) the socket is a Signal and the jack is a Chelten.

ever, none being used in the grid, the connection from the antenna going direct to the grid of the tube, and the plate connection coming direct to the under side of the jack thereby eliminating all wire in the plate side of the set.

I have used this set three nights after 11 o'clock and have heard the following stations loud and clear from Miami, Oklahoma, with no distortion, very little noise and very little trouble from interference. The stations heard were: WOC, WLAG, WHB, WDAF, WHAH, WSB, WGM, WOAW, WFAA, KSD, WMC.

A Long-Range Crystal Receiver

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

THE amateur radio operators of but a few years ago knew of the vacuum tube only as they read about it in the books and periodicals. It was at that time that the crystal set was in its full glory. And, considering the apparatus available, some really remarkable reception was carried on. The writer had a friend living in Brooklyn who picked up the Naval station at Honolulu a number of times, using nothing but a loose coupler set with a crystal detector. A distance of 1,500 miles was not considered uncommon by anyone. Ships at sea, using the comparatively insensitive carborundum crystal, were expected to, and *did*, pick up "press" over distances of 2,000 miles. Today, although not a usual thing, radio fans pick up broadcasting over distances of 500 miles.

The favorite type of set was of the loose coupler variety, for with this arrangement a greater degree of selectivity could be obtained than with the tuning coil. The set to be described is of this type, embodying all the best features of the loose coupler outfit, with the windings designed especially for the broadcast

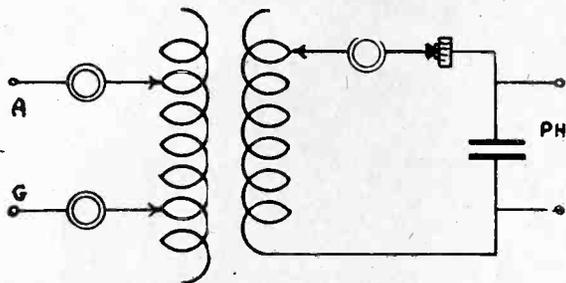


Fig. 1—Circuit diagram to be used with the set described. By connecting a variable condenser across the secondary, greater selectivity and easier control can be had.

wave lengths. Don't, however, imagine that a range of 500 miles is guaranteed—you might get it, but it is quite a sure thing that you will get every good broadcasting station within at least 30 miles.

Purchase an insulating panel $\frac{1}{8}$ -inch thick, $4\frac{5}{8}$ inches wide and $4\frac{3}{4}$ inches long. Also two small rotary switches and 16 switch points, or taps. Another slightly larger rotary switch with 10 switch points is needed for the secondary. About 75 feet of No. 20 S. C. C. wire is needed for the primary winding and 100 feet of No. 26 S. C. C. wire for the secondary. Secure a set of detector parts, somewhat like those shown in the drawing. A phone condenser of from .001 to .003 mfd. capacity, two $\frac{3}{16}$ -inch round brass rods and a set of four binding posts complete the list of electrical parts.

Before the other work is started the panel may be carefully laid out, the holes drilled and the switches, detector and binding posts mounted. The drawings show plainly how this is done.

For the primary and secondary coils two tubes are needed. These may be of cardboard that has been impregnated with some insulating varnish, hard fibre, hard rubber, or one of the phenol condensation products. One tube should have an outside diameter of $3\frac{1}{2}$ inches, and the other an outside diameter of three inches. The walls should be about $\frac{1}{8}$ -inch thick in order to conform with the measurements of the other parts that will be mentioned. The primary, or larger tube, should be four inches long and the other $3\frac{1}{2}$ inches.

Start the winding of the primary tube about $\frac{1}{2}$ -inch from the end and use the No. 20 wire. Wind on smoothly and evenly 72 turns making provision for

taps on each of the first eight turns, and on every eighth turn thereafter. This should make 16 taps in all.

The winding on the secondary tube should be started about $\frac{1}{4}$ -inch from the end and should consist of 100 turns of No. 26 wire. Provision for taps should be made at every tenth turn; this time the taps being taken from the *inside* of the tube. To do this, simply make a very little hole in the tube, where the tap is to come, and force through this hole a loop made of about an inch of the wire, then continuing the winding. Give the loop several twists to prevent it from pulling back through the hole.

Next we have to consider the wooden parts. Hard, well-seasoned wood should be used throughout. The base is 12 inches long, $5\frac{5}{8}$ inches wide, and $\frac{3}{4}$ -inch thick. A bevel around the top edge gives it a nice appearance. Two coil ends, $4\frac{1}{4}$ inches square, are needed for the primary tube. One of these should be $\frac{1}{2}$ -inch thick and the other must be composed of two pieces, each $\frac{1}{4}$ -inch thick. A piece $\frac{3}{8} \times 4\frac{5}{8} \times 4\frac{3}{4}$ inches is needed for the top, and another piece $\frac{3}{8} \times 4\frac{1}{4} \times 4\frac{3}{4}$ inches for the back. A piece $\frac{1}{2} \times 3 \times 1\frac{1}{2}$ inches is required for holding the ends of the coupling slider rods.

The only thing difficult in the construction of the set is making the tube fittings. However, if you have a little patience, a hand bracket saw will do the work very nicely. Find the exact center of one of the quarter inch end pieces by drawing its diagonals, and scribe a circle with a compass exactly $3\frac{1}{4}$ inches in diameter. This should be cut out with your saw, and if you are very careful, both the disk and the other part may be used. The disk should be mounted with two small brass screws on the exact center of the half inch end piece, as shown. Find the center of the other quarter inch end piece, and scribe a circle $3\frac{1}{2}$ inches in diameter. Cut this out. The edge of this disk should be carefully smoothed with several grades of sandpaper, for it is to be used for the end of the secondary tube. Out of another piece of $\frac{1}{4}$ -inch stock cut two disks $2\frac{3}{4}$ inches in diameter. Use glue and several small brass screws to fasten one of these to the center of the last mentioned disk. Glue and screw the two quarter inch end pieces together as shown in the drawing, so that the larger opening will be on the inside, or toward the tube.

Now the primary tube may be mounted. Place the end pieces on the tube and, when properly aligned, screw them to the base at the left end; the open end piece should be on the right side.

Next lay out and drill the secondary end piece for the switch and taps. The tap leads may now be soldered on and connected to the switch points, and the end fastened by means of several little screws through the tube. The disk for the other end of this tube should have a $\frac{1}{4}$ -inch hole drilled through its center. Through this hole runs about a 12-inch length of double twisted flexible wire, which serves the purpose of connecting the secondary with the detector, the phone condenser and phone binding posts. A hole near the left hand end of the primary tube will allow it to pass through. After all the connections have been made inside the secondary, this other end may be fitted.

At some point near the bottom two parallel holes, about an inch and a half apart, should be drilled through both secondary end pieces, and to a depth of about

(Continued on next page)

Dry Cell Eliminates Recharging

By Velma Carson

DRY cell vacuum tubes are beginning to displace storage batteries in radio receiving sets for the reason that they cost less and are more convenient to use. They are equally efficient for ordinary purposes.

Farmers are welcoming the use of dry cells because where they have no farm lighting system they have no way of getting storage batteries recharged unless they make a trip to town. And since this has to be done about every two months and costs at least a dollar it is a nuisance and an expense. Storage batteries cost around \$15 apiece and only last, on the average, about three years. Besides the original investment a person has spent \$36 in that length of time or \$51 altogether.

You can buy enough dry cells for vacuum tubes for \$50 to last ten years.

A dry cell costs 35 cents and can be used a hundred hours. There is no bother of re-charging or filling with distilled water every few weeks. It is put in the circuit, connected up, and then forgotten until it is ready to be thrown away.

A store of these tubes can be kept in reserve. They

remain in good condition unused for six months. Nearly any electric shop in any small town carries them.

Another motive than economy prompts the use of the dry cell vacuum tubes and that is the convenience. Compared to the storage battery eight inches high and four inches in diameter the dry cell is only 2½ inches in diameter and 6½ inches high. It contains no acid likely to spoil things, is not heavy to cart, and does not take up a lot of space.

We can get more out of a dry cell by using it intermittently, i.e., with periods of rest in between periods of operation. We can get more out of it by keeping the current drawn from it as low as possible. What shall we do then? Be sure to turn off the filaments when the set is not in use. Do not run more than one tube from one cell. If you have two tubes, use two cells in parallel. When possible use two cells in parallel to supply one tube. One point to be remembered when connecting cells in parallel is not to use an old and a new cell. Their voltages will be different and will set up a local circulating current which will soon spoil the new one and will not improve the old one.

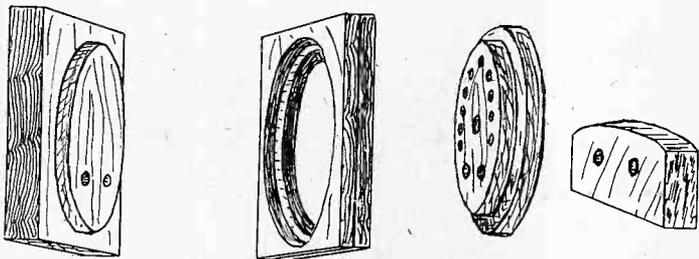


Fig. 2—Wood supports for the primary and secondary. They should be well seasoned. Dimensions are all given in the accompanying text.

(Continued from preceding page)

¼-inch in the left hand primary end piece and the rod support. Be careful to get these all in a perfect line, so that the rods may slip through easily. The rods may now be placed fitting them firmly in the left hand end, passing them through the both ends of the secondary and finally into the rod support. This latter piece may then be screwed to the base. If the work has been done properly, the secondary will slip into the primary tube very easily.

The panel may now be mounted and the connections made. The first eight taps of the primary coil are connected to the switch points of the left hand switch, and the other eight are connected to the right hand switch. One switch lever is connected to the aerial binding post and the other to the ground post. One of the flexible leads from the secondary is connected to one side of the detector and the other lead is connected to one of the phone posts and to one side of the phone condenser. The free side of the detector is connected to the other phone post and to the free side of the phone condenser. Be sure to solder all joints if you do not care to keep taking the set apart all the time.

The back and the top may now be fitted. If the wood parts have not been previously stained and varnished, it may be done now. After thoroughly sand-

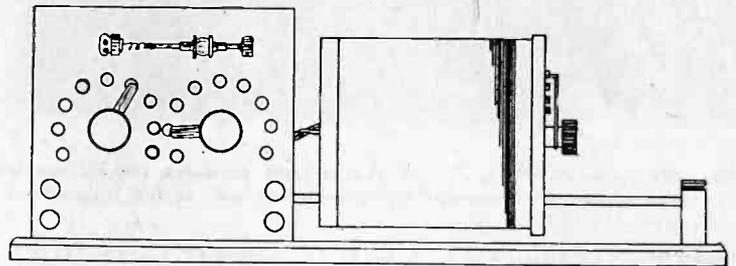


Fig. 3—The complete receiver as it should appear when finished. If care is taken in construction, and a good coat of alcohol stain applied, a very neat and serviceable instrument will be the reward.

papering, apply some oil stain of the desired shade and color, and when perfectly dry, apply a coating or two of white shellac or transparent varnish.

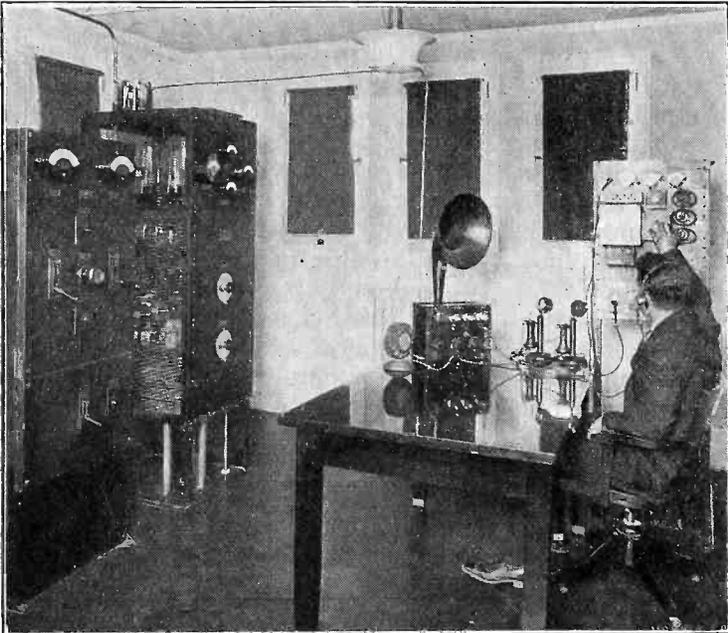
The set will now be complete and the results that you get will be commensurate with the quality of the materials and the workmanship that you put into it. Also, a great deal depends upon the sensitivity of the crystal and upon that of the phones. Personally, I think that a good piece of galena is the best crystal to use, though some of the new synthetic crystals are very good.

The operation of the set is quite simple and, after a little practice, considerable proficiency will be acquired. By the use of the two switches on the primary, a single turn adjustment will be possible, affording the fineness of tuning that could be obtained with a slider. To tune in a station, put the secondary well within the primary, and adjust the detector as best you can—if you think it is out of adjustment. Set the secondary switch at some arbitrary value. Move the right hand primary switch until something is heard, then try to increase the intensity by moving the left hand switch. Next adjust the secondary switch and the coupling. If the results are not then satisfactory, and you think they can be bettered, play around with the detector a little. After a little experience, you will be able to make the adjustments almost intuitively.

Col. Green's Radio Station WMAF

By C. W. Tucker

TO provide first-class radio programs for the people of New England and especially for his friends in and around New Bedford, Mass., Colonel E. H. R. Green has sponsored an innovation in broadcasting. Last Sunday night radio listeners heard the announcer say: "This is station WMAF, South Dartmouth, Mass. You have been listening to the



(C. Western Electric)

Apparatus room at WMAF. Here the operator regulates the volume of radio transmission and controls the entire power side of the transmitter.

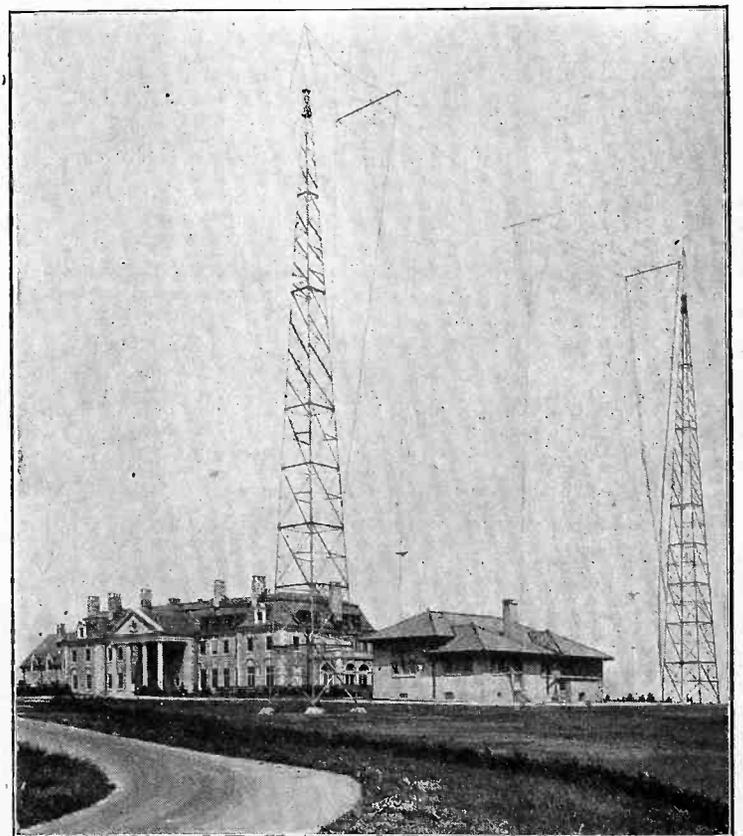
musical program of the Capitol Theatre, 51st street and Broadway, New York City." Back of this simple statement is a modern miracle of electrical communication.

Realizing that New York was the center of artistic talent, Colonel Green arranged with the American Telephone and Telegraph Company that programs rendered for its station WEAJ should be transmitted also over its telephone lines to the radio station on his estate, "Round Hills," where the speech and music control the radio set of WMAF just as if the performers were in the adjoining room. In the studio of WEAJ is a sensitive microphone whose output is amplified through five stages and fed to a high-grade telephone circuit passing through Hartford, Providence and New Bedford. In each of these cities are test stations where the voice currents are amplified; and finally at Round Hills are four more stages, making a total of fifteen. The total amplification from transmitter to antenna reaches the enormous figure of ten billion times. Were it not that the energy of the transmitter is so tiny, and that much of the "gain" from each stage is dissipated in the intervening lines, all the power plants in the country could not furnish enough power to operate the last stage of amplification.

The building which Colonel Green erected for station WMAF is of tile and stucco, its lines harmonizing with Round Hills close by. Through the wide front doors one enters first a spacious reception hall, whose comfortable furnishings and broad fireplace make one feel at home. At the left are the office of the station manager, and the artists' retiring rooms. At the right, glass doorways lead to the studio, where local pro-

grams are produced. Blue brocade is hung loosely about the walls, so that reverberations may be damped to just the right degree. Deep chairs and a great davenport suggest that relaxation in which a performer can give the freest expression of personality.

From the main hall or the studio one enters the apparatus room, where stands the Western Electric 500 watt radio telephone transmitter. From the microphone in the studio, or from the telephone line from New York, tiny electric currents bearing the impress of the speaker's voice go through four stages of amplification and thence to the twin modulator tubes. Here they control the output of two oscillator tubes, thus sending out to the antenna a high frequency current whose strength is a faithful copy of the vibrations of the speaker's voice. The antenna itself, whence the other waves are radiated, is swung from two graceful steel towers 143 feet high. It consists of four wires, having a flat top 115 feet long, with lead-in wires falling 140 feet vertically to the transmitting apparatus. Power is furnished to the set at 14 volts for the tube filaments and at 1600 volts for the plate circuits, from a motor-generator set in an adjoining room. A radio receiving set is also provided, on which, as required by law, an operator listens constantly during transmission to pick up any distress calls from ships at sea.



(C. Western Electric)

Station WMAF showing the antenna equipment, the studio and transmitting room. Round Hills House, Col. Green's summer home, at Dartmouth, Mass., directly back of the tower.

When a program is to be produced, power is thrown on the set, and the wave length and antenna current are checked. Over a telegraph wire the New York control room is notified that all is ready. In New York, the announcer presses a button which makes the final
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connection from the microphone, and then introduces the performer to the invisible audience. During the program, the control operator listens constantly by a head set or a loud speaker to what is being transmitted, and adjusts the degree of amplification so as to fully load, but not overload the transmitter.

