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Radio Journal

Los Angeles, California

August

1922



An Excellent Short Wave Receiver--Amateur Experimentation
Directional Radio--History of Radio--Wave Lengths

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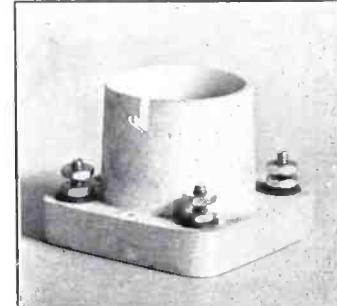
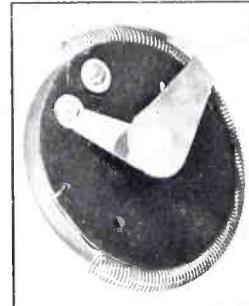
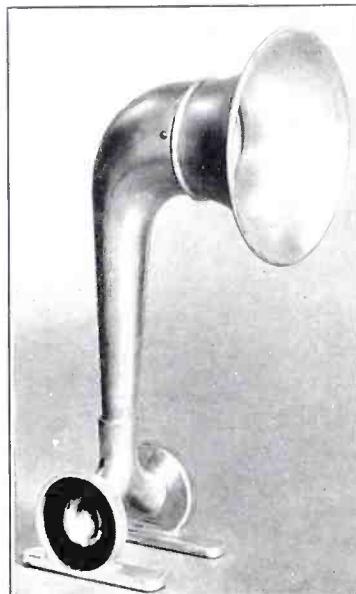
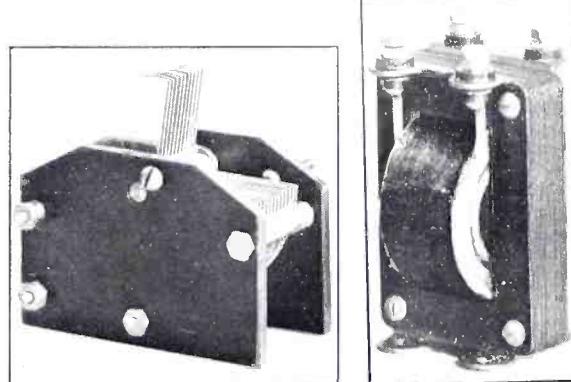
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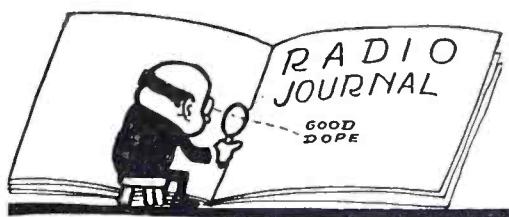
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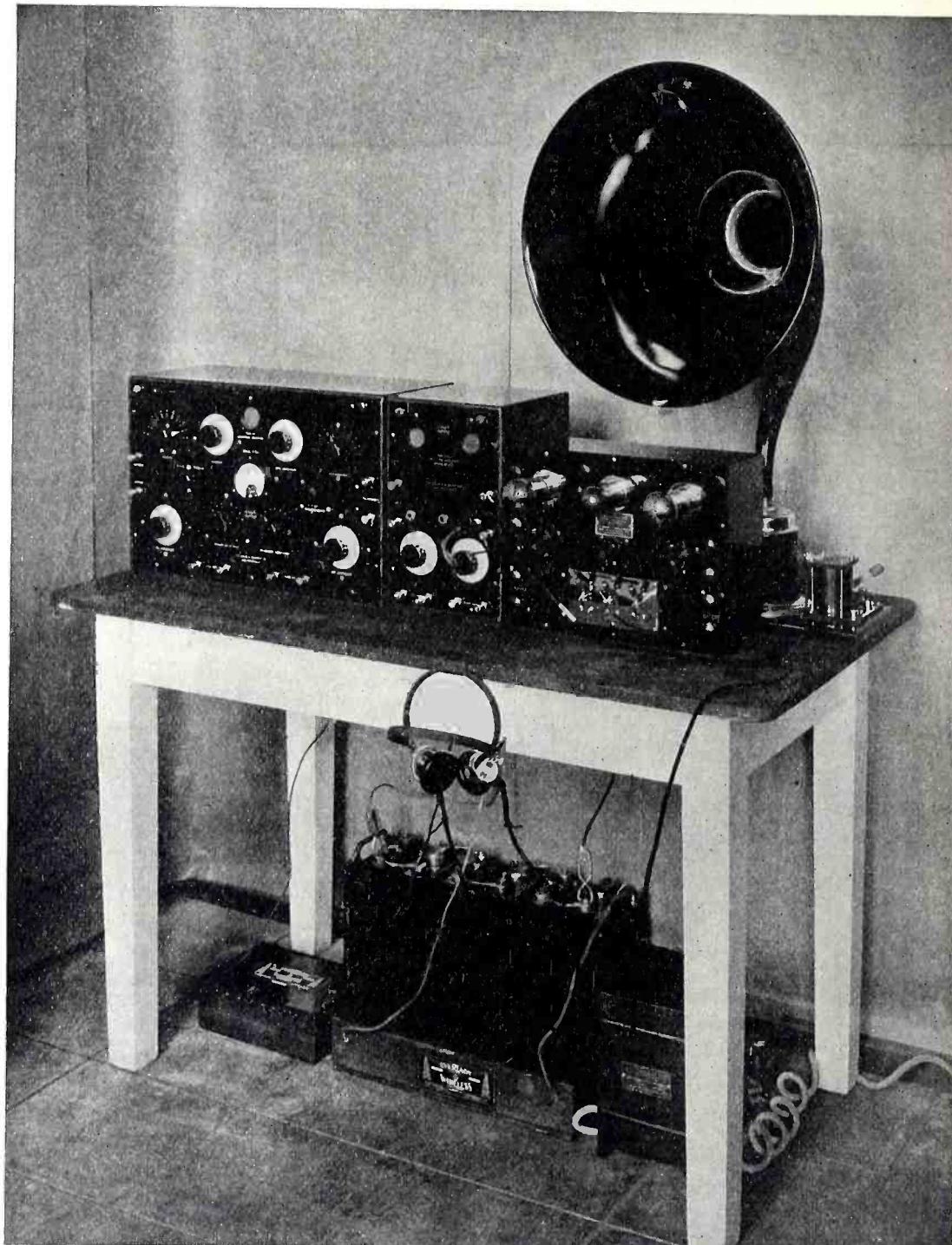
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Paul Franklin Johnson



Radio Journal

Los Angeles - California

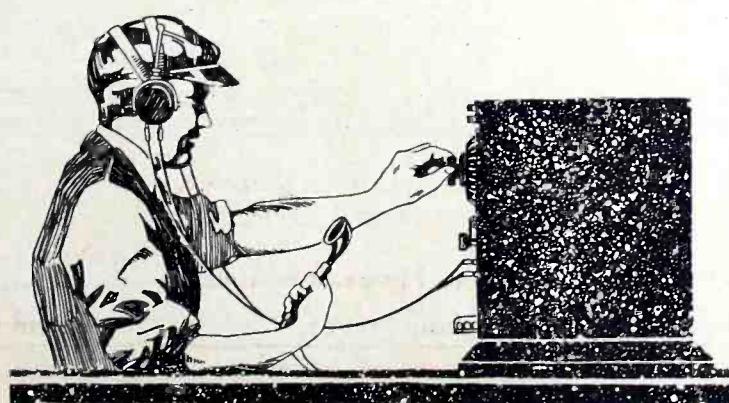
Volume One

AUGUST, 1922

Number Three

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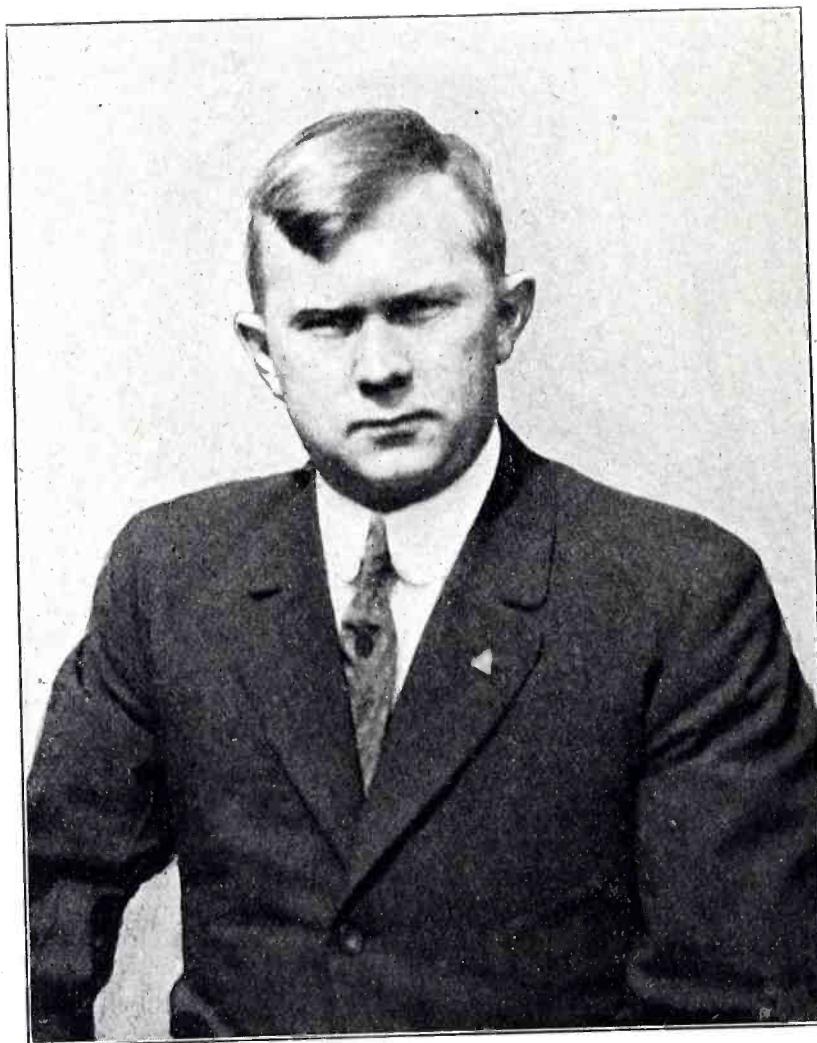
Because of the fact that intense interest in radio is sweeping the entire country, causing a flood of inventive and research work, much of which will be duplicated, it is necessary to state that in the event of expressions of opinion and various statements from contributors and correspondents appearing in Radio Journal from month to month becoming the subject of litigation in courts, or of controversy in scientific circles, and which may involve questions of the priority of invention and a comparison of merit of apparatus, the owners and publishers of Radio Journal positively and unequivocally disclaim any responsibility for any such expressions of opinion or partisan statements.

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MR. O. R. REDFERN

U. S. RADIO INSPECTOR

7TH DISTRICT

Editorial Comment

Help Keep the Air Clean

Broadcasting is a new means of communication, a new diversion, and presents to the American public something with startling possibilities. Today the Air is Clean. A speaker broadcasting from KHJ, the Los Angeles Times Radio Station a few weeks ago, laid great stress upon the fact that the air is as yet unsullied. One may listen in to any concert or any speech broadcasted, and he will find that concert or that speech clean. A parent need have no hesitancy in placing in the hands of his boy or girl a receiving set, and telling him or her to listen in at any time. The air is clean, wholesome, and unsullied. And, above all, for the good of radio, for the good of the dealer, the broadcaster, the amateur, the novice, and the professional radio man, *let's keep the air clean!*

Aid The Broadcaster

If you enjoy radio concerts and speeches aid your broadcaster in the production of such programs.

If you want a certain kind of program or a certain style of music, and the broadcasters you can hear don't supply that program or that style of music, don't condemn radio, don't revile the broadcaster. Tell him in a gentleman's way just what you want, and then aid him in getting it.

If KOG, KFI, or KYJ, fails to deliver, tell the operator in charge, and try and tell him just why he does not deliver. Remember, he is on the sending end and cannot determine how his program is doing unless some one on the receiving end informs him.

The broadcaster is working under handicaps few novices in the radio game understand, and because a certain demonstration failed to come out plainly, or because certain stations fail to keep up to a high percentage of efficiency, or because all the stations in town do poorly for a day or two, we often hear the thoughtless condemning radio, and telling their neighbors why radio is a failure. Remember, the broadcaster has his difficulties, and it is not fair to knock. Let him know where he is failing, then aid him to rectify his errors or to mend his ways. And, don't knock.

If the radio program from each station does not contain selections sung by famous artists, remember that the broadcaster and the entertainer are giving their time, for your amusement, free gratis, and that famous artists are hard to get; that fifty-watt tubes cost thirty dollars apiece, and are difficult to obtain, and that the costs of running a station are heavy at all times. Entertainers sing for the publicity they get out of singing, and the broadcaster sometimes has a difficult time to get anything but phonograph music. If you know anyone who might want to sing over the radio take him or her to your favorite station and effect an introduction. If your friend really can sing there will doubtless be a place on the program. Be constructive, however,—don't kick. Aid your broadcaster!

There are many ways of aiding the broadcaster. A few have been suggested. Since singers sing for the publicity they get, they are pleased if someone notices their efforts and comments by letter. A few letters to a singer

from listeners miles away are greatly prized. If you like a certain singer write a letter to your broadcaster telling him so. Give comments on her or his voice as you heard it,—whether the voice was clear, well modulated, etc., or whether it was distorted. Such letters aid the broadcaster in getting return dates, and make more certain a good program. Aid him if you can.

Each broadcaster is rendering a public service at his own expense. A little appreciation is his only pay. Aid him by giving him a good word now and then, by writing a little letter now and then, and by helping him make his service the more perfect. Be constructive. Aid him.

A Municipal Problem

Every so often this problem arises: How shall the cities equip their fire and police automotive devices with radiophones? There have been a number of such installations, but as yet there is no full general understanding as to what is the best way.

Why not have a symposium, gathering together all the details of what needs to be done, how it has been done so far, what are the particulars in which success has not been met, and what can be done to finish the task?

"What needs to be done" is perhaps the simplest part of the problem. It is essential that the apparatus shall enable the fire-truck, the pump, the police ambulance or the patrol wagon to communicate instantaneously with a central station of one or the other department, not necessarily while actually on the run, but most promptly when at rest. The central station shall in turn be able to speak to any piece of apparatus having radio equipment, and this wherever within the city limits that apparatus may be. The need of intercommunication between vehicles of the fleet is not so acute, but such a need may exist at times.

The problem of the central station for such a system is about the same as that of building a broadcasting station of the present type, but fortunately the maximum required range is small. The less that neighboring cities overhear each other the better, so far as fire and police apparatus is concerned. It is in the vehicles that the problem gets a little out of the line of regular practice. The aerial must comply with a number of rather trying conditions; the radio devices must be able to stand hard travel, and there must be no need of tuning-adjustments after the first construction of the outfit. The ideal arrangement will be one in which also there is no need of filament-rheostats.