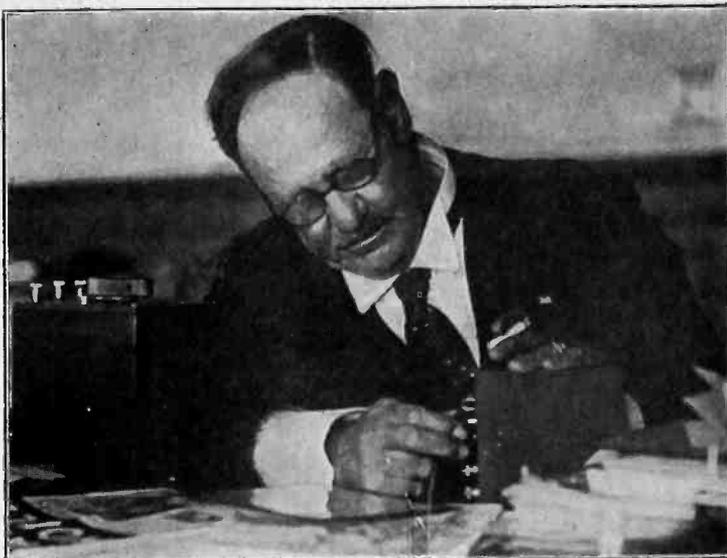
To make these excellent programs available to guests on his estate Colonel Green has installed on the top of a water tower a group of loud speaking sound projectors connected to another amplifier, the whole being known as a Western Electric public address system. Near the water tower is ample parking space for automobiles and Colonel Green has invited his neighbors to drive in and listen to the programs, which will be clearly audible for a half mile or more. Plans are under way for the installation of additional projectors at Round Hills Light, a rocky isle off the shore of the estate, so that when the New York boat passes in the early evening the passengers may be entertained and farewell messages may be given to departing guests.

With the arrival of its big brother, the 100 watt Western Electric set of Colonel Green's station No. 1 will still render programs, but at less frequent intervals. It will be used to broadcast the work of local artists, and to transmit market and weather reports, local news, etc.

It is fitting that Round Hills should be the home of a great radio station.

In olden days the Master of Round Hills watched his own ships bearing cargoes of all lands to and from the port of New Bedford. Cargoes now arrive at Round

Hills House—cargoes of good-will from radio listeners to WMAF's programs. As he reads these letters from lonely farms and frontier camps, from ships at sea, from those isolated by sickness, from his brother radio-



(C. Western Electric)

Colonel E. H. R. Green in his laboratory at Station WMAF.

fans, the Colonel is glad that Round Hills still shares in world-communication. Here, where sky and sea have long played hosts to the Four Winds, has arrived a new guest. Borne on wings of light, yet unseen; unheard, yet bearing tidings to all mankind—radio!

Mexico Generates Our Static— We Get Only the Echo!

THERE is no static in the northern states, and radio fans who think that Dame Nature is not giving them a square deal have a lot to learn. Even heavy electrical showers have little appreciable effect on radio. Such is the opinion of S. Kruse, technical editor of "QST," published by the American Radio Relay League. Mr. Kruse says that the nation's static has its natural element in the Mexican mountains and all the northern states get is the outer fringe.

These views are based on his radio experience of several months in the vicinity of the Gulf of Mexico. "What we get here is very second grade stuff," he says, "but in Mexico they have the real thing and the life of a radio operator on a Gulf steamer, or in a shore station, is well nigh impossible. The static growls and grumbles and raves and pops and at one time the Mexican operators at the old station in Tampico threw their phones on the floor and took to the monte, preferring chances with tigre and the culebra rather than to have their eardrums tortured any more by the tropical radio roar.

"This does not spoil reception for an evening now and then—it blazes away for six months at a stretch and during that time the owner of a radio set had better use it for a rabbit hutch. On a tug-boat off the Mexican coast I have heard static crash and bang so that it was totally impossible to hear any sign of a high-power station less than ten miles away—yet that same station was being heard in Boston at that moment without any trouble.

"A radiophone is simply helpless in that sort of a mess and communication is accomplished entirely with

code—radiotelegraph. The Mexican government, the United Fruit Company and the U. S. Navy have strong stations around the Gulf and by using high power and repeating and repeating, they manage to get traffic through. But it certainly is tough on the operators, for they have to unravel a signal from a roaring boiler shop effect that is ten times as loud. At times they have to repeat each word five times, and if it gets extra bad and an important message must go through they repeat each letter as many as ten times.

"Nowhere is profanity so well developed as by these men—the tenth repeat of a message calls for remarks that would make a steamboat mate blush and, if there are many messages on the hook, the sender is likely to be talked clean out before he gets all the traffic cleared.

"Why do they stick? You would not ask if you had ever been in the South—one never likes the North again, one simply swears at the heat and the static and the dumbbell operator at the other end, and the infernal sand fleas and mosquitoes—and sticks.

"Where does the static come from? No one knows. It starts somewhere in the Mexican mountains—the radio compass proves that—but just where or why no one knows. Neither does anyone know why it disappears entirely in the winter and leaves wonderfully perfect conditions to compensate the man that has had the grit to stick. And finally no one knows why there are hours in each day when it lets up suddenly and then crashes out again with full volume.

"All we do know is that it does all of these things."

The Handy Eye-Splice—How to Make it in Hemp Rope and Wire Cable

By Arthur S. Gordon

A NEAT antenna installation is one of the indications of a thorough working radio amateur. On the other hand, if there are frayed rope ends showing, if there are unsightly joints in the wire covered with a mountain of black tape, then it's a ten to one proposition that the radio enthusiast within is neither an ex-boy scout nor a one time sailor. The unseamanlike aspect of his aerial betrays his clumsiness in handling rope and wire. "Oh, what's the use?" ask many amateurs. But they forget that slipshod work in this respect is evidence of careless work in everything they do. The odds are against these amateurs ever getting a set to operate at top notch efficiency.

Splices in a radio antenna, after all, are merely efforts in the direction of maximum efficiency. In making

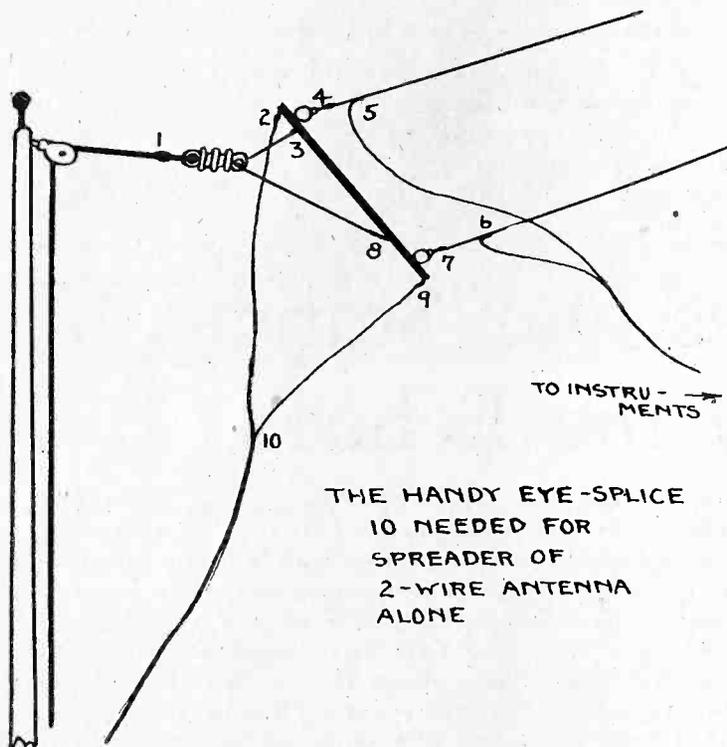


Fig. 1—Showing ten places where the eye-splice can be serviceably used in the erection of a first class antenna.

joints, some amateurs twist the two wires carelessly together and then rely upon the solder they pour over the joint to give them the strength and full electrical contact gained by a more painstaking procedure. In the long run, nothing could be more unsatisfactory. There is no trouble harder to trace than aerial trouble, the sinister part about it being that it shows itself not as a sudden and total breakdown but as a slow, steady deterioration of results. Splice joints, on the other hand, are not only as strong as the unbroken wire, but are electrically perfect. They will never pull out, are the last word in neatness and are especially recommended where the joint cannot be filled with solder, although where that procedure is possible, it is by all means desirable.

Contrary to the general impression, splices are easy to make. Rope, too, is easier to splice than wire, first because it has fewer strands and second because it is workable with the fingers. Boys with whom the

author has worked have grasped the principle of splicing in less than five minutes and within ten minutes have been turning out almost perfect specimens of the art.

Perhaps the handiest splice for a radio amateur is the eye-splice, where the end of a rope or wire is turned back upon itself to form a loop or, as it is more properly called, an eye. Refer to Fig. 1. There, in the vicin-

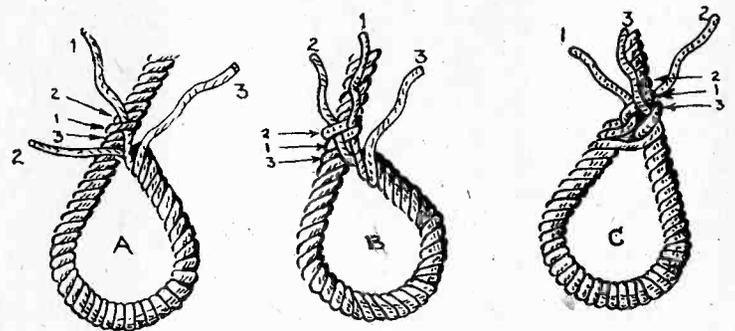


Fig. 2—The three stages of starting an eye-splice in rope. By referring to the text in connection with these sketches it is very easy to splice the toughest rope or the finest line.

ity of an aerial spreader carrying only two wires, are ten places where an eye-splice could be used to advantage. Think of what the ability to splice means to the radio amateur—to you—and then get a piece of three stranded rope and take an immediate lesson, not only in splicing, but also in one of the essentials of proper aerial construction.

Open out the strands for about four inches from the end and bend the rope into a noose with the open strand-ends crossing over the spot in the rope where the splice is to begin. Number the strand-ends 1, 2 and 3, according to the first step as illustrated by A in Fig. 2. Then make the tuck, under any strand of the rope as shown, and the resulting figure ought to resemble in every detail the sketch A. Strand-end No. 2 is the one which comes from behind the other two. It passes over the first tuck and under the next strand as shown by B, Fig. 2. In the meantime, No. 3 has been off on one side. Now turn the noose over, and for a moment, take hold of No. 1 and No. 2 and pull them a little apart. The rope will open, but one strand will remain conspicuously in place. This strand is the one

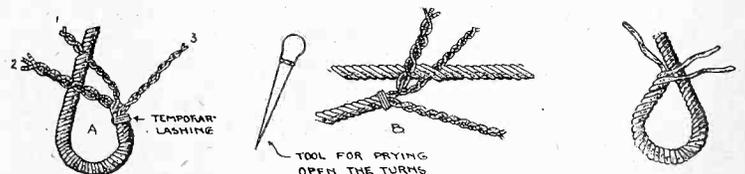


Fig. 3—Method pursued in the splicing of stranded wire. While not as easy as rope, the same method is used. The sharp pointed pricker is used to separate the strands and is a handy tool to work with. The illustration at the extreme right shows the wrong manner of splicing, due to the strand-ends approaching the rope from the wrong direction. Compare it with Fig. 2 A and notice the difference.

under which end No. 3 is tucked. Do not do the obvious thing, which is to tuck it under at once. This will spoil the splice. Instead, take it over the strand, turn around and come back under it, so that strand-end No.

(Continued on next page)

Reflexing the Nite Owl Special

By J. E. Anderson, M. A.

IN RADIO WORLD for July 7 I described the new Nite Owl Special circuit, with which I have had exceptionally good results. Since that article was written I have extended the circuit by making use of the reflex principle, as shown in the accompanying diagram. This circuit gave most gratifying results.

Since the apparent selectivity of a reflex circuit is not as great as the ordinary circuit it was found advisable to use double tuning in the input of the first stage. The antenna is tuned merely by varying the inductance of the coil, which is tapped at every turn. The coupling between the primary and the secondary does not need to be variable unless the added control is desired in a special case. With a little experimenting the best coupling readily may be found. The secondary tuning unit should have a range from 600 meters down to about 150. This is obtained with an inductance of .1 millihenry if the maximum capacity of the variable condenser is 1000 mmfd. and with .2 millihenry if the maximum capacity of the condenser is 500 mmfd. Thirty-two and 44 turns on a 3.5" tube will give these inductances respectively with sufficient accuracy. The interstage coil should have about 60 turns of wire on a 3.5" tube and it should be tapped at least every five turns.

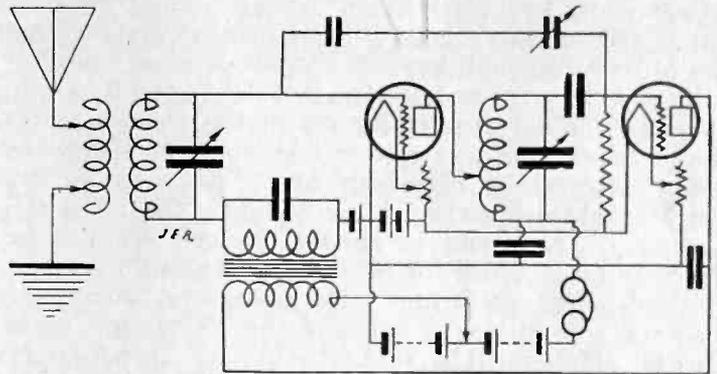
The reflex circuit does not oscillate at radio-frequency as readily as an ordinary circuit on account of the resistance introduced into the grid circuit by the audio-frequency transformer. For this reason a larger portion of the interstage inductance coil may be included in the output of the first tube than is possible in the straight circuit described in RADIO WORLD referred to above, and the neutralizing capacity from grid to grid may be dispensed with. However, the circuit will frequently oscillate at an audio-frequency, which gives rise to the familiar howl or squeal. This may be eliminated by reversing the leads to the audio-frequency transformer, or by reducing the filament current, the plate potential or the grid biasing potential.

It is not advisable to increase the regeneration in the first tube to a point where the tube overloads, as this would cause the tube to act as a detector. This, of course, would result in an audio-frequency current in the output of the tube, which would interfere with the output of the tube which is due to reflexing the output of the second tube. These two audio-frequency components of the output of the first tube will usually be out of phase by an amount sufficient to cause con-

siderable distortion in the received signals. For this reason, and the fact that the desired output of this two-tube reflex will be very large, only the larger tubes available on the market should be used.

If it is desired to increase the intensity of the signals beyond the point where the first tubes detects seriously, it should be done by making the detector tube regenerative. This is not shown in the diagram but it may be done by any of the ordinary methods. When this is done it is well to retain the neutralizing capacity from grid to grid to help control regeneration and to prevent re-radiation.

The by-pass condenser in the secondary of the audio-frequency transformer is not necessary as the capacity of the leads is usually sufficient. If it is used it should not be greater than 500 mmfd. A larger value would



Reflex circuit incorporating the fundamental circuit of the Nite Owl Special. Note the neutralizing capacities which are used to prevent the tube from oscillating.

noticeably by-pass the audio-frequency currents and introduce distortion. The by-pass condenser in the primary of the audio-frequency transformer should be somewhat larger because the self capacity of the leads is much less, and it is necessary to furnish a low impedance path for the radio-frequency currents in the output of the detector, especially if this is regenerative. A suitable value is 1000 mmfd. A larger value than this would introduce a noticeable distortion in the output by shunting the high audio-frequencies from the audio-frequency transformer. If it is desired to tone down the high notes in the output and obtain a softer and more pleasing effect these by-pass condensers may be used for that purpose.

(Continued from preceding page)

3 comes out on the same side of the rope as No. 1. See C, Fig. 1.

The hardest part is over. Turn the noose over again. begin with No. 1 and continue the splicing. Pass over one strand and tuck under the next, always climbing up the rope and not down it. Do this with Nos. 2 and 3 in succession, and watch the splice grow under your fingers. Tuck each strand three or four times, pulling each tuck tightly. Then cut off the ends, roll the splice under the sole of your shoe a few times to smooth it off and the job is finished.

The single caution necessary in continuing the splice is not to mistake the strand-ends for the strands, when working the game of pass one and tuck one. If the rope is very thick, and you want the splice as neat as possible, taper down the strand-ends after the

second tuck by tearing away some of the yarn strands.

Can you do it? How about wire, now, with seven strands instead of three? Well, it is just as easy. The soft wire used for aerial is very easy to handle, and the only tool needed is a miniature marlinspike, or what sailors would call a steel-pointed pricker. This may be any pointed piece of iron or steel, about the size of a leg on tinmiths' pocket dividers. Unlay the wire as you did the rope and temporarily bind the throat with string, as shown in A of Fig. 3. Now twist the seven strand-ends into three and proceed exactly the same as with rope, with the small difference that you tuck under two strands instead of only one. When continuing the splices, pass over two and tuck two.

Eye splices are also used when joining a rope or wire end to the middle of another rope or wire. See B, Fig. 3. This is done when tapping off the lead-in wires.

Station NAA Gets a New Voice

By Carl H. Butman

WASHINGTON, D. C.—Sea-going radio operators, many skippers and landsmen who listen in will note a change in the "voice" of NAA at Arlington 2,650 meters. The peculiar tone of the old Fessenden spark will no longer carry the time signals, weather reports and information of great interest to mariners. This famous spark set installed in December, 1912, was replaced on Sunday, July 8, by a new tube transmitter.

Operating on the same wave length, 2,650 meters, the new set will carry all the governmental broadcasting formerly done on the spark. Although its power is not quite as great, the range of the tube set by tests has proven a little greater than the old 100 KW spark. After eleven years of almost constant operation, the Fessenden set is to be retired from active service, and it is understood that it may be presented to the National Museum, where many radio experts believe it should have the honor accorded to the early locomotive of Baldwin and the Morse telegraph key.

Even before its installation in 1912 as the first high powered radio transmitting set in the United States, the Fessenden set was used in test work for nearly two years between the Plymouth, Mass., radio station and the Mackaranish station in Scotland by the Fessenden Company. A service of almost thirteen years is believed to be a record for even a modern radio set.

Besides the seafaring radio operators, many ship masters will miss the tone of the Fessenden spark. Careful skippers, it is said, check their chronometers personally in the radio shack when NAA broadcasts time twice each day. Trusting their operators in every-

thing else, they prefer to put on the receivers themselves and count the dashes preceding the time signals at noon and ten p. m. noting the number of seconds fast or slow when the hour is designated by the long dash. Masters on the Atlantic and Mediterranean runs whose daily progress is noted in degrees of longitude, rely almost solely upon the time by radio, especially when the sun is not visible, and never miss an opportunity to check their ships' clocks.

In the old days before radio time transmission, east and west navigation was a more difficult task, since the mariners had no means of calibrating their time pieces while on a cruise requiring from ten days to two weeks. An accurate record of the chronometer's gain or loss in time per day had to be kept, and every observation had to carry the correction multiplied by the number of days out of port. This of necessity increased any unknown error and made navigation far from the accurate science it has become with the advent of radio time. Once in port, the master carried his chronometer carefully ashore to a reliable clock maker or watch expert and had it checked. The result was a correction in gain or loss in seconds per day and, as has been explained, necessitated daily corrections for exact time. Today there is no reason for the skipper to carry his timepiece ashore for calibration, except about once a year, since he can correct it twice a day no matter where his ship is.

While the time is sent from NAA primarily for Naval vessels, it is extended as a free service to all who sail the seas, besides all who listen in ashore. The new set will, it is believed, improve the time signals somewhat in audibility and in range.

State College to Teach Radio by Correspondence

CORRESPONDENCE courses in radio reception and transmission are now being offered by the Engineering Extension Department of Pennsylvania State College. According to N. C. Miller, head of the department, this new bit of extension service has been instituted in response to a large number of requests that have been received.

The course is divided into two parts, each with its own text and assignment pamphlets. The first part establishes principles and suffices for the ordinary student. It takes up common electrical phenomena, radio circuits, the vacuum tube, amplification, sources of power, transmission circuits, and applications of radio.