The most likely source of knowledge about the best forms of aerials for fire and police apparatus is that group of amateurs who have equipped their own cars with radio sets. And there is an amateur in our neighborhood who once in a while has been using a radiophone wave-band that is wide enough to include more wavelengths than any fire-wagon could encompass, no matter how often it turned corners. Maybe some of our readers have had that experience and know what are the causes of broad bands with even continuous waves.

This magazine will be glad to be the clearing house for ideas on the subject, covering the art to date, the unfilled needs, and suggestions for the solution of the latter. Let them come along and we will do our best at this end.

An Excellent Short Wave Receiver

By SAMUEL G. McMEEN

Radio Journal readers will like Mr. McMeen's article, which, by the by, is the forerunner of a series which he is preparing exclusively for Radio Journal. Mr. McMeen is a consulting electrical engineer specializing in communication by electrical means. (No pun intended, Mr. McMeen.) He is one of the authors of the bulky volume, "Telephony," and of the telephone and telegraph portions of the "Handbook for Electrical Engineers." Follow directions in this article, and you'll have a "bully" good receiver, strong on selectivity.

THIS is a description of a receiver adapted to wave lengths from 150 to 800 meters. It is one of the large family of regenerative receivers, and no claim of originality in circuit design is made. The circuit was first made known to me by Mr. Oliver Wright, of California, and the particular arrangement I have given to its elements is merely that which I have found to be a satisfactory one. Very likely there are other sets of electrical dimensions that would be satisfactory.

In the form here described the receiver consists mainly of a primary, a secondary and a rotatable tertiary coil, two condensers, a detector tube, and a power tube used as an amplifier. It is able to operate a loud speaker satisfactorily. The power tube in this case is a VT2 made by the Western Electric Company, intended to operate on a filament voltage of 6.5 to 7.5, but is actually operated on six volts at a low temperature. One is only barely able to see that the filament is aglow. The plate voltage of this type of tube is given by the makers as 350 volts, but good results are obtained with a plate

voltage of 100, and a little better at 200.

The primary and secondary coils are wound with No. 28 cotton covered wire on a four-inch tube of firm material—bakelite or its equivalent preferred—and it is of first importance that the arrangement of these windings be that shown in the accompanying drawing. That is, the antenna side of the primary coil shall be nearest the grid side of the secondary coil, and separated from it two inches. It is on this separation that the set depends for its sharp selectivity.

From the primary coil taps are brought out at the 30th, 45th, 60th and 80th (last) turns. From the secondary coil taps are brought out at the 25th, 45th, 60th and 80th (last) turns. These taps are connected to switch studs, permitting the quick selection of the required portion of either coil.

The tertiary coil of 50 turns is mounted within the secondary coil on a brass rod or piece of brass tubing, carrying a knob but not necessarily a dial. The settings of the tertiary or tickler coil do not make a dial a necessity, though some may think one a convenience. The terminals of the ter-

tary coil may very conveniently be brought out through the brass rod or tubing on which the coil is carried, by drilling a small hole through the side of the tubing and passing the terminal wires into the central bore and out at the back end, as in Fig. 2. If solid rod is used as the axis, drill into the back end of the rod far enough to join the sidewise hole and so make a path for the wires. The rotor should be prevented from turning more than one complete revolution by stops on the face of the panel. Otherwise the terminal wires may be twisted off by an accumulation of revolutions.

For the purpose of the rotor mounting a separation of the secondary coil into halves should be made at the time of winding it.

An essential to the best result is that the grid condenser shall be as close as possible to the grid of the detector tube—electrically close, that is. This can be assured by having no wire at all between these two elements, attaching one terminal of the condenser directly to the grid post of the detector tube socket.

The plate circuit of the detector tube contains the tertiary coil at all

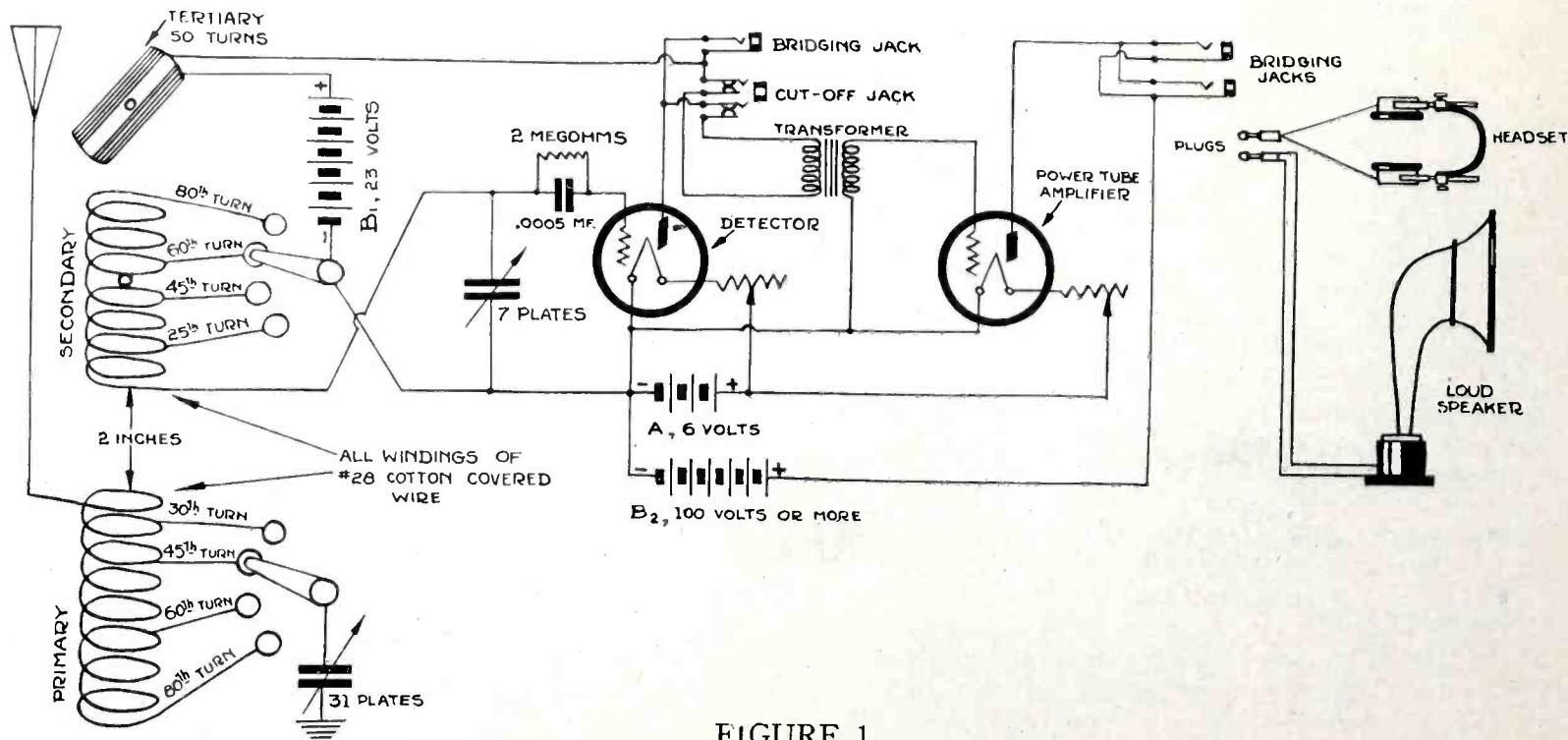


FIGURE 1.

times, and either the telephones or the primary winding of the audio-frequency transformer, depending on whether the cut-off jack of the detector tube is plugged into or not. The use of both a bridging and a cut-off jack at this point, and two or more bridging jacks after the amplifying power tube gives complete flexibility. Contrary to some popular opinion, there is no need of wiring the jacks so as to put headsets in series when two are used. It is possible to get good results even with the headset in the bridging detector jack and the loud speaker on the amplifier, and in some reception this has an advantage. The headset speaks too loudly for comfort on the last jack in many cases.