The second part is a continuation for those desiring advanced instruction and goes more thoroughly into the theory of electricity in order to prepare for a detailed study of electromagnetic waves, radio circuits, and apparatus for reception and transmission.

The purpose of the course is to correct the impression of mystery which surrounds radio and to show that the fundamentals of radio are not as mysterious as is commonly supposed. At the beginning it is assumed that the student has no knowledge of radio and very little of electricity, and the course is developed on that basis. Mathematics has been reduced

to a few simple calculations and all technical terms are explained clearly.

"Despite the wide use of apparatus of all degrees of complication, there is still very little known by the average layman of the underlying principles of radio," says Professor Miller. "As a result much apparatus is installed without regard to anything but a blue print of a hook-up which as often as not does not give the maximum service for the outlay of time and money. In many cases the radio fan connects up apparatus at random, hoping by luck to strike on some scheme that will give him desired results. This is often fatal to valuable tubes and apparatus." Inquiries concerning the course should be sent to the Engineering Extension Department, State College, Pa.

Tuning Tips

IN order to get the maximum results out of any receiver the set should be retuned after a station is found. This allows all the circuits to be tuned in resonance. The primary circuit is the governing feature of any set and should be tuned carefully, after which the various other controls are tuned.

"Original Radio Girl" in Her Own Studio

VAUGHN DE LEATH, so popular with radio fans through her frequent appearances before the microphone, is about to challenge the approval of radio audiences in a new role—that of studio and program manager of station WDT, New York City, now on the eve of opening for general broadcasting.

Rated among the leading women composers of the country, her songs and musical scores are known to all lovers of good music. As a recording artist, her phonographic records have had an enormous circulation, marked by an unusually even distribution over the entire country due, no doubt in a large measure, to the great range of her contralto voice (three octaves) and its quality of sympathetic appeal.

This young woman's remarkable versatility is further shown by her high rank as a piano player (not the mechanical kind) and by her success as director of her own band and orchestra of more than sixty pieces, as well as by her popularity as a concert singer and recitalist.

Miss De Leath was the first woman in the United States, and hence in the world, to broadcast vocal music for the benefit of the general public, with whom she has proved a decided favorite. She was the woman chosen for the first successful attempt to bridge the Atlantic by a woman's voice. It is for these reasons that she is so widely known as the "Original Radio Girl."

The radio-loving-public will now have an opportunity to observe her versatile talent further exercised for



Miss Vaughn DeLeath, the "Original Radio Girl," is now manager of the studio at Station WDT.

their benefit in the direction and management of her own broadcasting studio.

The Radio Woman

A YOUNG lady who had recently acquired the bad habit of repeating things she had heard, was surprised to find out that she couldn't get any thrill out of telling her friends about the news she heard by radio, because they all read RADIO WORLD and kept up to the second on all the latest radio gossip and news. Then she turned around and sent in her subscription for RADIO WORLD and now keeps up to the minute on everything without having to worry that she will lose or miss anything.

* * *

It is one of the greatest of marvels to me what a wonderful influence a violin solo has on some people's nerves. I have a very good friend who drops in occasionally to see me and is one of the most nervous women that I think I have ever met. She simply cannot sit still. She must be moving all the time. She visited me one day last week and after watching her show her case of nerves, I suggested that we listen to the radio. As luck would have it, there happened to be a wonderful violinist on at the time and my friend

just sat and listened right through, closing her eyes and not even moving. When it was all through, she remarked that it was wonderful. "If I didn't know that it was coming through that phonograph horn (my loud speaker) I would have thought that he was right here in the room. I love violin music—it seems to act like a soothing drug to me. I really believe that were he to play long enough he could put me right to sleep in a crowded train."

* * *

I think Friend Husband has bought more classical records since we have had our radio than he ever bought in his whole life before. He would hear a piece sung, or played, and if it appealed to him (and nearly every orchestral rendition of some famous suite was sure to) bright and early next evening, along would come hubby with two or three expensive records with that particular piece on. I don't think that we have bought more than a half dozen of those comical records since then, though before we used to specialize on them. How much nicer it is to hear Beethoven's "Moonlight Sonata" played by the Philharmonic Society Orchestra, than to hear "Yes, we have no oranges" by some comedian, that we will get tired of in no time.

Washington Signal Laboratory to Reopen

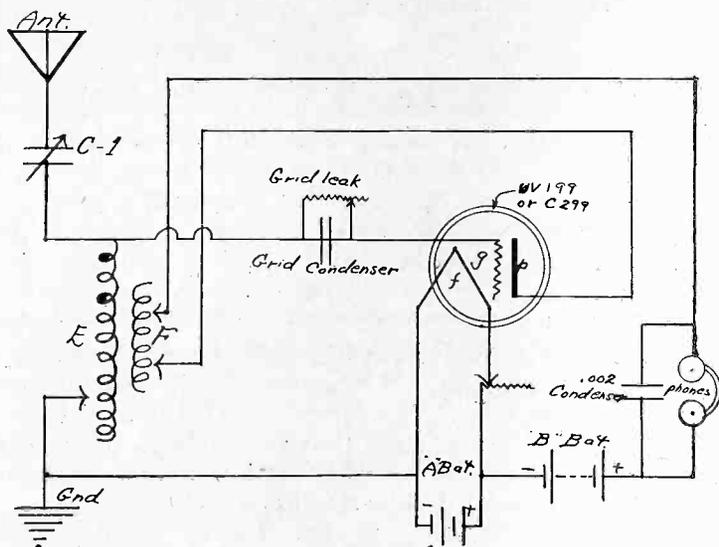
MAJOR J. O. Maubourge, Signal Corps, who was recently placed in charge of the Signal Corps laboratory at the Bureau of Standards, expects that experiments will start there on July 25th. Among the early experiments planned is the development of suitable terminal apparatus for transmitting General Squier's new universal alphabet. Since this code alphabet is intended to increase the speed of au-

tomatic transmission in cable, wire and wireless dispatches, the development of the necessary transmitting and receiving apparatus is necessarily somewhat complicated. With its perfection, it is understood that the Army Message Center located in the Munitions Building will then conduct some long-distance speed transmission tests, as soon as the apparatus can be installed there and at a distant station.

A Good U.V. 199 Hook-up

By C. White, Consulting Engineer

A FRIEND of mine recently said "circuits may come and circuits may go, but the single circuit regenerative is here to stay." Of course, the subject can be nobly argued pro and con but you have to admit that a circuit which would give more volume for a single tube than the single circuit regenerative circuit would have to go some. Then again, the circuit is very inexpensive to build and is almost fool-proof in operation. It is the utmost simplicity combined with the utmost reliability. I do not wish to go on record as saying that it is the best, for it is not, but I will say that for the amount of money invested and the results produced it is and will be for quite a time a leader. It can be constructed to be very compact and, while it is generally considered as a receiver with a radius of 500 miles maximum, it has been known to reach out as far as 2,000 or even more in cool weather. By using



A single circuit regenerative especially adapted to the new U.V. 199. Note the fact that the tickler inductance is variable, which adds considerably to the ease in obtaining the critical regenerative point just before the tube "spills."

the new UV199 tube and dry cells throughout the maintenance expense is very small and quite negligible in comparison to that of more expensive outfits.

The circuit illustrated in the diagram herewith has been simplified to the greatest extent. No unnecessary controls have been included and the use of expensive variometers and variocouplers has been avoided. The tuning element E is wound with No. 22 D. C. C. magnet wire on a four-inch tube. This coil should have 60 turns in all with a tap at every 15. The coil F fits inside of the coil E and is therefore wound on either

three or three-and-a-half inch tubing having 60 turns in all but differently tapped for switch points. One switch arm should allow connection to every 10 turns while the other arm should provide a fine adjustment allowing a tap-off at every turn. This means that the first 10 turns should be tapped by one switch for every turn in that 10 while the other switch arm should only tap off the entire coil in units of 10 turns. A similar arrangement is resorted to on certain variocouplers to obtain a fine and a coarse adjustment of the number of turns. The coil E is the main tuning inductance and the coil F is the tickler or regeneration control coil. Two switch arms control the number of turns of wire active on F while one such arm controls the number of turns in use on the coil E. The coils E and F should be wound with a piece of string between the turns in order to keep each turn from touching the next. By so winding the amount of distributed capacity of the coils is cut down. Very often a single circuit receiver is accused of being broad, but generally such trouble arises from the fact that there is a lot of capacity between turns of the inductance coil and the condenser employed has been of poor construction. Laboratory tests have definitely proven that a large number of condensers really act more like resistors in the circuit than condensers. Poor insulation and faulty construction are to be blamed. It is of the utmost importance to keep capacity out of a coil and resistance out of a condenser. I have constructed single circuit receivers bearing these facts in mind and have obtained very good selectivity—in fact, better selectivity than is possible with many double or triple circuit affairs that use poor parts.

I wish to call particular attention to the fact that the better the set is made the more important it will become to have a vernier condenser attachment on the condenser C-1, which is an 11 or 13 plate air variable. A 30 ohms rheostat must be used with the new tube in order to get a fine variation of filament current such as is necessary to control the detection. Failure of the tube to oscillate may be due to the fact that the terminal connection to the switch arms of the coil F should be reversed. A proper type of grid leak and grid condenser will play an important part in the successful operation of the outfit. A good variable grid leak would be a desirable asset to the outfit, as well as a good mica grid condenser. Do not forget to see that the movable plates of the condenser C-1 are connected up to the antenna and the fixed plates to the grid side of the circuit. By so doing you will avoid quite a bit of grid howl and body capacity effect when tuning in your set.

Aint it a Grand and Glorious Feelin'?

WHEN you get the new set home, attach the aerial and ground, put on the batteries, plug in the phones, turn on the juice, turn the dials and hear nothing? Your heart stops beating for a five second space, you look at your connections, wiggle your jack and plug, look at your phones, look at your tubes and they seem all right. You know that something is wrong, but can't figure it out. It must work!

You try to remember if anybody ran into you while you were carrying it—and faintly remember a fat man bumped your arm on the car. Hurriedly you examine the connections only to find that everything is perfectly O. K.

Suddenly—a bright idea—you look at your B battery and find there is a loose connection.

OH, BOY—ain't it a grand and glorious feelin'?

The Reasons for Trouble

THE average fan, when he first starts up of course reads loads of books on radio, and after hearing a million and one "Don'ts and Do's," is quite likely to question the validity of more than nine-tenths of them, because he does not see any direct bearing or reason for them.

He does not realize that experience is a wise but expensive teacher, and more than once is taught himself by his own experience just because he did not take the advice of others who have tried things and found out.

He will often boast that he receives long distances on a set that "hasn't a single soldered connection" not realizing that if he had soldered them he would have reached further. He thinks that soldering is a "bunch of bunk" and is simply specified because some fellow wants to make him work. Did he ever see a naval or professional set that "wasn't soldered"?

He burns his tube up as bright as he can without absolutely ruining the signals by distortion. The makers of the tubes may specify that a certain voltage should be used on the plate when it is used as a detector, but he puts on double the amount and thinks that he has "put one over" on the manufacturer.

He purchases a wonderful set, or makes one, and then puts up a poor antenna and to balance the bargain he connects the set to an equally poor ground and wonders why his set doesn't get the good results that are claimed for it.

He reads about some hook-up that "looks good." He makes it up and skimps on the expense by buying cheap parts, rushing the construction and then kicks when it doesn't turn out to specifications.

People wouldn't waste their time writing and experimenting and prescribing "Do and Don'ts" if there was no reason for it.

Think it over the next time your set doesn't satisfy you and see which of the ten and ninety commandments and rules you have violated.

Arc Transmitters Create Interference

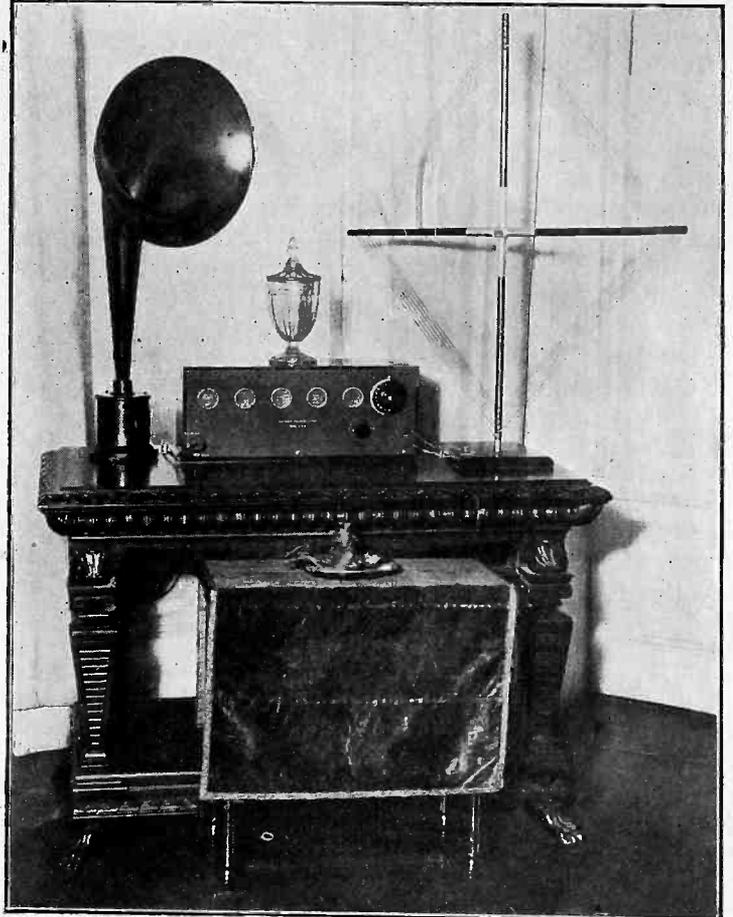
RECENT reports from the Navy Department indicate a very considerable amount of interference from mush and harmonics at all points within 200 miles of Pearl Harbor. Current transformer circuits will be installed on the Honolulu transmitters of the Navy within the near future, which will eliminate this interference it is hoped.

Naval experts admit that arcs and spark transmitters create a considerable amount of interference in their vicinity, unless special circuits are installed to reduce such interference. Transmitters of these types are being modified as rapidly as funds permit. On arc transmitters current transformer or similar circuits are being installed and spark transmitters are being replaced by tubes. Owing to the large number of transmitters operated by the Navy and the limited funds available, this work is, of necessity, proceeding slowly, but it is expected that the greater part of this interference will be eliminated during the next fiscal year.

Radio as An Ornament in the Home

YOU fans who take delight in showing pictures of sets with a dozen controls and a rheostat for every tube, take a look at the illustration below, which is the radio installation in the home of Dr. Donald M. Gildersleeve, 169 Prospect Park West, Brooklyn, New York. It is a five tube radio-frequency set using a loop antenna. The tuning is all accomplished by means of the condenser located at the right hand side of the set, and by swinging the loop in the direction of the desired station.

The set is conveniently located in the living room



An arrangement such as this makes a radio set an object of beauty as well as of service in the home.

of Dr. Gildersleeve's home, and will bring in long distance on a loud speaker such as is shown in the picture. The loud speaking unit is a Western Electric D10, and the set is a Davidson 2-R-S. It makes a handsome appearance, and we are told that it does some very neat work.

This receiving arrangement recently was entered for a prize that was to be awarded to the owner of the neatest receiving station, and it seems to deserve it, because it most surely is an artistic as well as utilitarian installation.

One Way of Doing It

If capacity effect is noticed when the antenna condenser is tuned, reverse your condenser leads. Where a condenser is used in the ground the rotary plates should be connected to the ground.

RADIO PRIMER

By Lynn Brooks

WIRING THE RECEIVER: Some amateur builders of radio apparatus will spend hours drilling, tapping and finishing the panel and cabinet of a receiver and when that is all done will wire the set with any kind of wire they happen to have at hand, not caring whether half of it is wired with bus bar and the other half with flexible leads or anything that may be handy.

In the wiring of a set it must be taken into consideration that the leads should be as short as possible to make them, and they should have as little resistance as possible.

Another point that is important, but neglected, is the bunching of leads. Wherever possible, the leads on a receiver should not be bunched or connected together in a manner that will tend to bring several leads close together. Just because the diagram specifies that a connector goes from the plate to the phones and another from the plate to the antenna side of the inductance and there is still a third that goes from the plate to the plate battery side of the phones, is no indication that all the leads should run directly to the plate connecting screw of the socket. It is often possible to eliminate several inches of wire by simply connecting one wire in such a manner that all the other leads that tap off on it can easily be bridged by a single wire from one of the other leads, and thereby eliminate bringing more than one lead to any connector.

The insulation of the leads is also important. Where leads cross even, though not real close, it is best to slip a few inches of spaghetti or some other insulating material across them. Do not run leads parallel for any length.

When placing the apparatus on the panel, consider before you drill the panel, the way in which the apparatus will control the wiring scheme. You can oftentimes by simply placing the condenser or coupler to the other side of some particular piece of apparatus eliminate a long lead.

Where leads are to be connected to some movable apparatus it is best to use flexible leads and fasten them to the solid wire. This gives freedom of manipulation and eliminates all chances of broken leads in after time.

FINISHING THE PANEL: In the final appearance of a set, the shiny panel does not generally look as rich as the finished satiny sheen of a manufactured set. It is very easy to give that satin finish to a panel if a little care is taken in the work.

Before the apparatus is mounted, take a piece of No. 0 sandpaper and carefully rub the panel lengthwise, being careful to do this in long, straight strokes, working from end to end. Do this until the entire panel is dull and scratchy looking. Do not make the mistake of rubbing with a circular motion, but keep even with each edge of the panel. Then brush off the dust, get some fine steel wool, and repeat the process until the panel has a dull, smooth finish. Then soak the steel wool in light machine oil, or melted vaseline, and continue to rub it. After the entire panel has been rubbed, go over it again with a clean cloth on which is some more oil or vaseline, and finally rub the whole thing down with a clean cloth, taking all the excess oil off. The panel will now be found to have a nice dull satin finish, but if a higher finish is wanted, get some rotten stone and put it on a rag dry, and repeat the process above until it has a real high finish, always taking extreme care to rub the panel in one direction only, whether using the sandpaper or the rotten stone.

RADIOGRAMS

With the 2 k.w. arc and chopper installed on the S.S. "Eastern Glade" reliable night communication was accomplished on 600 meters from Durban, South Africa, to Madagascar for a period of over a month. The distance between the above mentioned places is approximately 1,200 miles.

* * *

Extension of the market news service of the United States Department of Agriculture, involving the establishment of one of the largest commercial leased telegraph wire and radio systems in the world, has been announced by the Department of Agriculture effective as of July 1.

* * *

The authorities of Westchester County, N. Y., last week sent out a general alarm for a negro wanted as a suspect in the murder of Dorothy Kauffman, a governess at the home of Magruder Craighead in Greenburgh, and had his description broadcast by radio from Station WRW at Tarrytown, N. Y.

* * *

The marriage is announced of Miss Jessie E. Koewing to Carlton Brown. Miss Koewing is known to thousands of radio fans, her pleasant voice having been employed at the WOR broadcasting station, Newark, N. J. Mrs. Carlton Brown has resigned from her activities with L. Bamberger & Co., who operate WOR.

* * *

An automobile was stolen from a motor company in Kansas and a few hours later news of the robbery was broadcast. In ten minutes a long-distance call from a farmer told the motor car dealer that a car answering the description he had picked from the ether had been abandoned in a ditch and a neighboring farmer had the car in his yard.