The two variable condensers are chosen of such sizes as to give the required range and at the same time to make the settings as accurate as possible without the use of verniers. There appears to be no need of the latter refinement, though slow-turning devices can be added on the front of the panel if desired. The primary condenser has 31 plates and the secondary has seven. The stationary plates of the primary condenser are grounded and the rotating plates connected to the blade of the primary-coil switch. The stationary plates of the secondary condenser are connected to the grid condenser and the rotating plates to the negative side of the A battery. These precautions are to minimize the effects produced by the capacity of one's body, and they are very successful in this set.

In tuning to any wave-length one has several choices of settings of coil switches and condensers. For maximum loudness set the coil switches to include the more inductance and the condensers to give less capacity. For reception of broadcasting at 360 meters a good setting of these elements is the following:

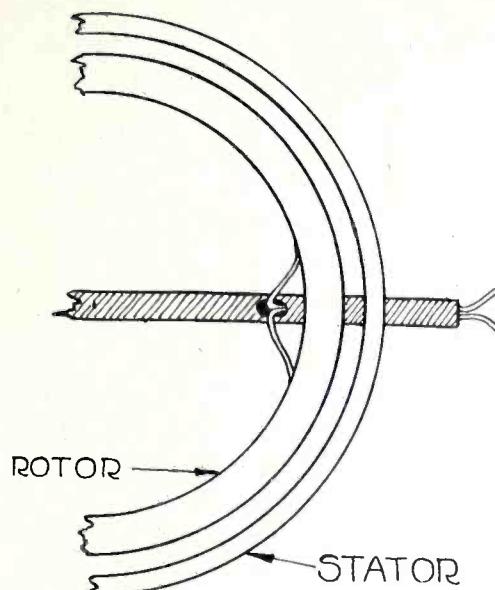


FIGURE 2. BRINGING OUT MOTOR WINDING TERMINALS.

Primary switch, 45th turn.

Secondary switch, 60th turn.

Primary condenser, 30% of maximum.

Secondary condenser, 30% of maximum.

Tertiary coil, about as shown in drawing.

In the actual device under description here the tuner portion and the tube portion of the apparatus are mounted on separate panels and enclosed in separate cabinets. This is not an essential arrangement, as all the parts could be in one cabinet, but it has the advantage that one can insert later at any time one or more stages of radio-frequency amplification between the tuner and the detector. The tube, socket, rheostat and radio-frequency transformer can be assembled on a small panel with its binding posts located to conform to the two sets on the adjacent edges of the tuner and detector panels, so that the temporary insertion of radio-frequency amplification is quite simple.

I say "temporary" because for the purposes of short wave reception, say broadcasts and amateur working, the use of radio frequency elements is not necessary. Indeed, the gain from such use is small, and not needed. For long-wave and long-distance working, however, the facts are different, but this particular receiver is not the best for long waves.

Now for a few constructional details for those to whom the making of things is a source of pleasure. Rotors are practical when merely wound on sections of cylindrical tubing, but of course the more workmanlike form is that in which the surface of the rotor ring is a portion of the surface of a sphere. This form can be turned from a single piece of birch, but there is an added charm, perhaps mainly mental, in using laminated material made up of three pieces of birch three-eighths of an inch thick, the grain of the middle piece crossing the others, and glued together with casein or other glue. Casein glue in its present grade of excellence is a war-heritage that all amateur physicists ought to know and use. It is made from milk. It is mixed cold and used cold. Joints made with it can be soaked and boiled in water and will still hold. The wood can be worked three hours after the joint is made. The cost is almost nothing.

The rotor may be finished in shellac or may be treated first with paste wood filler and then with varnish of the turpentine variety. But no varnish or shellac or other dope is permissible on the windings of stator or rotor. It is necessary to have capacitance in series or in parallel with the inductances, but it must be capacitance under control, which distinctly is not the case when it is applied between turns by the use of resins. Leave the capacitance tasks to the variable condensers.

The bakelite panels for the tuner

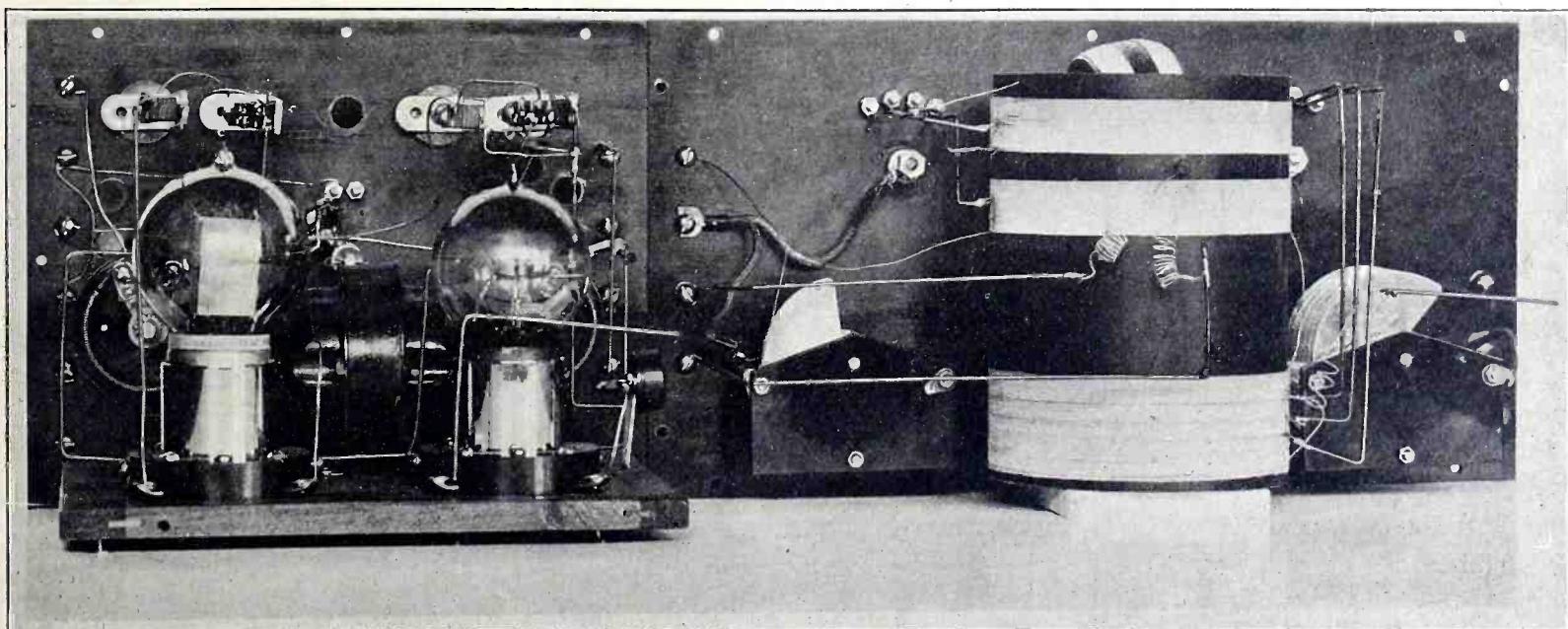


FIGURE FOUR—SHOWING THE "GIZZARD" OF MR. MCMEEN'S SHORT-WAVE RECEIVER

thick. The former is seven by eleven inches and the latter seven by nine inches. They are brought to a beautiful velvet finish by the simple use of 00 steel wool, rubbed in straight lines lengthwise. On this matt surface the whole arrangement of holes can be laid out in pencil and all the drilling done from the front. Careful drilling generally will leave holes clean on both sides, but by drilling from the front one puts the rough edges of holes, if any, on the back. Laying out in pencil keeps both sides clear of layout-scribing in the end.