* * *

With the Model TF tube transmitter installed on the U. S. Cruiser "Omaha" reliable communication was obtained up to 1,200 miles by day on CW and up to 1,600 miles by night on ICW and voice. With the 20 k.w. arc daylight ranges of 1,800 miles were obtained while working vessels of the U. S. Fleet, and 2,000 miles while working shore stations.

* * *

Arthur Hammerstein is strong for the broadcasting of his musical shows. It is invaluable advertising, he thinks; but not so with the dispensing of his airs through the orchestras of the cabarets and hotels. He has instituted injunction proceedings against the band leaders of London to restrain them from playing the various tunes of "Wildflower."

* * *

Station WMAK, Lockport, N. Y., will discontinue broadcasting during July and August, except the weather and farm reports, which will be sent out on the 360-meter wave length at 11 A. M., Eastern Standard time. The station will be remodeled and alterations made in the transmitter during the summer. It will operate as a Class B station in September.

* * *

A daily radio service, direct from New York City markets, giving last-minute prices on farm commodities, has been inaugurated by the *American Agriculturist*, a farm journal, in co-operation with the Department of Farms and Markets and Station WEAJ. The service will start at once and be given every Tuesday, Wednesday, Thursday and Friday at 10.50 a. m., Eastern Standard Time.

* * *

The Naval Radio Traffic Station at Cape May, N. J., has been closed and abandoned. The transmitter at that station was removed to the Radio Compass Station at Henlopen, the latter station becoming the compass control station for the group composed of Cape May, Cape Henlopen and Bethany Beach. Traffic formerly handled by the Cape May station will be handled by the radio station at Philadelphia.

* * *

Few American cities are so completely wired for electricity that they can provide their push-cart men and their sidewalk merchants with electric lights to hang over their stands at night. Japan does, and is rapidly approaching American universal and highly specialized use of electrical energy in her homes, factories and shops, according to a bulletin of the New York State Committee on Public Utility Information.

* * *

Dr. Louis Bell, the eminent electrical engineer, whose recent death was chronicled in RADIO WORLD, had a profound knowledge of wireless telephony among his many remarkable achievements. During the World War he was a member of the advisory committee of the Council of National Defense, and, with Norman Marshall, of Waltham, Mass., invented a system of signaling by ultra-violet rays which enabled dots and dashes to be transmitted invisibly to the enemy, but with accurate reception for several miles by troops provided with the proper apparatus.

Amateur Radio Station as Powerful and Complete as a Commercial Plant

By Lynwood Cowen

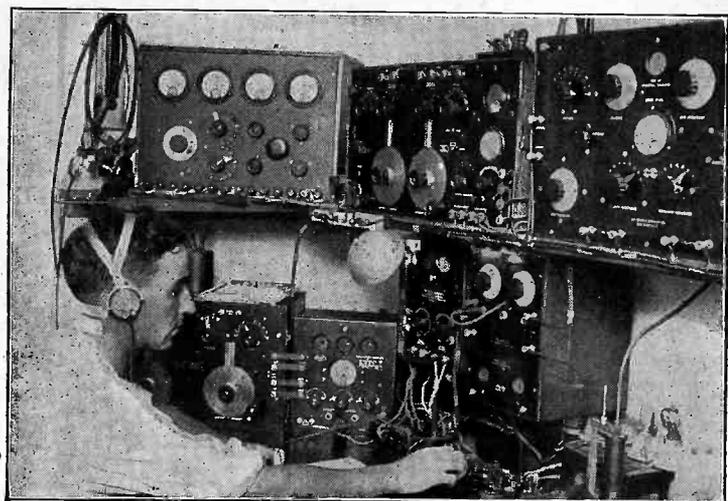
CONSIDERING the tremendous strides made by amateurs throughout the United States during the past year, it is not surprising that some very fine and complete sets and stations have been established.

Heretofore all amateur stations have as a rule kept strictly to amateur practice, but it remained for Walker P. Inman, a New York amateur and owner and operator of station 2BGM to establish a station that is far away and above anything else in that line.

To illustrate this fact, take a look at the transmitter which is used for phone work. It uses four 250 watt tubes with an input of 1,000 watts. The antenna radiation is six amperes and, with this transmitter, Mr. Inman has reached Honolulu and many other points as far away.

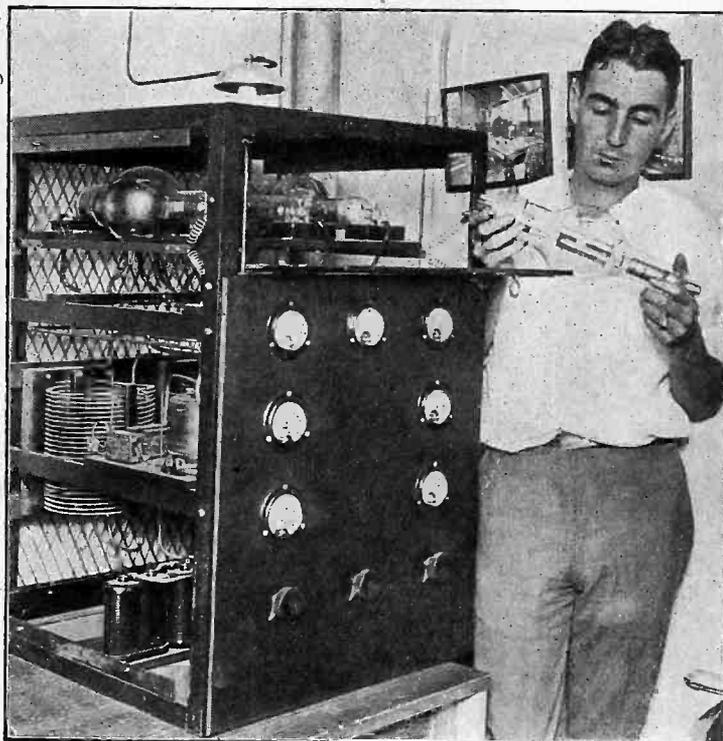
The receiving side of the station is a most complete one, and the number of receiving sets would make an operator on a ship turn green with envy. There are three sets used, one a navy receiver with a range of

from 300 to 8,000 meters. This is mostly for commercial work, as it is on these wave lengths that the receiver is most efficient. A Universal receiver with a range of from 150 to 25,000 meters is also used both for short and long wave work. A radio compass receiver for use with a loop is also used. Any one of these sets can be used simply by plugging them in the circuit, and if desired from one to four stages of amplification can be employed. The illustration shows the sets. There is also a 20 watt transmitter used when communication by CW and ICW is desired. This is shown on the upper shelf in the left hand corner.



(C. Kadel and Herbert)

Receiving equipment at Station 2BGM with the owner operating. The 20 watt CW transmitter is located on the upper left hand shelf. The compass receiver with three-stage amplifier is located directly under it on the table while the naval receiver and universal receiver are directly over the two-stage amplifiers directly in front of the operator.



(C. Kadel and Herbert)

Powerful 1000 watt transmitter used at Station 2BGM for broadcast work. Walker P. Inman is shown inspecting one of the 250 watt tubes. This transmitter is of the exact type used in commercial stations and current for the operation of the set is derived from a special generator set. With this set six amperes can be put into the antenna.

Handy Equipment

MANY times when an amateur is building a set, or considering the construction of one, he wonders just what tools are necessary, or maybe he has some few tools, and could do better if he had more. It does not require many tools if you intend building a set from parts that you purchase, but the list given below will help the average fan in making his set:

One breast drill; one set of drills for above in 16ths from $\frac{1}{8}$ to $\frac{9}{16}$ ths; a try square—12-inch blade; 1 good steel punch; 1 hacksaw and set of blades; 1 soldering copper; 1 compass; 2 screwdrivers—1 12-inch and 1 four-inch; 1 pair of electricians sharp nosed pliers; 1 pair of side-cutting pliers; 1 small vise; a sharp knife; 1 table clamp.

Station WCAP Opens

WCAP—note the initials—the new Washington station of the Chesapeake and Potomac Telephone Company, opened on July 4 by broadcasting a duplicate of the New York Telephone Station, WEAJ, program carried by land lines to Washington. This simultaneous broadcasting in two cities was very successful, except for a slight hum due, it is believed, to the long land line from New York to Washington. Operating under a temporary license, it is understood that WCAP will continue to broadcast the New York program occasionally until arrangements for the local program are completed. The station is licensed in Class B on 469 meters and has a power of 500 watts. It is Washington's first B station, although Arlington, NAA, is actually in this class.

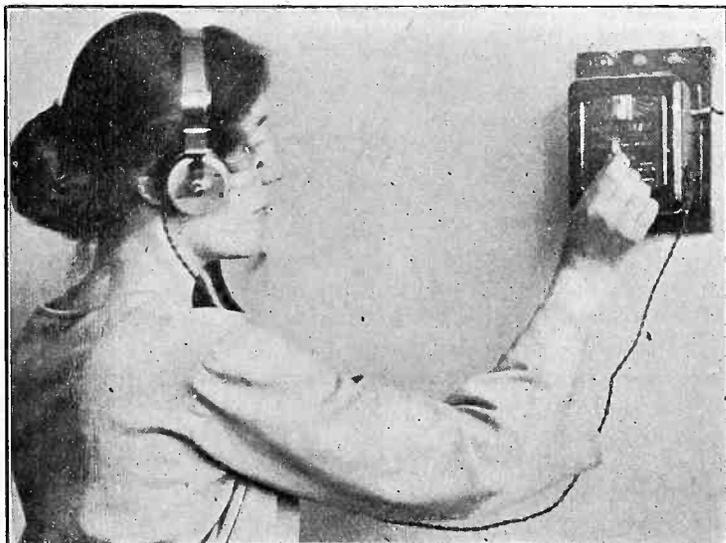
The Beautiful, the Practical and the



(C. Photonews)

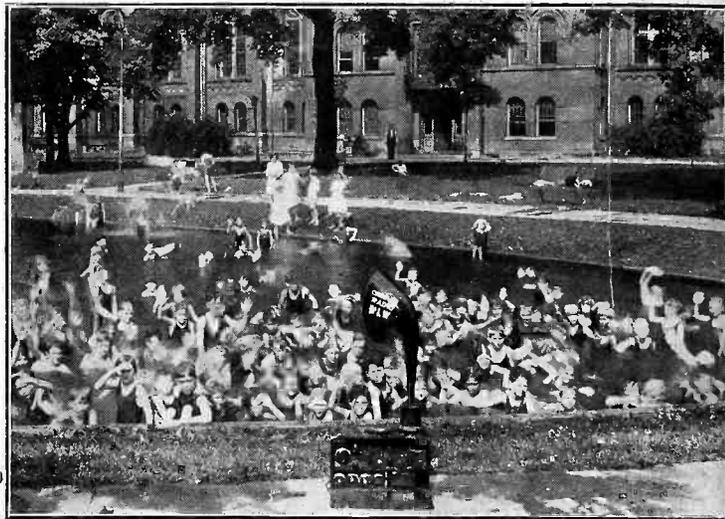
"Mother, may I go in to swim?" "Yes, my darling daughter. Take your radio set along, and sit right near the water!" That's the way we would sing the ancient ditty, after seeing Sara Mullen enjoying a sun bath at Rye Beach, New York, with the aid of the new portable Radiola which operates on dry cell tubes with neither antenna nor ground.

Captions by Robert L. Dougherty

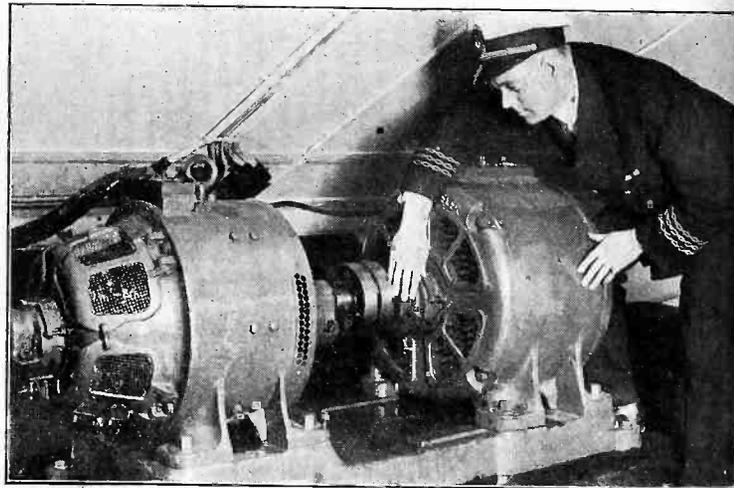


(C. Kadel and Herbert)

Automatic radio is being installed in Parisian cafes, hotels, and other public places. The idea is proving quite popular with those who do not own sets. Regular time schedules are kept by the broadcasters, and by simply removing the phones from the hook and listening at the right time a full-fledged radio concert may be had without the necessity of tuning in.

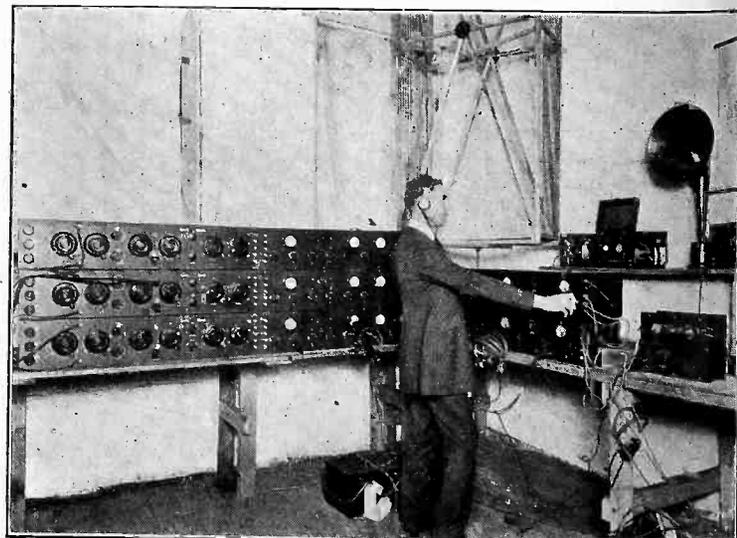


Station WLW, of the Crosley Manufacturing Co., Cincinnati, recently gave a series of swimming lessons by radio. The lessons were broadcast by Stanley Brauning of the Y. M. C. A. from the station, and by means of a portable set with loud speaker children were instructed in the natatorial art. This is the first time anything of the kind has been attempted, but the fact that it met with success shows to what lengths radio instruction can be utilized.



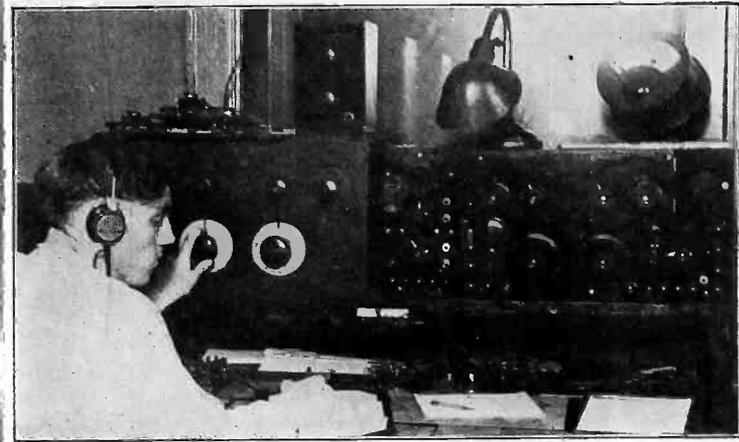
(C. Kadel and Herbert)

Chief Radio Officer Pickereil of the S. S. "Leviathan" inspecting the motor-generator set of the world's largest ship after using the set for tuning and testing. This generator set is the largest installed on any commercial vessel for the purpose of communication. The power furnished by this plant is enough to light a good sized town, but instead of doing that it is used to furnish power to keep this floating city in touch with both continents during its voyages.



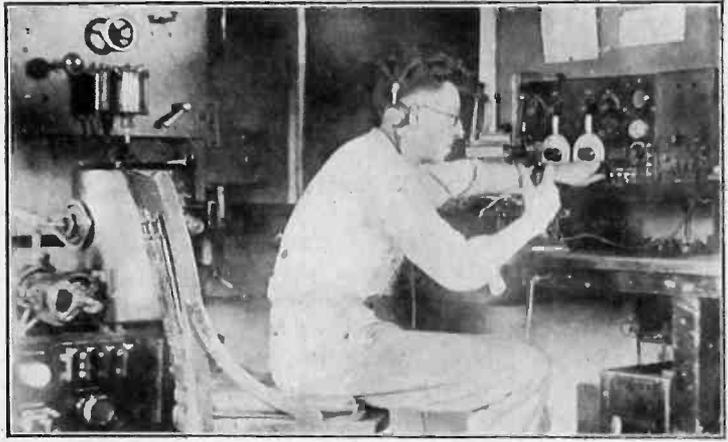
A laboratory equipment that would make the average fan's envy mount to the skies. Five ten-tube super-heterodyne receivers all blasting at the same time bringing in five distant stations. This experiment was recently carried out by the Experimenters' Information Service in New York City in order to determine the amount of interference that had to be overcome by the use of antennae that were centrally located, and the amount of interference that could be overcome by the use of specially designed loops.

The Scientific Phases of Radio News



(C. Photonews)

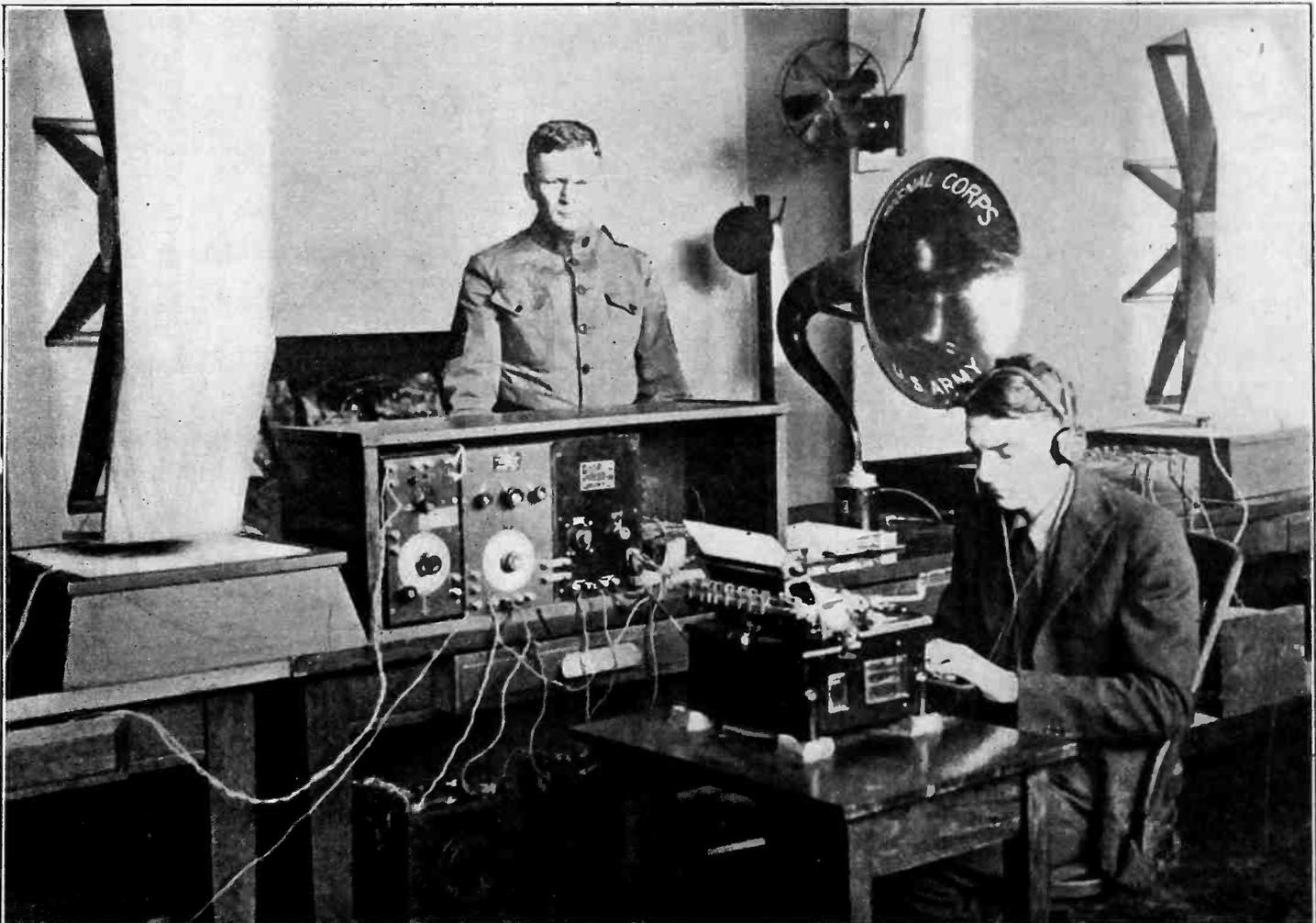
Here is the station that many amateurs and broadcast listeners hear just when their sets are bringing in the DX. It is the spark station WNY, at Bush Terminal, Brooklyn, N. Y. The illustration shows Ernest Engelder, chief operator, using the heterodyne receiver.