Three-eighths inch is a satisfactory thickness for the cases of the sets. Of all the ornamental woods, mahogany is least liable to warp and split. Its ease of working and the good finish it takes make it desirable. The corners of the cases may be glued or fastened with flat-head

screws. On first mention the use of such screws may seem to be unsightly, but it is not so. Well countersunk they come very nearly adding to the good appearance, and the corners are easier for the amateur worker to finish truly in that way than with glue. Some of the best instrument makers are using the screw method today. Of course the end grain of the wood is exposed when the corners are merely lapped and screwed together, but the end grain of mahogany finishes well if treated with paste filler.

A super-bottom is fitted to the detector panel, this being attached to the panel at such a location that it will just slide in upon the actual bottom. It is not attached to any other part of the set than the front panel.

There is just the possibility that some one may care to reproduce the

set here described for exclusive broadcast reception, not caring to listen for ships or amateurs. In such a case all but the used turns for 360 meters may be omitted from the primary and secondary coils. That is, the primary will have 45 turns and the secondary will have 60, with consequent greater compactness.

If the set, further, be made with the original intention of using a power tube as an amplifier, and not for general experimentation with tubes in general, then there is no need of using a rheostat on the last tube at all. Obviously there will be no danger of over-energizing the filament of a 7.5 volt power tube when directly connected to a three-cell storage battery, unless the tube be in circuit while the battery is receiving a vigorous ending of a full charge,—a practice which it is hoped is not general.

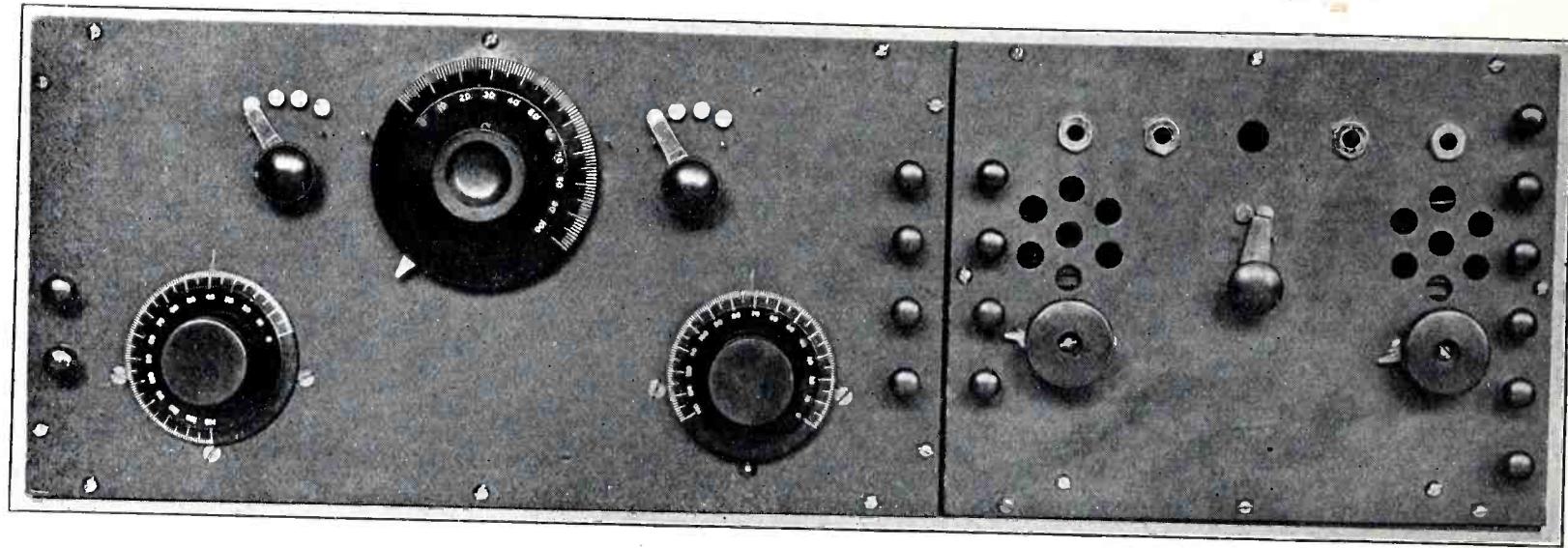


FIGURE THREE—SHOWING THE FRONT OF MR. McMEEN'S RADIO SET

HAIL THE RADIO SLEUTH

The palm for the inauguration of aerial detective work goes to Los Angeles. Ned Lawrence, writing in the Los Angeles Herald, tells of the self-imposed detective activities of a radio fan whom one interference too many rendered desperate. He fitted up his automobile with a small antenna on top of the car, adjusted his headphones, tuned his set to the disturbing signals and started on his way. He circled about in his territory, moving always toward the point where the interference seemed most pronounced. Finally he would locate the signals in a comparatively small area, and then would pursue subsequent investigations until he located the origin of the disturbance.

In three experiments he traced the trouble to a faulty transformer on the electric-power wire, to a high tension wire which had rubbed against the branch of a tree, and in the third instance a small boy's attempt to build

himself an antenna was the source of mischief.

The public service company was glad to know of his discoveries and remedy them in the first two cases, and the small boy was duly penitent.

BROADCASTING ORGANIZATIONS UNITE

Announcement has been made of the formation of the Radio Broadcasting Society of America composed of twenty-five broadcasting organizations in the United States. In part its declaration of principles is as follows:

We believe that radio communication should at all times be under the regulation of our government and forever so safeguarded by law that it will never fall under the control of any selfish group or monopoly.

We believe that the privilege of listening in should be available to the public and the American boy at all times without charge, and we call to our standard all amateur and other radio organizations that oppose the proposed system of rental and mon-

opolization of the sources of supply necessary in constructing radio apparatus.

We believe that the best interests of radio communication are served by the establishment of various local limited power stations, classified according to service, operating on definite wave lengths, geographically placed at distances far enough apart to minimize interference, and this society pledges itself to assist and encourage the establishment of such stations throughout the country.

Every person in any way interested in radio is admitted to membership.

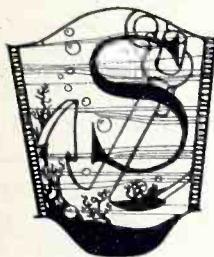
The Radio Broadcasting society, which will further the art of radio in every way, believes that the best interests of radio communication are served by the establishment of various local limited power stations operating on definite wave lengths.

One of the important aims of the society is to have all patented radio devices for transmitting and receiving placed freely upon the market without operating or receiving restriction.

Romance of Radio

By FLORENCE G. ROGERS

This is the second installment of Mrs. Rogers' very interesting History of Radio. The first part appeared in the July Radio Journal. Radio is the Marvel of the Age. Herein are traced the early developments that preceded the present achievements in radio. Dip into it—it's a real Romance. More will follow in the September issue.



O many wonderful discoveries and inventions have been the result of accident—if accident we can call it—that it was quite true to form that an accident should have turned Morse's demonstration of his electric telegraph into a discovery and demonstration of radio. At the time that Lindsay and Steinheil were carrying on their experiments Morse was concentrating his efforts upon his system of electric telegraphy. In 1842 the American Institute requested him to demonstrate his system, and this he was doing when the anchor episode occurred. He had laid wires under water between Governors Island and Castle Garden for his demonstration, but no sooner had he got his apparatus to working than the wires were cut off by the lifting of an anchor on a vessel in the channel where they were laid.