(C. Fotograms)

The Air Mail Radio Station of the Post Office Department, located at Garden City, L. I., which keeps in touch with the 'planes and landing fields all over the country. It is by means of this station that the service can be kept in touch with all delays and maintain the air mail service at its highest efficiency.

U. S. Signal Corps Uses Loops to Receive European Stations in Washington, D. C.



(C. Fotograms)

The U. S. Signal Corps' radio station at Washington, D. C., does all long-distance receiving of European and foreign stations by means of loops and heterodyne receivers. This eliminates the necessity for long antennae and large inductances, as the loops are wound with the necessary amount of wire to allow reception over ranges of 15,000 to 30,000 meters, and tuning is done by means of the condensers across them. It is in the laboratory of the U. S. Signal Corps that Brig. Gen. Squier, Chief Signal Officer, conducts all his experimental work, and where the wired wireless system was perfected.

Peak in Broadcasting Stations Reached

By Washington R. Service

WASHINGTON, D. C.—Broadcasting is apparently slowing down slightly, based upon the number of stations in operation today. The peak of the curve of this popular service was reached in May, when 591 stations were on the lists of the Department of Commerce. On June 30th, there were 573—18 less stations than in May, although there were 115 more than in June, 1922.

The broadcasting service which started in September, 1921, with three stations, rose slowly during the last months of 1921 to 28 at the end of the year, but in March, 1922, it began to climb by leaps and bounds, reaching 576 in December, 1922. January showed a loss of six stations but this was made up in February when a total of 581 was reached. Following the National Radio Conference in February, 1923, this figure increased until the peak of 591 was reached in May. With the allocation of wave lengths, a number of stations have dropped by the wayside; fifty stations were deleted in June, more than in any other month since the service was undertaken.

On June 30, the total of 573 stations was distributed as follows: Class A, 203; Class B, 42; Class C, 327; and Class D (development) 1.

During the month of June, 31 new Class A stations were licensed and one Class B. 27 C's were transferred to Class A, and two were granted Class B licenses. In June, one Class A station stopped broadcasting, and 49 Class C's, on 360 meters were deleted.

The stations dropped from the records of the Department during June follow:

One Class "A"

Call
WLAS—Central Radio Supply Co., Hutchinson, Kansas.

49 Class "C"

Call
WPA—Anderson & Webster Elect. Co., Wahoo, Neb.
WHA—Automotive Electric Service Co., Sioux City, Iowa.
WOAS—Bailey's Radio Shop, Middletown, Conn.
WPAY—Bangor Radio Laboratory, Bangor, Maine.
WAAL—Beamish Elect. Co., Minneapolis, Minn.
KNN—Bullocks, Los Angeles, Cal.
WPE—Central Radio Co., Inc., Independence, Mo.
KFEB—City of Taft, Taft, Cal.
WCN—Clark University, Worcester, Mass.
WEY—Cosradio Company, The, Wichita, Kansas.
KDZG—Cyrus Pierce & Co., San Francisco, Cal.
WEAX—Daily, T. J. M. (Argenta), Little Rock, Ark.
WRAK—Economy Light Co., Escanaba, Mich.
KSL—Emporium, The, San Francisco, Cal.
KDZX—Glad Tidings Tabernacle, San Francisco, Cal.
WKAL—Gray & Gray, Orange, Texas.
WLK—Hamilton Manufacturing Co., Indianapolis, Ind.
WCAC—John Fink Jewelry Co., Fort Smith, Ark.
WMAX—K & K Radio Supply Co., Ann Arbor, Mich.
KFGB—Leewenthal Bros., Pueblo, Col.
WRAM—Lombard College, Galesburg, Ill.
WWAY—Marigold Gardens, Chicago, Ill.
WOU—Metropolitan Utilities District, Omaha, Neb.
WFAW—Miami Daily Metropolis, Miami, Fla.
WEH—Midland Refining Co., Tulsa, Okla.
WCAB—Newburgh News Printing & Pub. Co., Newburgh, N. Y.
KFCB—Nielsen Radio Supply Co., Phoenix, Ariz.
WKAK—Okfuskee County News, Okemah, Okla.

WGAM—Orangeburg Radio Equipt. Co., Orangeburg, S. C.
WHAW—Pierce Elect. Co., Tampa, Fla.
WKAH—Planet Radio Co., West Palm Beach, Fla.
WCAW—Quincy Electric Supply Co., Quincy, Ill.
KJJ—Radio Shop, The, Sunnyvale, Cal.
WKN—Riechman Crosby Co., The, Memphis, Tenn.
WEAV—Sheridan Elect. Service Co., Rushville, Neb.
KNI—Smith, T. W., Eureka, Cal.
WFAZ—South Carolina Radio Shop, Charleston, S. C.
WOAU—Sowder Bolling Piano Co., Evansville, Ill.
WRAC—State Normal School, Mayville, N. D.
WFAC—Superior Radio Co., Superior, Wis.
KFBH—Thomas Musical Co., Marshfield, Ore.
WMAG—Tucker Elect. Co., Liberal, Kansas.
WPO—United Equipment Co., Memphis, Tenn.
WSAV—Vick, Clifford W., Radio Construction Co., Houston, Tex.
WMAR—Waterloo Electrical Supply Co., Waterloo, Iowa.
KFBD—Welsh, Clarence V., Hanford, Cal.
WAAY—Yahrling-Rayner Piano Co., Youngstown, Ohio.
KOA—Y. M. C. A., Denver, Col.
WIAE—Zimmerman, Mrs. Robert E., Vinton, Iowa.

List of Broadcasting Stations Licensed Week Ending June 30

Call	Station	Frequency Kcys	Wave Length, Meters	Power, Watts
K F I U	Alaska Elect. Light & Power Co., Juneau, Alaska.....	1330	226	10
W S A N	Allentown Radio Club, Allentown, Pa.	1310	229	10
K F I V	Broyles, V. H., Pittsburg, Kansas	1250	240	20
K F H Y	McEwan, R. S., Trinidad, Col.	1240	242	50
W S A Q	Round Hills Radio Corp., Dartmouth, Mass.	1070	280	100

Transferred from Class C to Class A

Call	Station	Frequency Kcys	Wave Length, Meters	Power, Watts
W Q A E	Moore Radio News Station, Springfield, Vermont.....	1090	275	50
W S A T	Plainview Elect. Co., Plainview, Texas	1120	268	20

One new Class B license and three new Class A licenses were issued by the Department during the week ending July 7.

New Class B

Call	Station	Frequency Kcys	Wave Length, Meters	Power, Watts
W C A P	Chesapeake & Potomac Tel. Co., Washington, D. C.....	640	469	500

New Class A

Call	Station	Frequency Kcys	Wave Length, Meters	Power, Watts
W K A D	Loeff, Charles, East Providence, R. I.....	1250	240	10
W S A R	Doughty & Welch Elect. Co., Fall River, Mass.	1180	254	10
K F I X	Reorganized Church of Jesus Christ of Latter Day Saints, Independence, Kansas	1250	240	500

Transferred from Class C to A

Call	Station	Frequency Kcys	Wave Length, Meters	Power, Watts
W N A C	Shepard Stores, Boston, Mass.	1080	278	100
W R A Y	Radio Sales Corp., Scranton, Pa.	1070	280	100
K F B U	Thomas, Bishop N. S., Laramie, Wyo.	1060	283	50
K F F R	Kirk, Jim, Sparks, Nev.....	1330	226	10

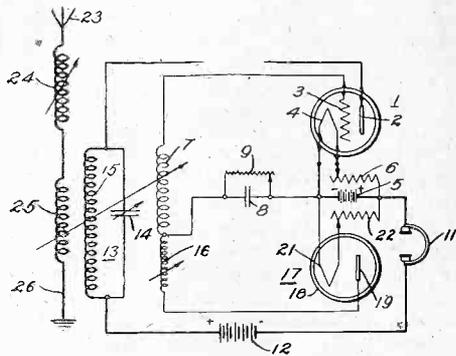
Latest Radio Patents

Wireless Receiving System

No. 1,455,768: Patented May 15, 1923. Patentee: J. Slepian, Swissvale, Pa.

This invention relates to methods and means for amplifying currents and particularly to wireless receiving systems.

In its broad aspect, the object of my invention is to provide an improved



Receiving system utilizing cascade detection and selective feedback.

wireless receiving system which has highly desirable operating characteristics and which is responsive to signal impulses radiated from either damped or undamped wireless transmission systems without the customary heterodyning step.

More specifically, one object of my invention is to provide a receiving system which admits of an extremely high amplification of received signal impulses.

These and other objects of my invention will be apparent from the following description of the nature, the mode of

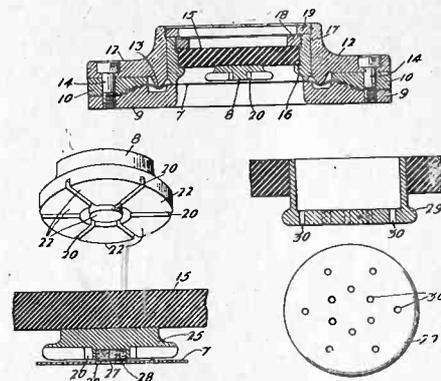
operation and the advantages of my invention.

It is well known that, in a regenerative feed-back system employing a grid condenser having insufficient grid leak, the system oscillates intermittently, as indicated by a howling in the telephone receivers. That is to say, upon some slight unbalancing of the system, the tube is set to oscillating, the oscillations increasing in amplitude. When the amplitude of the oscillations stops increasing, the oscillations become unstable since any slight decrease in their amplitude fails to produce a corresponding decrease in the charge in the grid condenser; hence the oscillations continue to decrease in amplitude and finally stop. When the charge on the grid condenser has decreased to a sufficiently low value, as determined by the constants of the system, the oscillations again build up, as before, and the blocking action is repeated. It will be noted that the oscillations must build up to approximately the maximum limits of the tube before the blocking action becomes effective.

I have found that, by increasing the charge on the grid to values higher than the peak value of the alternating grid potential, in accordance with the varying intensity of a signal impulse to be detected, the blocking action may be manifested before the oscillations reach their maximum value, as determined by the constants of the tube, and that the maximum amplitude of the intermittent oscillations obtaining in the system is directly dependent upon the varying intensity of said signal impulse.

It has been found that diaphragms such as are used in telephones, phonographs and other acoustic apparatus have a more or less marked natural period for one or more frequencies, and if acted upon by waves of these frequencies will respond more than for materially different periodicities. The natural frequency depends in general on the mass, and stiffness of the diaphragm, decreasing with increase in mass, but increasing with increase of stiffness.

In the usual telephone diaphragm the lowest natural frequency is in the neighborhood of 1,000 cycles per second, which is well within the range of those frequencies used in speech. Because of this natural periodicity and the resulting inequality in response to impulses of different frequencies a telephone diaphragm will distort speech



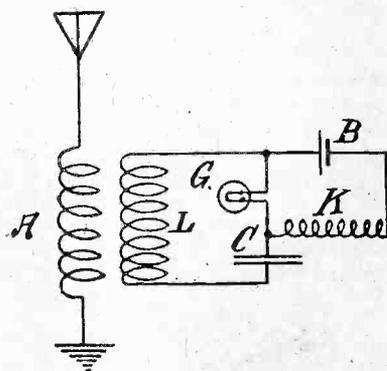
Improvement in diaphragm construction as applied to phones.

waves which are impressed on it when the resonance point of the diaphragm falls within that range which is of importance in speech. If, however, the elasticity or the stiffness of the transmitter is increased sufficiently this resonance point will be removed outside the speech range, and there will be a substantial equality of response to all impressed frequencies of the same intensity over a wide range of frequency. This maximum response at the resonance point could also be considerably decreased in value by increasing the damping factor of the vibrating system. The damping factor in general depends only upon the frictional forces and upon the inertia, being directly proportional to the frictional forces and inversely proportional to the inertia or mass of the moving system. Increasing the damping factor therefore gives a vibrating system a frequency characteristic of response more nearly of the ideal form.

Detecting Small Electric Currents

No. 1,455,458: Patented May 15, 1923. Patentee: J. S. E. Townsend, Oxford, England.

The object of this invention is primarily to provide a simplified instrument whereby the wave length of electrical oscillations can be readily measured. The instrument may, however, be used merely



Means of measuring wave length by sight.

for detecting the presence of small oscillating currents.

It has been before proposed to employ an incandescent electric lamp bulb for detecting electric currents, but hitherto it has been possible to use such a detector only when the current is fairly large, that is, large enough to heat the filament from

its normal condition to the temperature at which it becomes incandescent.

According to this invention I employ an evacuated bulb having its filament connected in series with a choke coil and a battery of sufficient strength to heat the filament to a temperature slightly above or below the point of incandescence, so that the lamp is in a sensitive condition to show visually any small change of temperature due to the passage through the filament of a small current, and I superimpose the current to be detected upon the current flowing from the battery through the filament, so that the addition of this small current to the normal current may cause a change in the condition of the filament, which change is easily distinguished by the eye. Such a detector is especially suitable for showing alternating currents or currents of high frequency, and may be used either to detect the currents or to indicate when they attain a maximum value.

Acoustic Apparatus

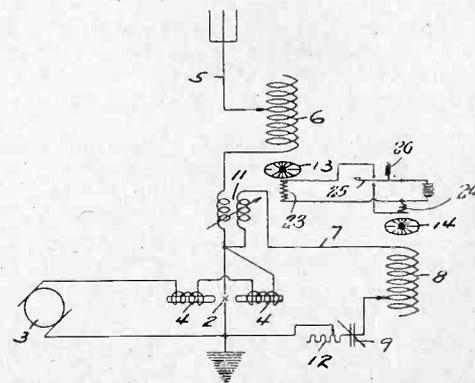
No. 1,456,538: Patented May 29, 1923. Patentee: Irving B. Crandall, New York, N. Y.

THIS invention has reference to improvements in acoustic apparatus for the transmission, reproduction, recording, analyzing and measuring of sound waves. More particularly it relates to telephone transmitters, one of its objects being to produce a transmitter that gives practically a uniform transmission over a greater range.

Radio Telegraphy Signalling System

No. 1,454,629: Patented May 8, 1923. Patentee: H. F. Elliott, Palo Alto, Cal.

An object of this invention is to provide an efficient uniwave signalling system for radio transmitting stations. The invention possesses other advantageous features.



Means of providing uniwave transmission.

tem for radio transmitting stations. The invention possesses other advantageous features.

Answers to Readers of Radio World

I have been told that by using one tube and a crystal detector in a reflex circuit that I can get louder signals and longer distance than by the use of the detector and one stage of audio-frequency. Is this so? Why?—Carl Kinesta, Maryville, Ky.

You can obtain louder signals and longer distance with a reflex such as you mention. The reason is that with a one tube reflex circuit you are getting one stage of radio frequency amplification, and one of audio-frequency amplification, in connection with your crystal detector. With the other circuit you would only be using the tube as an audio-frequency amplifier, and here you are gaining the use of an added stage of radio-frequency.

* * *

Is it possible to guarantee a circuit to receive foreign broadcasting stations? I have received a circular from a radio manufacturer that states that he will positively guarantee his set to receive English broadcasters anywhere in the United States on two tubes and an outside antenna. Is this possible? A Constant Reader.—Kansas City, Mo.

It is a pretty difficult thing to guarantee the receiving range of any set, as there are many conditions that have to be considered, and we have never heard of a set that is guaranteed to receive over such distances. You had better investigate it thoroughly before purchasing. The statement "anywhere in the United States" is quite a large order, and while receivers have been made that will get English broadcasters along the eastern and central parts of the United States, it is not probable that a two tube set is capable of such work.

* * *

Which is the more efficient form of radio-frequency amplification, tuned impedance coupled, transformer coupled, or resistance coupled?—A. G. Grant, 1673 Broadway, N. Y.

As far as efficiency is concerned, the tuned impedance coupled is the best. This is because of the fact that transformer coupled and resistance coupled are only capable of receiving on a very narrow band of wave length, and on all others it will receive with decreased efficiency. By using tuned coupling, you are enabled to control the wave length of your amplifiers and therefore get the best response from your tubes.

* * *

Kindly explain how I could repair my tube. I broke the tip off, and the vacuum was lost.—Ezekial Henderson, Camp Kum-watchee, Indiana. General Delivery.

It is impossible for any one to repair tubes unless they are equipped with apparatus necessary, such as mercury pumps, and a full line of glass blowing equipment, as well as a most complete knowledge of lamp-glass blowing. It takes more than a knowledge of how it should be done.

* * *

Will you kindly publish a diagram of the Flewelling Circuit? What plate voltage should be used in this circuit? Will it operate a loud speaker? What tube should I use in this circuit?—Joseph E. Healy, 114 Cypress Ave., Bronx, N. Y. Alfred Neff, 23 Chatham St., San Francisco, California.

The Flewelling circuit was published in RADIO WORLD for March 24. From 45 to 60 volts is correct for the plate voltage. It is doubtful if there will be enough volume to operate a loud speaker on one tube; however, with one stage of audio-frequency you will be able to operate one. Would

suggest that you use one of the U. V. tubes as you are looking for volume. This circuit will operate on dry cell tubes but the volume will be greater when the larger plate surface tubes are used.

* * *

Is there any advantage in winding coils and tuners with Litz wire? Are there any books published which will show me the different forms of winding coils? Where can they be obtained? Is my enclosed description of Litz wire correct?—George Stepanek, 3328 Portland Ave., Minneapolis, Minn.

The advantage gained in the use of Litz wire in the winding of coils is the lowered resistance and greater inductance. We advise you to get the book titled "Ideas for the Radio Experimenter's Laboratory," by M. B. Sleeper. It can be obtained from the Columbia Print Co., 1493 Broadway, New York City. It gives several ideas for the winding of coils and inductances that are of value to the radio enthusiast.