Morse related the episode in a letter to Congress in 1844,—a document which conclusively, and we might say authoritatively dates America's first experience with radio,—although he did not go further than to satisfy himself of the fact of its existence.

"In the autumn of 1842," he wrote, "at the request of the American Institute, I undertook to give to the public in New York a demonstration of the practicability of my telegraph, by connecting Governor's Island with Castle Garden, a distance of a mile; and for this purpose I laid my wires properly insulated beneath the water. I had scarcely begun to operate, and had received but two or three characters, when my intentions were frustrated by a vessel which drew them up on her anchor and cut them off. In the moments of mortification, I immediately devised a plan for avoiding such accidents in the future by so arranging wires along the banks of the river as to cause the water itself to conduct the electricity across. The experiment, however, was deferred until I arrived in Washington; and on December 16, 1842, I tested my arrangement across the canal, and with success. The simple fact was then ascertained that electricity could be

made to cross a river without other conductors than the water itself; but it was not until the last autumn that I had the leisure to make a series of experiments to ascertain the law of its passage."

In 1845 Michael Faraday, in the course of his researches in light and magnetism, made many experiments which resulted in the discovery of the laws of the electro-magnetic induction mentioned in a previous chapter. The properties of magnetism per se were no new discovery by any manner of means. The Northmen employed a magnetic compass in the year A. D. 868, and the magnet went much farther back in history than that comparatively recent date. In ancient Sanscrit writings—and Sanscrit has been a dead language for a matter of 2200 years—the magnet was called "the precious stone beloved of Iron." In the Talmud it is called the "stone of attraction," and elsewhere in an-

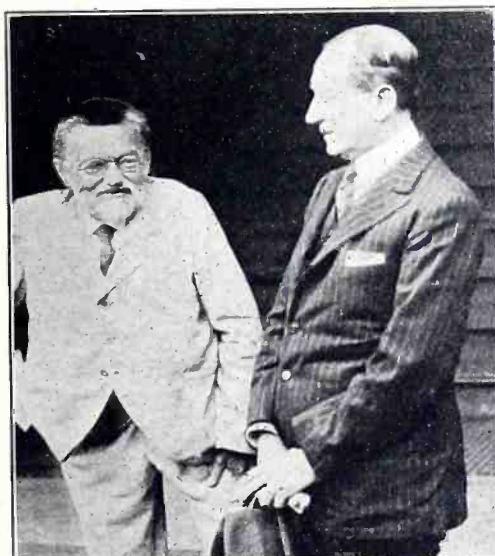
cient writ it is termed the "stone of Hercules."

At approximately the same time of Faraday's discovery Henry, an American, arrived at these same laws independent of Faraday's work. This was a step in the right direction, but electro-magnetic induction did not inaugurate any spectacular progress in wireless communication. Perhaps Faraday was nearer to the secret of radio in his paper which he modestly entitled "Thoughts on Ray Vibrations," in which he suggested that all radiation such as light, heat, etc., was due to a high rate of vibration of the lines of force in the magnetic field.

Romance drew near to him but merely breathed upon him as she passed, and therefore Faraday stopped short of certainties and achieved only unformulated speculations upon which another might build. This other was Clerk-Maxwell, an English mathematician of Cambridge.

Clerk-Maxwell was content to follow his Star which remained in the rarefied upper air of pure science, dreaming to reflect its glory and the world well lost. He began a series of experiments which in 1861 bore fruit in the Faraday-Maxwell electro-magnetic theory of light. This was the theory of the vibratory transmission of magnetism, electricity and light in one common ether. Prior to this time scientists knew practically nothing about the ether although they reasoned that it must exist and that it interpenetrated all space. They likened it to an incompressible liquid that was both tenuous and rigid. In the present discussion of the subject it is interesting to quote H. Poincare. "It matters little whether the ether really exists," he says, "that is the affair of the metaphysicians. The essential thing for us is that everything happens as if it existed, and that this hypothesis is convenient for the explanation of the phenomena."

In 1864 Clerk-Maxwell presented before the Royal Society his theory that light and electricity were akin, and in his paper he voiced his debt to Faraday in the words: "The electro-magnetic theory of light as proposed by him (Faraday) is the same in substance as that which I have begun to develop in this paper, except that in



"WIZARDS OF ELECTRICITY"
MEET

PROFESSOR STEINMETZ, CHIEF CONSULTING ENGINEER AT THE GENERAL ELECTRIC COMPANY PLANT AT SCHENECTADY, N. Y., AND MARCONI, THE ITALIAN WIRELESS WIZARD, PHOTOGRAPHED AT THE G. E. PLANT WHERE THEY MET FOR THE FIRST TIME IN FIFTEEN YEARS. AND STRANGE TO SAY, THE TWO MEN DISCUSSED EVERYTHING BUT MATTERS ELECTRICAL, PREFERRING TO CONVERSE ABOUT THE ALLIGATOR PETS OWNED BY STEINMETZ.

1846 there was no data to calculate the velocity of propagation."

His idea was that of one all-pervading electro-magnetic field, any disturbance of which produces waves, and that all forms of radiant energy such as heat, light, etc., are in reality disturbances within this field propagated in the form of electro-magnetic waves. He developed this theory more fully in 1873 in a treatise on electricity and magnetism, and while he predicted the existence of radio waves, he actually demonstrated nothing. Twenty-five years were to pass before scientists were destined to do more than to sail the vast sea of theories before Hertz was to arrive to chart it. Clerk-Maxwell stopped short with the idea; he did not carry it forward into a

brilliant actuality. Some accepted his theory; others rejected it as complex and difficult of comprehension much as we today are applying these terms to the Einstein theory of Relativity. However, it was much to have conceived of so tremendous a theory as that of electro-magnetic waves, for others were to come who would build upon his speculations as he had built upon those of Faraday.

In America Thomas Edison was now started upon his fascinating and wonder-provoking career as an inventor. At about the time of the presentation of Clerk-Maxwell's paper he was working on the quadruplex telegraph in a little shop in Newark, New Jersey. In 1877 he produced the crude instrument that was the fore-

runner of the phonograph. This was the first instrument invented that reproduced the human voice. He touched the hem of the garment of Romance with relation to radio when two years later he invented the incandescent light which formed the basis for DeForest's audion tube. But this is getting ahead of our story.

David Hughes is a romantic figure in these early days of wireless communication. To him is accredited the invention of the microphone which is similar in form to the Branly coherer. Edouard Branly, by the way, was born in Amiens in 1844, and in recognition of his part in radio he had bestowed upon him the enviable honor of being made an officer in the Legion of Honour. He was elected a member of the Academy of Sciences at Paris in 1911.