* * *

Where can I obtain a sketch or blue print of a set using five tubes using two stages of radio-frequency, detector and two of audio-frequency amplification?—John Budge, 65 McGregor Ave., Toronto, Ont., Canada.

A suitable circuit for this purpose was published in RADIO WORLD for June 30, in the "Answers to Readers" department.

* * *

In RADIO WORLD for March 24, you published a photograph of B. R. Mayo. Where can I obtain his address?—Mrs. C. B. Holden, Midland Park, N. J.

The address of B. R. Mayo is 2761 Broadway, New York City.

* * *

On page 16 of RADIO WORLD for June 2, you published an article by W. S. Thompson, on a simple reflex set. Where can I secure a diagram of this set in "long hand," as I am not familiar with technical diagrams? Can the set mentioned be used with the U. V. 199 tubes? Can a variocoupler or variometer be used with this set?—Carl E. Morrison, 545 62nd St., Brooklyn, N. Y.

From your description we understand that you cannot translate a diagram. Suggest that you take the diagram in question to some friend that is familiar with such things and have him help you, as the description that you ask for would take up too much space to allow us to print it. The set can be used with these tubes. Yes, it is possible to use this set with a variocoupler by connecting the secondary of the coupler in place of the loop, and using an antenna and ground.

* * *

I constructed the single circuit regenerative receiver that was described in RADIO WORLD for April 24, by Arthur S. Gordon. I have checked this circuit very carefully, but cannot get anything out of it. What is my trouble?—Reinhold Dalhm, R. R. 2, Box 44, Hartford, Wis.

Your diagram is correct, and we suggest that you examine the grid leak and condenser and make sure that all your connections are good. Soldering them is best. If you have hooked the set up exactly as your diagram shows there is no reason for the circuit not operating, as it is absolutely correct. Make sure of your B battery, and see that your antenna is not grounded.

* * *

Will you please publish the circuit diagram that is used by Myrle Wood, in your

Nite Owl Records of RADIO WORLD for June 2? Can honeycomb coils be used in this circuit for long waves?—R. Babylon, 3024 Fern St., New Orleans, La.

The circuit diagram as used by Myrle Wood was published in the issue you mention. You cannot use honeycomb coils in connection with this circuit. You can load it up by the use of the coils you mention; but the fact that it uses variometers will naturally limit the range of such practice.

* * *

Which is more efficient as to distance work, a three tube reflex or a single circuit receiver with two steps of amplification? Is the circuit used in the De Forest D7 a reflex circuit? Is regeneration necessary in order to receive telephone signals? Is a crystal set capable of regeneration?—William Morris, 345 West 54th St. New York City.

The more efficient of the two sets mentioned is the reflex if properly constructed and tuned. This is because of the fact that radio-frequency amplification is used, which allows amplification of the signals before rectification. With a single circuit set, with audio-frequency amplification, no signals can be amplified that are not heard in the detector alone. The De Forest D7 is a reflex circuit. Regeneration is not necessary in order to receive signals. A crystal set is not capable of regeneration.

* * *

Can I use the — coupler in a reflex receiver, using a crystal detector? Where may blue prints of reflex sets, with panel layouts and all necessary data be furnished?—James R. Kaker, Str. "Malutoa," Sault Ste. Marie, Mich.

The coupler you mention can be used in connection with the reflex circuits. We do not handle blue prints of circuits. Apply to S. Newman & Co., 74 Dey Street, New York City.

* * *

Where can I obtain instructions as to the exact tuning in of long distance stations using the set described in RADIO WORLD for May 12, by C. H. Stoup?—J. H. Parkhurst, 221 S. Ashland Blvd., Chicago, Ill.

Information as to the exact tuning of any particular set is very difficult to give, as it is only by familiarity with your own set that you can learn how to tune any set, even a crystal set. In order to properly tune any set you must practice and get used to it.

* * *

Is there any practical method of eliminating static?—Joe Kavanaugh, 519 Grant Ave., Hoboken, N. J.

Static cannot be entirely eliminated, but it can be diminished by the use of a loop antenna. If an outside antenna is used no series condensers should be used in the antenna-ground circuit, and the use of a short, low antenna will help. See article on static by Kenneth Malcolm in RADIO WORLD, June 2.

* * *

Will you publish a diagram for two stages of radio-frequency detector and two stages of audio-frequency in a set? Will it enable me to receive from 200 to 600 meters? Will it work on a loop?—Walter Mack, 806 No. Windomere, Dallas, Texas.

A diagram such as you wish was published in RADIO WORLD for June 30 in answer to a question by A. Hallam. It will enable you to receive over the wave band you desire. It is possible to work the set on a loop.

What the Public Likes in Broadcasting Programs Partly Shown by Letters

AT the close of radio programs announcers invariably ask the audience to express its appreciation or criticism in writing. "We want to broadcast programs which you like, and unless you write we will not know what you enjoy," they say.

Dr. Burton, of the University of Michigan, in a baccalaureate sermon, said: "The first requisite of valuable public service is not the desire to find out what most of the people want, but the purpose to help people want what they ought to have."

The big question in the program director's mind is whether to give the public what it wants or learn what it should have and broadcast that, says a writer in the *New York Times*. A radio impresario entertains the largest audience of any showman, and he can lose his audience in a second. Few people walk out of a theatre, circus or concert if the program is not what they desire, but a slight turn of a radio dial and any member of the audience can free himself from the theatre of the air without disturbing the others. The station which radiates a program that the people "ought to have" is generally a victim of tuning out as the dials revolve to bring in some other station broadcasting what the listeners want.

Based on the quality and merits of music, opera and classical selections are what the music masters say the public "ought to have." Letters received at the radiophone studios show that great differences exist between that estimate and what the radio audience wants.

What does the public enjoy most? This question is answered in part by the letters. However, these represent but a small percentage of the audience. Comparatively few express their applause or criticism in writing.

Believing the Volstead Act to be something many people do not want, and others think the nation ought to have, the impresario of WEAf selected as part of an evening program a prohibition debate between prominent wet and dry leaders. Considerable interest was aroused, as indicated by telephone calls which overburdened the wires with questions from radio listeners. About 2,000 letters were received from the estimated thousands who tuned in on the debate.

To determine how many listened to the prohibition arguments and other features broadcast from the station a survey was conducted through the co-operation of sixty newspapers. The general plan was to obtain a fairly accurate figure relative to the number of receiving sets tapping the ether within a 100-mile radius of WEAf's aerial. The census showed about 13,600,000 persons living within that radius, and the results of the survey indicated about 600,000 receiving sets.

A study made by the Radio Corporation of America pointed to a division of the radio audience into two general classes—one which wants jazz and the other classical music. New stations are generally provided with two studios so that a classical

concert and dance music can be broadcast simultaneously.

Telephone calls and letters addressed to the program directors indicate clearly that jazz bands are the favorite of youth. A symphony orchestra and opera bring correspondence expressing appreciation and is apparently the most pleasing form of musical entertainment to many of the older listeners. The trend seems to indicate that the radio audience is growing more critical in its tastes. It is admitted that light music is appreciated by many, but several program directors believe jazz is merely a diversion to be heard at intervals rather than regularly.

There is a great gap between the listener who wants dance music and the one who favors high-class selections. The middle group of listeners seldom take time to write to a radio station.

Large sales have been recorded in the radio business on advance notice that a prize fight would be sent into the air, blow for blow, direct from the ringside. Football games and the World's Series baseball contests stimulated the sale of radio instruments to a marked degree. A conquest for supremacy is a radio event which entertains the mass of those listening in. People the world over throughout history have found pleasure in conquest, so this favorite program of the radio theatre is little different from the programs in the coliseum of ancient Rome, the lists of England and the arenas of Spain.

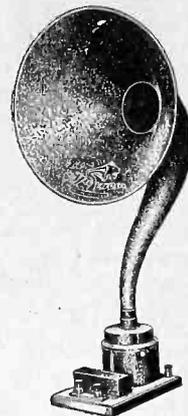
Just before a contest is broadcast many people invest in a radio receiving set to hear the contest direct, first hand, the instant it happens, whether the result be a knockout, a touchdown or a home run. Music has its charms, but a fight for supremacy and championship fascinates and quickens the pulse even by radio.

During the last few months WEAf has broadcast a program at 11 a. m. daily. Many wondered if such broadcasting would be worth the time and expense because few persons would be listening at such an hour. Correspondence shows that the morning program entertains a new audience—women at home and people who work at night. Correspondence from women has more than doubled, and many of those who work at night write to tell how the 11 o'clock entertainment affords the only opportunity they have to tune in. It is estimated that about 7 per cent of the population of New York works at night, so the 11 o'clock audience is not a small gathering.

Musical comedy selections are popular, as they travel through the air especially to listeners in outlying districts. The effect of broadcasting one act of the musical comedy "Wildflower" through the microphone was called a revelation. For several weeks afterward every performance was sold out, and the largest advance sale ever reported for the Casino Theatre was recorded. Radio evidently gave sufficient suggestion of the quality of the performance to attract hundreds to the box office.

MAGNAVOX

Radio Products



R3
Magnavox
Radio
The
Reproducer
Supreme

Make Your Receiving Set Complete

The efficiency of the Magnavox Reproducer is due to its principle of construction.

Only the Magnavox (electro-dynamic) reproducer can re-create broadcasted programs according to their original pitch, quality and volume.

Without Magnavox equipment, no Radio receiving set is complete.

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

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

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

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

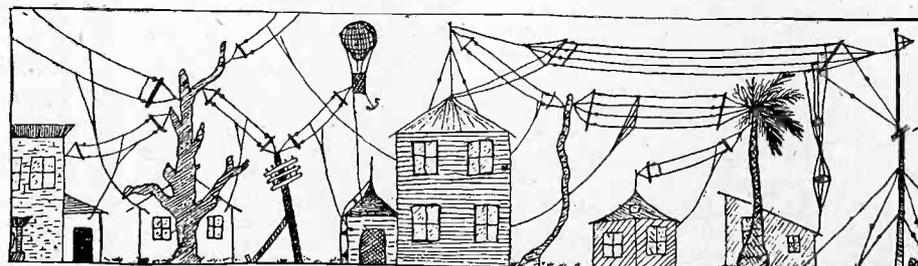
AC-2-C, 2-stage, \$55.00
AC-3-C, 3-stage, \$75.00

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

The Magnavox Co.

Oakland, California
New York Office: 370 Seventh Avenue

Radio Fever Has Struck Porto Rico



From Porto Rico Radio News

THE RADIO BUSINESS IS GETTING INTO FINE SHAPE. AS FORBES SAYS: "THE BEST STEEL IS THAT WHICH HAS UNDERGONE THE HARDEST POUNDING."

Radio Merchandising

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

Telephone Bryant 4798

Radio Literature Wanted

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

- W. Stark, Box 154, Portland, Texas.
- Kent Deckard, P. O. Box 3, Rusk, Texas.
- Frank E. Boyd, Woodland Street, Englewood, N. J.
- D. W. McArthur, Jr., Box 74, Montbrook, Fla.
- Theodore F. Hehlant, 917 Watson Street, Ripon, Wis.
- W. M. Sudmore, 2206 Elinor Drive, Des Moines, Iowa.
- E. H. Harvey, 4008 Westminster, St. Louis, Mo.
- G. W. Fitzmaurice, Big Oak Flat, Calif.
- Robt. G. Vaughn, Jr., 357 Church Street, Greensboro, N. C.
- P. H. Duncan, 1250 Starr Avenue, Burlington, Iowa.
- H. O. Mendousa, 241 North Euclid Street, Pasadena, Calif. (Wants to buy receiving set.)
- A. H. Cumming, Lewellen, Nebr. (Dealer.)
- E. H. Haysel, 4258 Normal Avenue, Los Angeles, Calif. (Will soon establish exclusive retail radio business.)
- Will Wiggins, Warkworth, Ontario, Canada. (Dealer.)
- Ernest Pumphrey, 2410 Olive Street, Texarkana, Texas.
- C. R. Cochran, P. O. Box 434, Cottage Grove, Oregon.
- G. Pericaud, 85 Boulevard Voltaire, Paris XI, France.
- Taylor Radio Shop, Minonk, Ill.
- K. G. Howard, Alsen, Greene Co., N. Y.
- H. V. Lounsbury, 530 King st., Stratford, Conn.
- C. H. de La Monti, 252 West 64th St., New York City. (Builds to order highest type sets.)
- C. Kendle, 217 Klotter Ave., Cincinnati, Ohio. (Wants tube repairing outfit.)
- G. L. Michard, 1346 Geddes Ave., Ann Arbor, Michigan.
- Swain Solon, Shenandoah, Iowa. (Wants parts.)
- Lloyd J. Lewis, R. I. Box 68A, Baraboo, Wis. (Wants loud speaker.)
- H. Elgie, Woodfibre, Howe Sound, British Columbia, Canada. (Handles parts as side line.)
- C. A. Rheinstrom, 235 West 108th St., New York City.
- Thos. Ellingson, 4136 North Kildare Ave., Chicago, Ill.
- C. H. Chisholm, 16 Ashland St., Malden, Mass.
- Joe Boyd, Box 167, Wynona, Okla. (Dealer.)
- C. A. Marshall, 46 Newton St., Ottawa, Canada.

Crosley Holds Jobbers' Convention

THE Crosley Manufacturing Company held a jobbers' convention at its home offices in Cincinnati, Ohio, on July 10 and 11. There were present representatives of the largest jobbing houses of the country to inspect the Crosley company radio plant, wood-working shop, printing office and broadcasting station, WLW. Numerous valuable suggestions for the marketing of radio products were advanced during the sessions of the meeting, most of them in correction of past mistakes in the industry as a whole.

De Forest Elects New Officers

AT a recent meeting of the board of directors of the De Forest Telephone & Telegraph Company, Jersey City, N. J., the following officers were elected: E. H. Jewett, president; Chas. Gilbert, vice-president and treasurer; and R. M. Keator, secretary.

\$1,000,000,000 Gain in 1923 Crop Value Considered Big Thing for Radio

Radio manufacturers, distributors and dealers should go right out for the farmer trade.

A government forecast shows that the crop value in this country for 1923 will show a gain, at the present market prices, of \$1,000,000,000 (one billion dollars) over the crop value of 1922.

The farmers are going to have money. They can afford to buy radio sets. Sell 'em!

Dr. Gildersleeve's Set Goes to the Veterans—Six Tubes Needed

FOLLOWING the suggestion of RADIO WORLD, made in last week's issue, Dr. Donald M. Gildersleeve, 169 Prospect Park West, Brooklyn, N. Y., generously has donated a six-tube receiving set to the Veterans' Mountain Camp, Big Tupper Lake, N. Y. The set goes forward this week to the officials in charge of the camp.

The set is a Rico JM-6 and is complete with the exception of the necessary six tubes. Now, will one or more readers of RADIO WORLD come forward with the tubes? Their prompt generosity will complete Dr. Gildersleeve's fine gift. De Forest, Radiotron, or Cunningham tubes may be used.

Gentlemen, the veterans can't listen in without tubes for their new set!

That Stencil List of Radio Manufacturers and Dealers

A trade reader of the Merchandising Department of RADIO WORLD has asked for information as to the number of names of radio manufacturers, jobbers and dealers obtainable from concerns having stenciled lists. Inquiry has been made of one of the most important list dealers in this country, and we are informed that a corrected, up-to-date and authoritative list of the names wanted would show the following figures:

Radio manufacturers	1,826
Radio jobbers	1,758
Strictly radio retailers.....	3,867
	7,451

And that seems to be the answer.

Western Electric Does Big Business

FIGURES of the Western Electric Company show that its billed goods were valued at \$114,890,000 in the first half of 1923, an increase of \$15,237,000, compared with the same period last year. Orders booked in the first half of this year approximated \$142,805,000, which is \$57,363,000 more than last year.

Orders Show Big Increase

THE Westinghouse Electric and Manufacturing Company reports new orders valued at \$47,500,000 in the second quarter of 1923, against \$32,119,000 in the same period last year.

New Radio and Electric Firms

Electrial Thermal Machinery Co., manufacturing apparatus for electrical heat treatment of metals and alloys, \$1,000,000; Edwin S. Pickett, Jos. E. Perry, New Haven, Conn.; Daniel J. Keefe, West Haven, Conn. (Corporation Service Co.)

Volton Battery Co., New York City, has increased its capital stock from \$5,000 to \$20,000.

The Improved Electric Products Co., Cleveland, Ohio; capital, \$10,000; manufacture and deal in electrical devices; incorporators, H. D. Weinstein, Wayne C. Black, M. Becker, G. H. Brunswick and W. G. O'Haren.

McPhilpin Radio Electric Corporation, Brooklyn, N. Y., has increased its capital stock from \$20,000 to \$30,000.

Barclay Electric Co., New York City, has increased its capital stock from \$20,000 to \$25,000.

Brackman Electric Co., Rochester, N. Y., \$50,000; A. L. and C. Brackman, R. J. Jauss. (Attorney, W. V. Armstrong, Rochester.)

Harlem Radio, New York City, \$5,000; H. C. Bernheim, M. Lovett. (Attorney, M. L. Gilman, 27 Cedar Street.)

Mu-tron Radio Corp., install radios, \$250,000; George A. Blackford, Wheeling, W. Va.; A. Tegarden, Martin's Ferry, Ohio; T. M. Darrah, Wheeling, W. Va. (Attorney, Horace G. Eastburn, Wilmington, Del.)

Status of American Telephone & Telegraph Co.

THE American Telephone and Telegraph Company, parent company of the "Bell System," had net working capital of \$113,214,961, according to its balance sheet as of March 31 last, current assets standing at \$138,334,102 and current liabilities at \$25,119,141. On December 31, 1922, net working capital amounted to \$99,695,528. Its report to the Interstate Commerce Commission shows net operating income of \$13,427,554 for the first five months of the current year against \$11,228,459 in the corresponding period of 1922. Operating income for May was \$2,643,284 against \$2,437,947. Net earnings of seventy telephone companies for the four months ended April 30 last totaled \$48,225,509, an increase of \$7,736,354 over the first four months of 1922. Operating revenue was \$210,723,542, an increase of \$22,041,534.

Daily Newspapers Publishing Radio News and Programs

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

The Lawrence Daily Eagle (morning), The Evening Tribune, Lawrence, Mass. Howard G. Lewis, radio editor, care The Eagle. Both publish daily radio programs and a radio column.

Daily Evening Item, Lynn, Mass. Clayton L. Carpenter, radio editor. Prints daily radio program.

The Evening Sentinel, Ansonia, Conn. Prints daily radio programs of nearby stations.

The New Haven Register, New Haven, Conn. Publishes same radio programs as The New York Tribune. H. I. Jenks, radio editor.

Worcester Evening Post, Worcester, Mass. Publishes daily radio programs from stations broadcasting in New England, North and Middle Atlantic States. Address communications to Radio Editor.

The Standard, New Bedford, Mass. Evening and Sunday. Carries daily radio programs and a full page of radio news on Sunday. Lester I. Jenkins, radio editor.

The New Bedford Times, New Bedford, Mass. Evening and Sunday. Daily radio programs. Full page of radio news on Sunday. Leonard Finnell, radio editor.

Boston American, Boston, Mass. Publishes daily nearly complete programs of six or seven stations and a schedule of evening and night broadcasting hours of 30 to 40 other stations.

Des Moines Sunday Register, Des Moines, Iowa. Publishes a summary of leading station programs for the ensuing week. James D. Le Cron, radio director.

Pine Bluff Commercial, Pine Bluff, Arkansas. Evening. Radio column discontinued during summer. Probably resume daily programs and radio news about October 1. James E. Miles, Jr., radio editor.

The Springfield Republican, Springfield, Mass. Daily, Sunday, weekly. Publishes radio programs daily and Sunday. Arthur F. Hardwick, radio editor.

The Hartford Courant, Hartford, Conn. Conducts regular radio departments. Publishes daily detailed programs of prominent broadcasters. Also operates its own broadcasting station, WDAK, and presents a weekly program every Saturday night. John R. Donahue, radio editor.
(To be continued)

The C. D. Tuska Company's Main Assembly Room

Here are assembled the radio products bearing the well known trade-mark of the C. D. Tuska Company, Hartford, Conn.



In the Market for Many Items

EDITOR, RADIO WORLD: We are just building our models and patterns of radio apparatus, and we need much material, but have difficulty in finding the right parties who manufacture and sell same at lowest prices. To house our apparatus we want manufactured for us "wood fibre cabinets" of similar materials to that in fibre water buckets, and finished in ebony, walnut, etc., at a low price to cut out high priced cabinets. We also need wood rotors, rotor axles or shafts, cardboard and fibre tubes, aerial wire, magnet wire, insulated lead in and ground wire, insulators, binding posts, dials, contact point, switches, switch stops, crystal detectors, headphones, washers, nuts, machine screws, brass rods, round and square, condensers, transformers, tubes, etc., etc. We must buy them as low as possible to reduce the present high prices on radio apparatus and will sell direct to users only.

Yours truly,
ADAM SCHICK.

Vinland, Kansas.

Radio Certainly Boosted These Songs and Music

EDITOR, RADIO WORLD: In regard to Broadcaster-Music Publisher fight I can truthfully say if it were not for the broadcaster I would not have heard and bought every new song or musical piece that I have at present. I have bought as high as seven pieces per week and also the same with records.

Every opera that was broadcast by WJZ when the station was in Newark was attended by at least three of my family or friends who had listened with me.

Yours very truly,
R. W. FINTER, Sr.

126 Wainwright St., Newark, N. J.

Radio Parts Wanted by This Buyer

EDITOR, RADIO WORLD: I will purchase about \$1,500 stock of standard radio parts before September 1 and would like to get in touch with manufacturers making good quality items, including fixed and variable condensers, vario-couplers, variometers, H. C. coils, storage and dry batteries, cabinets, etc. I will be located at San Antonio, Texas, and would appreciate your service.

Very truly,
GEO. L. EDWARDS.

Gibson, Mo.

Robin Radio Shop Opens New Quarters

AFTER a successful year at Craig Street and Centre Avenue, Pittsburgh, the Robin Radio Shop has been obliged to move to larger quarters at 3602 Fifth Avenue, Pittsburgh.

Right Side of Store More Valuable

IF your store has only one entrance the right side is the more valuable, says Harry Botsford in Electrical Merchandising. He continues:

An electrical merchandise dealer in Harrisburg, Pennsylvania, brought the matter to my attention. I consider him as one of the very best retailers I have ever known.

"The right hand side of my store is easily worth four times the other side," he told me a month ago. "This is a fact and not a mere theory. I've been in business for over ten years and I'm considered a fair business man, yet several months ago I discovered that something has been happening in this store every day, and I have never noticed it. And what I discovered has a direct bearing on sales, too!

"As you know, I am strong for service to customers. Originally, I had one telephone pay-station in the rear of the store. I managed to convince the telephone company it would be good business to install two telephones there. Each telephone was placed on a small table, fitted with a chair, at opposite sides of the store. Each was equally convenient and there was no reason in the world why one should be used more than the other. Yet at the end of the first month, the telephone on the right had taken in just four times the number of nickels the other had. I gave the matter scant consideration. The next month the same thing happened. That gave me the theory on which I subsequently worked.

"I decided on several experiments to prove whether or not people naturally had a habit of turning to the right when they enter a store. I had had for two weeks a very good-looking display of hair-driers and curling-irons in my front-center showcase. The sales on these items were very low for that period—only three had been sold, to be exact. I moved the display over to the right hand side of the store. The very first day it was there we sold more than we had sold before in two weeks.

"That almost convinced me; but I made other experiments. A display of electric flashlights and renewal batteries which had been selling very well on the right side of the store were moved to an equally well-lighted showcase on the left side of the store, and the sales dropped just an even 95 per cent. I have tried plan after plan of shifting and the net of my results is that I sell about four times the goods on the right as I do on the left."

Radio Trade Notes

The plant of the Virginia Radio Corporation at Charlottesville, Va., recently was damaged by a \$10,000 fire. The loss was fully covered by insurance.

* * *

Ashton Bremner, 1 Margaret St., Oxford Circus, London, W. E., England, is open to represent American firms interested in the British market.

* * *

Rocky Mountain Radio Corporation, 1512 Broadway, Denver, Colo., is in the market for cheap crystal detectors, knocked down.

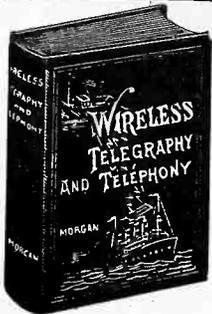
* * *

Arthur Unger, formerly assistant manager of the Permanent Radio Fair, New York City, has become a radio manufacturers' representative, with offices at 30 East 23d Street, New York City.

IF YOU ARE INTERESTED IN RADIO YOU NEED THESE BOOKS

Radio Books for Your Vacation

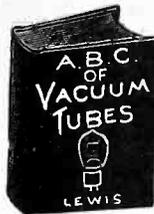
Telling How to Operate a Radio Set—How to Build a Set—Principles of Vacuum Tubes and Other Radio Problems



Wireless Telegraphy and Telephony Simply Explained

By ALFRED P. MORGAN

One of the most complete and comprehensive treatises on the subject ever published. A study of its pages will enable one to master all the details of the wireless transmission of messages. The author explains in simple language the theory and practice of wireless telegraphy and telephony. 154 pages. 156 engravings.....PRICE \$1.50

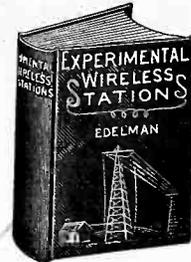


The A B C of Vacuum Tubes Used in Radio Reception

By E. H. LEWIS

Assoc. I. R. E., and Radio Instructor

Written particularly for the person who "knows nothing about radio," but who would like to gain an understanding of the elementary principles of operation of vacuum tubes and various circuits in which they are used for the reception of radio-telegraph signals and radio-telephone music and speech. Illustrated.....PRICE \$1.00



Experimental Wireless Stations

By P. E. EDELMAN

Tells how to make apparatus to not only hear all telephoned and telegraphed radio messages, but also how to make simple equipment that works for transmission over reasonable long distances. Then there is a host of new information included. The first and only book to give you all the recent important radio improvements, some of which have never before been published. 392 pages, 167 illustrations....PRICE \$3.00

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Sleeper's Two Latest Radio Books

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

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U. V. 200.....	\$2.75
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C. 300.....	2.75
C. 301.....	2.75
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AN ATTRACTIVE BINDER FOR RADIO WORLD

The publishers of Radio World have at last succeeded in getting a binder that will securely hold a full volume of this publication (26 numbers).

This binder is securely made, is attractive in appearance, and each copy can be added weekly without any difficulty.

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(Sent parcel post prepaid.)

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RADIO WORLD
1493 BROADWAY NEW YORK

RADIO WORLD

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Los Angeles—Stevens & Baumann, Inc., Higgins Building.
San Francisco—Stevens & Baumann, Inc., Holbrook Building.

SUBSCRIPTION RATES
Fifteen cents a copy. \$6.00 a year. \$8.00 for six months. \$1.50 for three months. Add \$1.00 a year extra for foreign postage. Canada 50 cents.
Receipt by new subscribers of the first copy of RADIO WORLD mailed to them after sending in their order, is automatic acknowledgment of their subscription order.

ADVERTISING RATES
One page: One time—\$150.00.
Half, Quarter, Third and Two-thirds pages at proportionate rates.
One inch, one time—\$5.00. Per agate line \$0.40.
On four consecutive issues, 10% discount.
On thirteen consecutive issues, 15% discount.
Cover and preferred-position rates made known on application.
Terms: 30 days net. 2% 10 days.

CLASSIFIED ADVERTISEMENTS
Five cents per word. Minimum, 10 words. Discount of 10% on 4 consecutive issues—15% on thirteen consecutive issues. Cash with order.
Entered as second-class matter, March 28, 1922, at the Post Office at New York, New York, under the act of March 3, 1879.

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

New Type Radio Control for Airplanes

A NEW type of automatically directed airplane performed marvellously before Marshal Petain and other high army officers at the Villa Coublay aerodrome near Paris recently, according to a press dispatch.

The control device consists of a roll of perforated paper as that of a player-piano roll. The movement is directed by wireless from the ground. As the roll moves it sets in action mechanical arms and legs which direct the plane, control the motor and release bombs.

The new craft marks great progress over other automatically controlled aircraft because there is less electrical apparatus on the airplane.

Oakland Broadcasters Increase in Number

THE Oakland Tribune in California is planning to increase the power of its broadcasting station, and hopes by October to be in a position to apply for a Class B license. At present KLX is operating as a Class C station on 360 meters with a power of 250 watts. New apparatus for a 500-watt set has been ordered from the Western Electric Company, and, with a 300-foot antenna, a far wider broadcasting range is planned this fall.

There are seven broadcasters in Oakland and its vicinity, two B stations and four A stations being in San Francisco, across the bay. The new General Electric station planned at Oakland will make a total of eight.

YOU SAVE 50% OF THE USUAL COST

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6 Volt	\$10.00
60 Amps.	
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A Better Battery Cannot Be Built

The best of material—careful construction by skilled mechanics—makes a battery that will give a long life of hard service.

A written two (2) year guarantee. You take no chances with a World Battery—it is the most satisfactory battery you can get and you save 50%.

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We ship C. O. D. subject to inspection, or will allow 5% discount for cash with order. All orders shipped same day as received.

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"RADIO TUBES REPAIRED"

Work Guaranteed

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U. V. 201 A	

SIX VOLT TUBES
DETECTORS \$2.75
AMPLIFIERS \$3.00

Radio Tube Laboratories
776 Broad Street Newark, N. J.

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700 THINGS FOR BOYS TO DO
480 Pages—700 Articles
500 Illustrations—Cloth
Price \$2.00 Prepaid

The Ideal Book for the Wide-Awake Boy

All the things described in this volume have actually been built or experimented with by boys. The ideas contained in "The Boy Mechanic" would more than keep a boy occupied until he grows up and also be an incentive to original thinking and achievement.

The Most Interesting Boys' Book

Unlike so many other books of a somewhat stilted nature, it is not confined to only one or a few subjects, but describes 700 different things boys can make and do in the fields of mechanics, electricity, sports, arts and crafts work, magic, etc.

An unusually generous book; size 7 by 10 in. and 1 1/2 in. thick; printed from large, clear type on high grade book paper and durably bound in cloth. Attractive four-color cover design.

Wholesome, Practical, Instructive

Besides telling how to make scores of things useful about the house, full and complete directions are given for constructing hundreds of things which appeal to the heart of every boy.

Many hours of enjoyment are in store for the boy who becomes possessor of this book.
Price \$2.00 Prepaid to Any Address

THE COLUMBIA PRINT
1493 Broadway New York City

Radio Locates Line Trouble

WHEN the two St. Croix transmission lines of the Northern States Power Company tripped out at 1:55 P. M. on January 30, both telephone lines to St. Croix were put out of commission, according to the Electrical World. F. J. Gerlich, superintendent of the service department, lost no time in getting to the radio set, and upon tuning in immediately heard the wireless operator at St. Croix calling Minneapolis. By means of radio-telephone communication the trouble on the transmission lines was quickly cleared up, and both lines were back in service by 2:05 P. M. (within ten minutes). Wire telephone communication was not re-established until half an hour later.

Trailing Fake Battery Sellers

WITH purpose to curb and, if required, to aid in the prosecution of deceptive advertising in the storage battery field, the national vigilance committee of the Associated Advertising Clubs of the World and its affiliated better-business bureaus and commissions have launched a campaign against unscrupulous manufacturers and dealers. The vigilance committee contends that some service stations known and advertised as the authorized representatives of well-known manufacturers are prone to trade upon the established good name of reputable concerns through the substitution of foreign or inferior parts in the reconstruction of batteries.

Government Wants Radio Engineers

THE United States Civil Service Commission announces the following open competitive examinations: Radio Engineer, \$4,000 to \$5,000 a year; Associate Radio Engineer, \$3,000 to \$4,000 a year; Assistant Radio Engineer, \$2,000 to \$3,000 a year. Applications will be rated as received until October 30. The examinations are to fill vacancies in the positions named, or in positions requiring similar qualifications, in the federal classified service throughout the United States.

The duties are to conduct or superintend the development, design, construction, installation, standardization, and the writing of specifications for practical and special apparatus and methods of radio communication, such apparatus to include sets for land use for more or less permanent stations, also for portable land stations, and for airplane and ship sets, and similar lines.

Competitors will not be required to report for examination at any place, but will be rated on the following subjects: Education and preliminary experience, 30%; special experience and fitness, 40%; publications, reports, or thesis, to be filed with application, 30%.

Full information and application blanks may be obtained from the United States Civil Service Commission, Washington, D. C., or the Secretary of the Board of U. S. Civil Service Examiners at the post office or custom house in any city.

Forthcoming Features of Program at WGY

THE Georgia Minstrel Boys, one of the most popular of recent attractions at WGY, the Schenectady broadcasting station of the General Electric Company, will give another program July 27. Within twenty-four hours of their last program 1,400 letters were received by the station.

Monday evening, July 23, Edna Schuyler, pianist; Mrs. Fred Harris, contralto, and Rosina Holmes, reader, will appear. The program on Tuesday night will be presented by the Gibson Mandolin Club, Joseph Carroll, tenor; Edith MacCulley Corlette, reader, and Ethel Mincoff, pianist. The mandolin club will play the type of selections that sound good on the water—the kind you like to hear as you drift along in a canoe.

"The Royal Mounted," a four-act play by DeMille, will be presented Thursday night, July 26, by the WGY Student Players, assisted by three members of the WGY Players.

A classical program is scheduled for the late or 10.30 p. m. program Friday. The artists will be Raymond Sachse, piano; Lloyd Beebe, cornetist; Raymond Stine, reader, and Leo Kliwen, violin.

Sunday, July 22, the morning service of the First Reformed Church of Schenectady will be broadcast, and in the evening a studio religious service will be broadcast, with a sermon by the Rev. Robert W. Anthony.

Coming Events

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

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

AMERICAN INSTITUTE OF ELECTRICAL ENGINEER, Pacific Coast convention, Del Monte, Cal., Oct. 2-5. F. L. Hutchinson, 33 West 39th St., New York.

Don't ask for Rheostat—Say

FIL-KO-STAT
FOR REAL FILAMENT CONTROL

Summer Schedule of WIP

GIMBEL BROTHERS, Philadelphia, who operate Station WIP, inform RADIO WORLD that they will not broadcast any program on Saturdays or Sundays during July and August. The regular seven-day-a-week schedule will be resumed on September 1.

"B" BATTERIES

Depleted "B" Batteries are usually the cause of your trouble in receiving. Eliminate it. Buy your "B" Batteries direct from Manufacturer. No old stock batteries, but fresh tested batteries, with a 100 per cent. efficiency, at the following low prices, which are 50% less than list price.

	Large	Medium	Small
22½ Volt plain	\$1.25	\$1.00	\$0.70
22½ Volt variable	\$1.38	\$1.13	\$0.75
45 Volt plain	\$2.50	\$1.75	—
45 Volt variable	\$2.75	\$2.00	—

Any other type of battery made to order. Send Money Order or Order for C.O.D.

ROSENDAL & CO., 2 Stone Street, New York

WOULD YOU LIKE TO RECEIVE RADIO ADVERTISING MATTER?

Are you in the market for radio goods of any kind, either as a consumer, a distributor or a retailer? If so, send us your name and address on a post card and we will see that your name reaches the right people so that you will receive pamphlets, circulars, etc., regarding the goods you want.

ADDRESS SERVICE EDITOR, RADIO WORLD, 1493 BROADWAY, NEW YORK CITY

¶ "Radio," the San Francisco magazine, is a very excellent publication. We have made arrangements with the publishers by which we are able to offer for a limited time only a six months' subscription for RADIO WORLD at the regular price of \$3.00 and also "Radio" for six months without extra cost.

¶ Send your \$3.00 at once, as this offer is open only until July 30, 1923.

CUT OUT AND MAIL TODAY

Special Radio World and "Radio" Subscription Blank

RADIO WORLD, 1493 Broadway, New York City.

Enclosed herewith find \$3.00 for which please send RADIO WORLD for six months beginning with issue of and "Radio" for six months, beginning with issue of There is to be no other charge to me.

You may, if you wish, send remittance for \$6.00 and receive RADIO WORLD for one year (52 issues) and "Radio" for one year without extra cost. This offer good only until July 30, 1923.

Name

Street Address

City and State.....

WYG Gets 65,000 Letters from Fans

SINCE the inauguration of broadcasting by WGY, sixteen months ago, the General Electric Company has received 65,000 letters from listeners scattered over the United States and from points as widely apart as Hilo, Hawaii, and London, England; Vancouver, Canada, and Valparaiso, Chile.

Some of these letters are typewritten and from the offices of business and professional men and some are penciled on scraps of paper from woodsmen and from forest rangers. All the letters acknowledge appreciation of the broadcasting service the General Electric Company is giving and, by the very fact that they are written, prove that the writer feels that the company addressed has a heart, is interested in the letters and receives them sympathetically and appreciatively.

Until WGY began broadcasting, the mail of the General Electric Company was made up of the usual type of business and technical letters. Broadcasting began a veritable flood of warm, personal missives in many of which intimate facts relating to the family were unboomed. The listener feels that the voice coming out of the air is that of a friend. It enters his home and provides pleasure and entertainment for all the members of the family circle and in acknowledging appreciation the writer addresses the station as a friend.

An elderly woman wrote WGY in part as follows:

"Accept my thanks for the two sermons yesterday. I am a poor, hopeless invalid and they were most comforting. I shall be waiting for the coming Sabbath for you have brought something into my life I had never expected to enjoy again."

Another, also an invalid, wrote: "I have been an invalid for over twelve years, confined to my wheelchair or couch nearly all that time and it is indeed a great privilege to hear the dear old hymns which I love so well and the word of God so faithfully proclaimed. It helps me forget my suffering for I am a great sufferer. * * * It is little I can do to help carry the burdens of the world but at least I can keep sweet and WGY helps me do it."

A mother told how each of her children enjoy the WGY concerts, even an eighteen months' old infant, she said, was comforted when the phones were placed over its head. A blind girl related how she had grown melancholy and depressed and then radio came along and she now has a daily joy to anticipate.

WGY requested letters from listeners when the station was started because those in charge of the technical operation wanted to know the quality of the transmission and the range of the station. When these facts became known the announcers continued to ask for letters because these letters constitute the only applause which the radio performer gets, and a large number of complimentary letters is an inspiration. So far as the performer in the radio station is concerned he has only the word of the engineers that his solo is being radiated many miles. When the letters come he knows that the words sung in the radio station in the presence of only his accompanist and an announcer, have taken flight over many states and brought pleasure to countless homes.

These letters are also useful to the program manager for from them he learns what type of program appeals to the majority of listeners and the letters strongly influence his decisions in building up future programs.