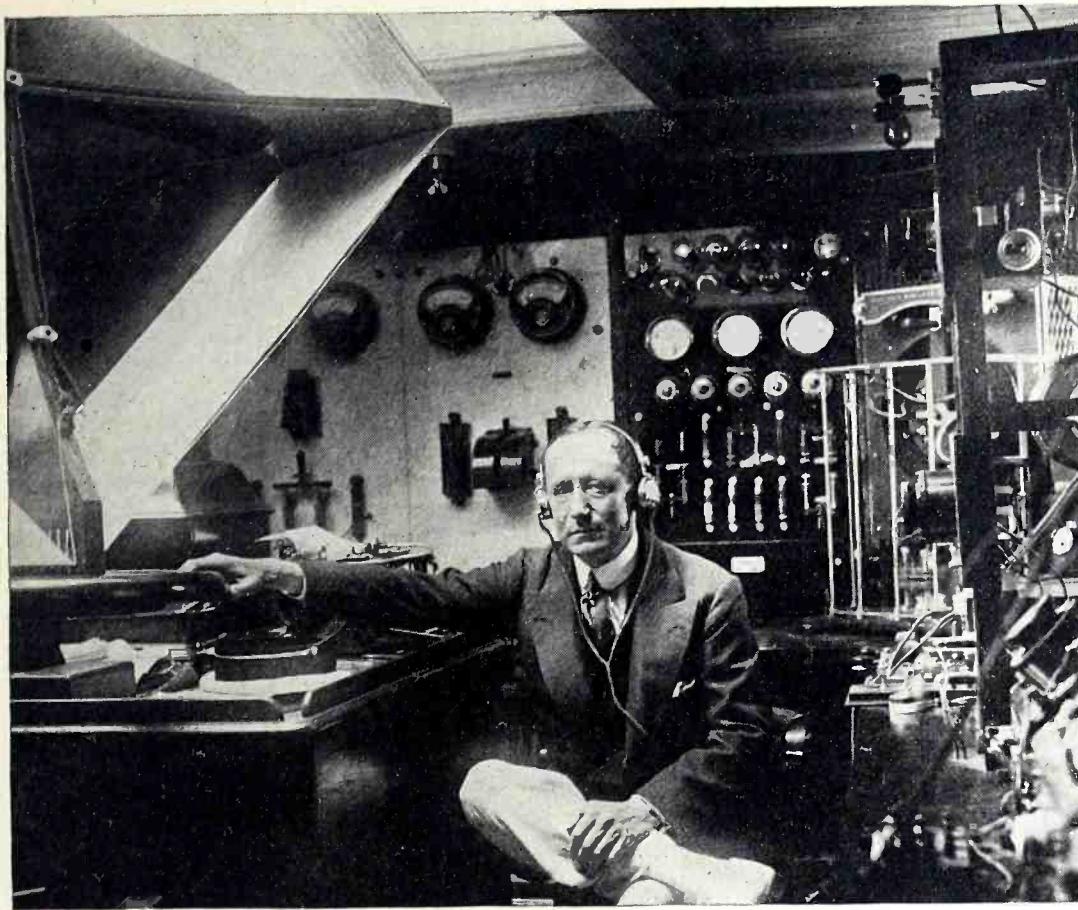
While Hughes was experimenting with his microphone he observed phenomena which he concluded to be due to invisible electric waves. Later Hertz noticed the same phenomena, and related them with the theories presented by Clerk-Maxwell. Hughes, however, did not carry his thought far enough for this. He continued his investigations and constructed apparatus by which he succeeded in telephoning in 1879, without wires, over a distance of several hundred feet. Many homely things went into the construction of this apparatus such as knitting and sewing needles, ash trays and the like. Although it did not present an appearance of efficiency, nevertheless he repeated his experiments with it before the president of the Royal Society, Professor Stokes, and Professor Huxley. These gentlemen chose to be supercilious, and scoffed at his theories and his claims. He allowed himself to become inoculated with the virus of their scepticism, lost faith in himself, became discouraged, and gave up his efforts. Romance here proved herself a jade, for had she companioned Hughes past the forbidding reception of Stokes and Huxley his brow would have worn some at least of the laurels that crowned Hertz, Marconi and others whose names are lauded today in radio achievement.

In the following year, 1880, Alexander Graham Bell was chosen by Romance to enter the charmed circle of radio. Bell had successfully demonstrated his telephone, and two years later he and Sumner-Tainter worked together on an apparatus to which they gave the name "Photophone" for the reason that by its means sound was reproduced through the medium of light. At first sunlight was used, and later the light from an arc lamp. Mercadier, who himself was conducting intricate experiments in this same field, suggested the name

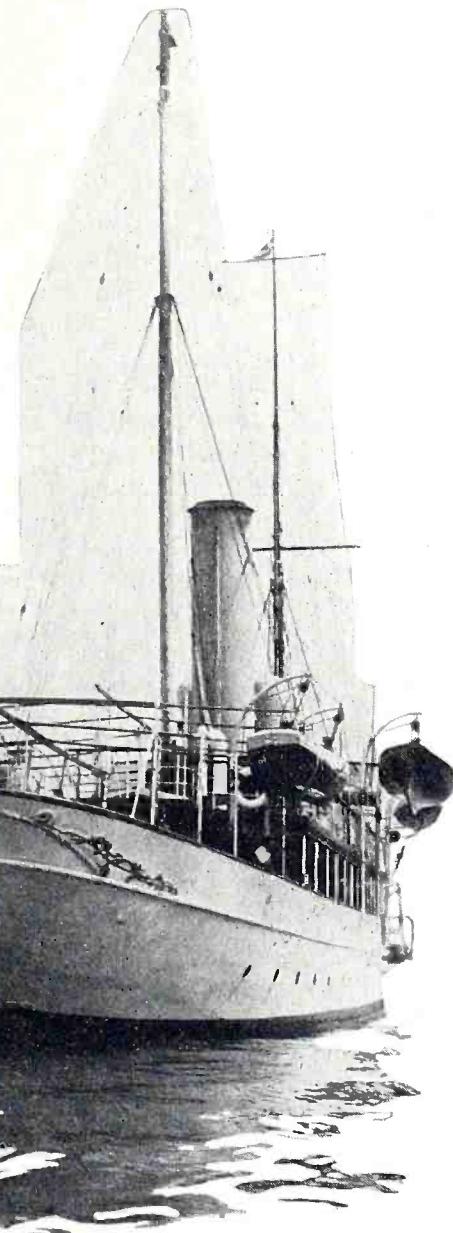


Photo by Underwood & Underwood, N. Y.

WHAT KIND OF A THINGAMAJIG, DOODAD, OF WHOOSIT IS THIS THAT LEE DE FOREST IS FROWNING AT? WE CAN PARDON THE FROWN, FOR THE CONTRAPTION LOOKS LIKE A CROSS BETWEEN A TELEPHONE AND A NICKELODEON MOVIE TO US. BUT NO MATTER WHAT IT LOOKS LIKE—IT HAS SERVED ITS PURPOSE, FOR IT IS A WIRELESS APPARATUS WHICH DE FOREST EXPERIMENTED ON IN THE EARLY STAGES OF RADIO DEVELOPMENT.



SEÑOR GUGLIELMO MARCONI, THE ITALIAN WIRELESS "WIZARD" IS SHOWN (AT THE LEFT) SEATED IN THE WIRELESS ROOM OF HIS YACHT "ELETTRA" WHICH IS PICTURED BELOW. DURING HIS RECENT TRIP ACROSS THE ATLANTIC MARCONI MADE SEVERAL ATTEMPTS TO REACH THE PLANET MARS BY RADIO, MARS BEING AT



"radiophone" because the thermal as well as the light radiations were employed. Even with the light from a candle it was possible to reproduce a faint sound, although the apparatus was primarily devised for the use of sunlight. An essential part of this apparatus was the selenium cell on which the beam of light was focused, the peculiar properties of which had been demonstrated by Willoughby Smith in 1873.

The "photophone" was tested in the laboratories of the Bell Telephone Companies, and some years after its invention Hammond B. Hayes, an engineer connected with the American Telephone and Telegraph Company, conceived the idea of attaching the telephone wires to the wires in the electric arc light, and with this arrangement the voice was transmitted several miles. This so-called "light telephony" reached its highest development through Ernest Ruhmer, although twenty miles is said to have been the extreme limit to which the voice has been carried by this method, and open spaces and clear atmosphere were essential to its success even within this restricted area. It was used successfully on ferryboats in America for the transmission of messages between the ferry and the shore, and also by the United States Signal Corps. Germany also found it practicable for light-house work on the Wansee near Berlin. The necessity for a clear path for the light ray to travel, together with its comparatively short range, imposed insurmountable barriers to complete commercial success.