After a recent minstrel show broadcast by WGY 1,400 letters were received by the station within 24 hours. Over 2,000 letters were received within a week re-

EXTRAORDINARY SUMMER SUBSCRIPTION OFFER

Radio World and Other Popular Radio Publications for the Price of Subscription for Radio World Alone

- Radio World has made arrangements
- by which it is possible
- to offer a year's subscription for
- any one of the following publications
- with one year's subscription for
- Radio World:
- RADIO NEWS or
- POPULAR RADIO or
- WIRELESS AGE or
- RADIO (San Francisco)

- This is the way to get two publications
- for the price of one:
- Send \$6.00 today for Radio World
- for one year (52 numbers)
- and select any one of the other
- four publications for twelve months—
- This offer good only up to and
- including August 10, 1923.
- Present Radio World subscribers
- can take advantage of this offer by
- extending subscriptions one year.
- Or order thru your newsdealer.

RADIO WORLD'S SPECIAL TWO-FOR-PRICE-OF-ONE SUBSCRIPTION BLANK

RADIO WORLD, 1493 Broadway, New York City.

Enclosed find \$6.00, for which send me RADIO WORLD for twelve months (52 numbers) and also, without additional cost, Radio News or Popular Radio, or Wireless Age or Radio for twelve months.

Name

Street Address

This Offer Good
Until Only
August 10, 1923

City and State

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

RADIO WORLD'S QUICK-ACTION CLASSIFIED ADS

This department is intended for everybody who wants quick action on short announcements covering the buying, selling, exchanging or general merchandising in the radio 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 reaches us.

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

GUARANTEED 3,000 OHM HEADSETS.. \$3.95
postpaid. C. Cannon, Box 177, High Point, N. C.

BUILDING A RADIO SET? Write for monthly bargain list on parts and sets. Postage paid on all orders. Taylor Radio Shop, Minonk, Illinois.

CUTTING AND WASHINGTON detector and 2-stage audio amplifier complete with tubes, B Batteries, Storage Battery (100 ampere hour), two sets phones, Dictograph Loud Speaker. Range, 2,200 miles. \$75.00. K. C. Matheson, Box 186, Clinton, Nebraska.

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

FORMS to cast Tin Soldiers, Marines, Indians, Trappers, Hunters, and my Air Pressure Cannon Machine. Moulds from \$1.25 up to \$3.50, casting 3 to 4 pieces at once. Write for catalogue. Ht. Schiercke, 1304 72nd St., Brooklyn, N. Y.

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

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

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

FREE APPARATUS FOR SECURING SUBSCRIPTIONS FOR "RADIO." Write today for complete list of premiums and our special subscription offer. "RADIO," Pacific Bldg., San Francisco, Calif.

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

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

HONEY COMB COILS—35, 50 or 75 Turn, 40c, Each Mounted, \$1.25; Special Windings to Order. Tapped Honey Combs, 3c per Tap. Crystals—Honest John's Old Fashioned Crystals. "Thunder Note" (Pyrites) and "Wonder Rock" (Galena). Tested, guaranteed and individually boxed. Each Crystal as big as a walnut. Biggest value in radio, 25c each. Small Pyrites or Galena Crystals for mounting, 75c per pound. Dealers and jobbers, write for special quotations. Factory agents wanted in some States. HONEST JOHN MFG. CO. (Dept. RW.), 1509 East 11th Street North, Portland, Ore.

AMRAD NO. 3500 BROADCAST TUNER, ONE-STEP RADIO DETECTOR, TWO AUDIO—List, \$125.00; sell, \$80.00. Also complete specified parts Mawhinney circuit, includes panels, \$50.00. Both sets never used. Struller, 6 Fuller Place, Brooklyn, N. Y.

EVERY RADIO FAN should have these two books, "101 Receiving Circuits" and "Six Successful Receiving Sets." By M. B. Sleeper. They are the most up-to-date radio books for the fan who likes to make his own, and will help you out and save you many times their cost. Both books are full of illustrations. Price, 50c. each, with 10c. extra for postage, or both for \$1.00 sent postpaid. COLUMBIA PRINT, 1493 Broadway, New York City.

CASH FOR OLD GOLD, Platinum, Silver, Diamonds, Liberty Bonds, War, Thrift, Unused Postage Stamps, False Teeth, Magneto Points, Jobs, Any Valuables. Mail in today. Cash sent, return mail. Goods returned in ten days if you're not satisfied. OHIO SMELTING CO., 337 Hippodrome Bldg., Cleveland, Ohio.

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

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Have you seen the list of Camps and Camp Directors which started in the MAY 12 issue of RADIO WORLD? Here is a list of all the Camps and Directors of camps in the United States, and is of essential value to any Radio Merchant who is anxious to enlarge his summer business. Get these people interested in installing radio sets in their camps for the benefit of the campers. Any single copy, 15c; or the four issues for 60c. RADIO WORLD, 1493 Broadway, New York City.

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TWO FOR THE PRICE OF ONE—Send \$3.00 now for six months' subscription (26 numbers) for Radio World during the coming month and we will send you also Popular Radio or Wireless Age or Radio for six months without any extra charge. Or send \$6.00 now and we will send you Radio World for one year (52 numbers) and Popular Radio, or Wireless Age or Radio for one year. These offers not good after July 23, 1923. If you are already a subscriber you can take advantage of this offer by renewing from the end of your present subscription. Sub. Department, RADIO WORLD, 1493 Broadway, New York City.

Manufacturers and Dealers, Attention!

If you can use a great list of names of people who want radio goods throughout the country you will find them in the Merchandising Department of Radio World, starting with our issue of April 14 and in every issue to date. Any copy mailed you for 15c. each from April 14 to July 7 or the entire twelve for \$1.50; or send \$6.00 for a yearly subscription starting with our issue of April 14. RADIO WORLD, 1493 Broadway, New York City.

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In order to materially increase our subscription list we are offering for a limited time a special subscription of seven issues of Radio World for \$1.00. You may begin your subscription now, or have us start sending the first issue on this subscription offer when you go out of town.

CUT OUT THIS TODAY SO THAT YOU WILL NOT FORGET ABOUT IT

Radio World's Special Summer Subscription Offer

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New York City

Enclosed find \$1.00, for which send me Radio World for seven issues, beginning with your number dated.....

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Add \$1.00 a year for foreign postage.
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By M. B. SLEEPER

Fully Illustrated. Price 75 Cents

IN addition to the listening to ships and broadcasting stations on short wave lengths there is a peculiar fascination about listening to the high-power telegraph stations of England, France, Germany, Russia and Italy as well as those located in the Pacific Ocean and the Oriental Countries. It is much easier to do this than most people imagine. The sending is very slow, a feature of assistance to the beginner in telegraphy. Several types of receiving sets for this task are described. Detectors, amplifiers, oscillators, etc., for long distance reception are also described. Suggestions for the operation of relays by the signals and the reproduction of them on a phonograph are given. In addition there is some valuable data on home made wavemeters for testing and experimenting.

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RADIO BROADCASTING MAP

FOR the benefit of those interested in Radio and those who are becoming interested, Rand McNally & Company have prepared a publication containing a wealth of information of greatest value. It shows, in the most comprehensive way, the location of the broadcasting stations, gives their classification, the call letters, wave lengths, ownership, etc., of each. The Rand McNally Radio Map of United States is 28x30 inches in size. The locations of broadcasting stations are shown by distinctive symbols. The call letters of each station are given, also the wave lengths of each. The Radio Districts with numbers are shown in red and the Radio Relay Divisions are in blue. Time zones are included. Alphabetical lists of stations and alphabetical lists of call letters are in the margins. Convenient pocket form with cover.

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audio frequency transformer has patented windings which are not available in any other make of transformer.

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If your dealer does not carry the "Sampson" send direct to us.

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Federal Standard Radio Products

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

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

Good 2 tube WD-11 Circuit for DX.....	Jan. 27
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Lewis Three Tube Circuit	March 19
Regenerative Radio Frequency Circuit for 5 tubes	March 24
Hazeltine Neutrodyne Receiver.....	March 31
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Improved Grimes Circuit, A. D. Turnbull's Long Distance Circuit, Combined Receiver and Transmitter, Improved 1 tube Rienartz	May 19

Any number for 15c. Any 7 numbers for \$1.00. All 10 numbers for \$1.35. Or start subscription with any number. Radio World, 1493 Broadway, New York City.

PATENTS

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I offer a comprehensive, experienced, efficient service for his prompt, legal protection, and the development of his proposition.

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

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RICHARD B. OWEN
Patent Lawyer

32 Owen Building, Washington, D. C.
2276-P Woolworth Bldg., New York City

Local Commercial Radio Service in Denmark

RADIOTELEPHONE connection between Copenhagen and the island of Bornholm in the Baltic Sea, heretofore poorly equipped with means of communication, is now an accomplished fact, Trade Commissioner Sorensen reports. Radiotelephony between the two points is now open to the public. The radio circuit, which consists of the four stations of Amager, Lyngby, Hammeren and Ronne Radio, is based on the Poulsen arc system, manufactured by the German firm of Lorenz. The installation permits of communications in either direction simultaneously. The radio is connected with the ordinary Copenhagen telephone system, so that any subscriber may ask for a number on Bornholm Island and get connection. The cost for a call is 3.50 crowns for a three-minute period.

One of the Types You Meet

HE comes down to the office looking as though he had walked all night with his darling child. He is continually reading radio magazines, he talks radio, he eats radio, he sleeps radio and he works radio.

When you go out to lunch with him he always takes the luncheon next to a radio store, bolts his sandwiches and coffee, and then stands outside of the store and looks longingly at some particular piece of apparatus. Then suddenly he gets an inspiration, goes in and buys some funny looking thing, comes out with a broad smile and hustles through his afternoon's work so as to be home early.

Next morning he comes in looking seedier than ever. When you ask him what is the matter, he spouts a bunch of station calls all over his vest and looks like a miner that has just picked up a ten pound nugget and hasn't a relative in the world. THAT'S HIM—THE RADIO BUG!



A Twist of the Wrist — **IT'S SET**

YELLOW TIP

MICROMETER ADJUSTING CRYSTAL DETECTOR

Increases the Efficiency of Your Crystal Set!

Finer tuning, clearest possible reception, constant adjustment until you wish to change, then—"A Twist of the Wrist—It's Set." Excellent for reflex and other circuits. \$2

Write for folder and name of your nearest dealer.
Exclusive Factory Representatives

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Dealers and Jobbers Write for Attractive Proposition

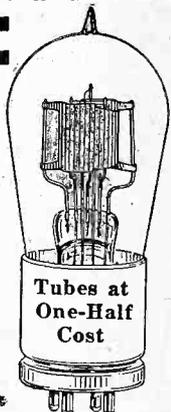
Cram's Radio Broadcasting Map of United States and Canada

With all the new allocations and changes recently brought out. Scale, 100 miles to the inch; in two colors—Size 34x28.

PRINTED ON HIGH-GRADE MAP PAPER WITH ALL UP-TO-THE-MINUTE INFORMATION BY WHICH YOU CAN LOCATE ANY BROADCASTING OR HIGH POWER STATION. A COMPLETE INDEX OF THE ARMY, NAVY AND BROADCASTING STATIONS. The Most UP-TO-DATE MAP out!

35c. (Postpaid)

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1493 BROADWAY, NEW YORK CITY



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WHEN that filament burns out, at least \$5.00 goes with it to put the set in operation again. WHY not save nearly one-half the cost of a new tube by sending us your burned out tube to be repaired? We REPAIR EVERY TYPE of tungsten wire filament receiving tube. All our tubes are TESTED and GUARANTEED to function as well as when new.

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

HARVARD RADIO LABORATORIES

BOSTON P. O. BOX 1781 MASS.

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Do you want to exchange anything for something?
Do you want to buy something?

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

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

RADIO WORLD, 1493 Broadway, New York City



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W. D. 11	\$5.50
W. D. 12	\$5.50
W. E. VT2	\$6.00
W. E. Peanut	\$6.50
W. E. 216-A	\$9.50

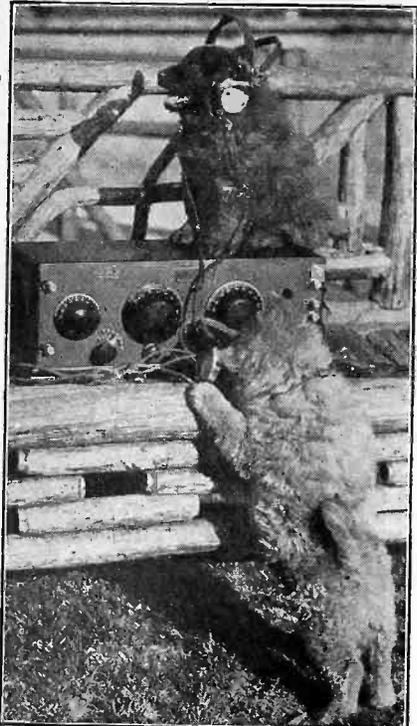
Add 25c. Postage and Insurance

SUNBEAM QUALITY goods, to complete the COCKADAY CIRCUIT. One guaranteed, accurate set of coils consisting of one plain and one Bank-wound coil sent postpaid for.....\$2.75

We supply information and prices on any set you may want to build, or we will build from your plans.

SUNBEAM ELECTRIC CO.
71 THIRD AVENUE NEW YORK

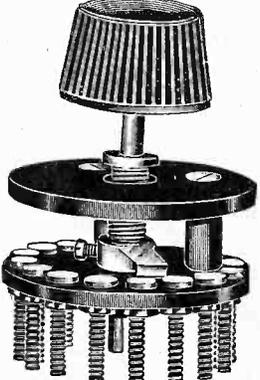
Chows Listen In For Prices of Chow



(C. Underwood and Underwood)

No brethren, this does not signify that radio is going to the dogs, but it does show that even Chinese Chows (aristocrats of dogdom) appreciate something out of the ordinary in a good concert. The announcer at the time this was snapped was giving the price of prime knuckle bones and Chinky, sitting up atop the set, is having a hearty laugh at the fact that they dropped three cents per pound. Blinky, down below, is hard of hearing in the right ear, so he takes the initiative of listening with his left ear in between both phones so that he won't miss a single price.

A Real Back Mounting Inductance Switch



12
Points

Another AETACO product up to the usual standard of AETACO equipment75c

AETACO Condensers

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

Two-Tube Portable Set

(Tubes Included)

Consisting of 1 23 P Condenser and Dial, 1 150 to 600 Meter Inductance Coil, 1 6 Ohm Rheostat with Automatic Control for Amplifying Tube, 1 Audio Frequency Amplifying Transformer, 1 Standard Double Socket, 1 Mica Grid Condenser, 1 Tubular Grid Leak and Holder, 1 Detector Tube, 1 Amplifying Tube, 1 Pair Federal Phones, A and B Batteries.

All Connections Automatic. Enclosed in 7x7½ Mahogany Finished Cabinet and Formica Panel.

\$30.50

American Radio Stores
235 Fulton Street New York City

Suggestion to Song Writers

WE have had songs about Dear Old Dad, and Dad's Wife, and Sweetie songs, and Dearie songs, and Banana songs, and Mamma songs, but what a reader wants to know is who is going to write that popular piece (it's bound to be popular, and think of the millions that it will hit) "My Ma's Got the Radio Bug Now," or "Pa, Turn the Juice Off, Soup Is On the Table."

Comparisons Are Odious!

MARY: "Huh, smarty! My father is a bootlegger."
Alice: "As though that was anything—my daddy owns a radio shop."

Freshman FIX-O

*A Fixed Resistance Leak
Combination—4 in ONE*



<p>Freshman Condenser Leak Mounting</p> <p>Freshman Fixed Leak SAFE-T HANDLE</p>	} 65c	<p>Price Complete</p>
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Furnished in any value of resistance from ½ to 10 Megohms

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Separate Leaks with Safe-T Handle 30c

At your dealers. Otherwise send purchase price and you will be supplied without further charge.

Chas. Freshman Co. Inc.

Radio Condenser Products

106 SEVENTH AVENUE NEW YORK

D. X. FANS

Send your name with type of set for details regarding the RaDioXor—the sensation of 1923.

WILLART SALES CO.

110 West 40th St. New York City

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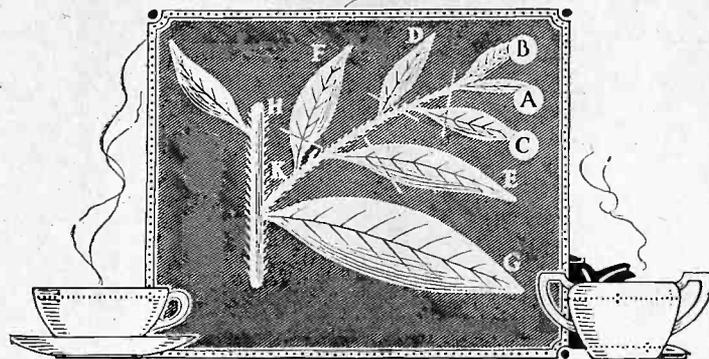
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which distinguishes the famous Ridgway blends. The leaves marked "D," "E," "F" and "G" are coarser and less flavory and therefore *are never used by Ridgways.*

This carefully guarded Ridgway quality also assures more cups to the pound. When you buy Ridgways Tea you not only get the best tea, but actually more of it than is possible from inferior tea. As an example of rare good tea we suggest that you order Ridgways (GOLD LABEL), the *Genuine Orange Pekoe.*

Be Sure to Insist Upon
Ridgways Genuine Orange Pekoe Tea

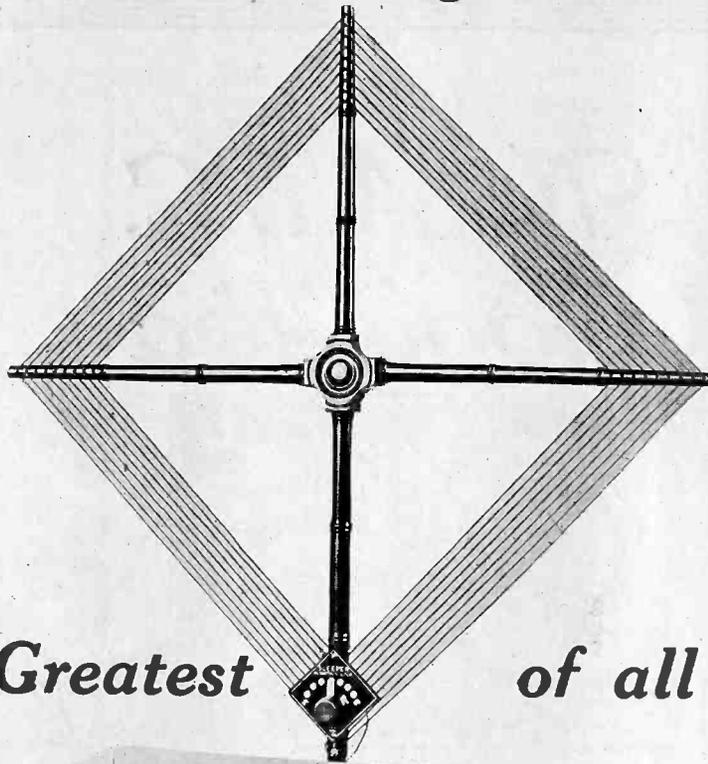
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*3 Tubes do the
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The beautiful Windsor period loop gives you a full range, reduces static practically to zero and with its patented Sleeper loop taps, provides perfect control of volume intensity without affecting tuning.

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