THAT TIME VERY CLOSE TO THE EARTH. AT THAT TIME HE DID RECEIVE A MYSTERIOUS MESSAGE WHICH WAS BELIEVED TO HAVE BEEN SENT FROM MARS.

It would seem that at this time Romance was seeking the wide world over for someone who would follow her gleam without question, without fear of scoffers,—that gleam that would lead into the effulgent glory of the full discovery of her secret of Radio. In Boston, in 1883, she intrigued Professor Dolbear of Tufts College so far as to cause him to grasp the significance of the aerial for bringing in wireless signals. His system of wireless communication required kites to elevate the wires, because he had found that the signals were more powerful at a height. His system is very suggestive of Marconi's antennae, bringing in sounds through a telephone receiver connected with one end of an elevated wire, the other end being grounded. Apparently his sig-

nals were not transmitted to any great distance. Romance did not linger long enough to give to Dolbear the glory of closing the circle of discoveries, theories and inventions.

In England she sought far and wide, and chose the Chief Electrician of the British Postal Telegraphs for some of her favors. William H. Preece, afterward knighted, will ever be remembered gratefully for his open mind to new things, and more particularly for his encouragement to young inventors such as Bell, Marconi and others less famous. His encouragement of Marconi belongs to the Italian's part of the story. Preece, however, carried on investigations in radio on his own account.

(Continued to Page 170)

Amateur Radio Experimentation

By W. L. POLLARD

Hail! His Majesty, the American Boy! The sweetest and most lovable roughneck that ever drew breath. He sees everything, knows everything, and does everything. Just now he is devoting all his dynamic energy to his wonderful new play-fellow—Radio. He is the amateur of whom you read so much. This article tells the value of what he is doing.

AMATEUR radio experimentation has been going on continually since the first discovery of the Hertzian wave.

Young Marconi, in the nineties, started out as an amateur experimenter. He is still experimenting, but, while in 1897 he was dreaming of sending wireless messages the great distance of ten miles, and sitting up at night experimenting with various forms of crude transmitting devices in an effort to achieve his dreams, he now does his experimental work on a palatial yacht, and measures radio waves one hundred and fifty thousand metres long. Times have changed!

A few years ago an amateur radio fan, named Armstrong, was doing some experimental work in the wireless laboratory at Columbia University. Wireless reception to this stage had been found practical only when the sending station was located a short distance away. The principle of taking messages out of the air had been firmly established, crystals and tubes were both in use, but long range reception was impossible. Armstrong was tinkering with his set, trying various circuits, various hook-ups, various plans of reception. He wired his receiving instrument in a certain way, when, lo! stations that had formerly been weak and scarcely audible came in strong. He listened further, and stations never before heard were strong. A new principle had been discovered. Amateur experimentation had again achieved. Armstrong did not stop. New principles have been studied out by him, and it is now rumored that Armstrong has a super-regenerative circuit which is said to make a receiving set of two electron tubes a thousand or more times as sensitive as the same tubes would be using the plain Armstrong regenerative circuit; more experimentation.

Hundreds and perhaps thousands of new angles, or new principles, in radio have been brought about by the amateur experimenter, and the great bulk of the radio progress of the future is going to come from this same amateur who lives radio, dreams radio, and makes himself a regular nuisance around the house with his wires and his bakelite.

If you are the mother or the father of a boy amateur remember these things. Remember young Hanson of Los Angeles, who, boy amateur that he was, experimenting and tinkering with radio sets continually, developed the audion tube for deaf people, perfected a device for the steering of ships into a harbor that made it possible for a captain of a ship to steer his vessel into New York Harbor from the open sea, though at the time he was blindfolded. Remember de Forest, Armstrong, Marconi, Kennedy and a score of other young fellows who, by their radio experimentation, made possible the present status of radio.

The United States Government recognizes the value of the boy amateur experimenter. Various bands of wave lengths are definitely assigned to him for his use, and when radio broadcasting seemed to threaten the boy the government, and its agents in charge of radio (the Radio inspectors in the several districts), stepped in and set up definite rules governing broadcasting that protected the amateur from aggression. Large manufacturing and distributing agencies handling radio supplies recognize the importance of the boy amateur, and there is hardly such an agency in the United States that does not have several amateur experimenters at work developing radio supplies or figuring out means of marketing such supplies.

The time the boy spends on radio experimentation is time well spent. Devices perfected by amateur radio experimenters aided our armies greatly while warring in France. Our naval units would have been far less efficient had it not been for the wireless appliances developed by the radio amateur.

Radio development is still in its beginnings. The next decade will see radio applied to many walks of life where its use is undreamed of at this time, but within the realm of communication alone there are thousands of radio secrets waiting to be uncovered, and for each of these secrets unfolded there will be literally thousands of hours of experimentation necessary. Before Dr. deForest put a grid into the electron tube and made the elec-

tron many times as sensitive as it had been before, much experimentation had gone on to produce this result, different people working along different lines. With the grid in the electron tube that tube became the most sensitive agency known to radio science. During the last few months practically everyone who has given any attention to radio has become acquainted with the crystal set. Many have also learned the value and the uses of the audion set, and have wondered why the audion gave results not obtained with the crystal. The answer is apparent when one learns that the de Forest audion tube, operating in an Armstrong circuit, is 5000 times more sensitive than the ordinary crystal set, and 1000 times more sensitive than the very best crystal on the market. And this is all the result of experimentation. Who knows but that the time will come when we will have at our command some agency for radio detection that will exceed the audion tube in its sensitiveness as the audion tube surpasses the crystal of today? The boy amateur, graduating into the engineer class, will be the person to discover the new principle if it is discovered.

Within the month I have talked with about fifty boys. Each has been experimenting on some phase of radio. Each has had his own idea as to what the next year is going to bring forth in radio development, but each is convinced that radio frequency amplification is going to be the secret back of the next sensational development. Since each boy had about the same idea I sought out a few of the sets these boys were working on, and I found that each was working hard to perfect some phase of radio frequency. Each boy was going about his task in a different manner, but all were working on the same principle. I then sought out a few of the best radio engineers in Southern California and asked them what in their opinion would be the next great radio principle developed. "Radio Frequency will come next." This statement was unanimous. Again the boy amateur is justifying himself. Perhaps it will not be a boy amateur who discovers the secret back of radio frequency and harnesses that principle of radio re-

ception, making it practical for the novice,—fool proof, as it were,—but if it is not a boy amateur who does it, it will be some engineer who was a boy amateur ten years ago. The thousands of boys now devoting many hours each week to a study of this principle are bound to find out something about it, and their study is going to be of great aid to the engineers who eventually master this principle and develop it for use.

Boys can serve radio well by experimentation along many lines, such as the elimination of static. Marconi, it is rumored, has developed a filter that eliminates static. However, this rumor does not prevent John Smith, aged anywhere from ten to twenty-five, experimenting along these lines and actually developing such a filter. There is directional sending to be studied out, directional reception, selective reception, coil and loop antenna to be conquered, and a thousand and one other phases of radio sending and reception that need improvement, and the boy amateur can be of great aid in solving each one of these problems.

Recently there has been much talk of sending pictures by radio. In fact, still pictures have been sent, but these have not been very clear. Pictures as they are now sent employ the same principle used in making a half tone on copper plate, i. e., a principle where the surface of the picture is cut up into a fine screen with thousands of tiny dots correctly shaded, each dot having a certain degree of shade; when these are assembled in proper form the picture appears. There are other means of picture transmission, some of which are used in sending pictures by wire for newspaper use; but due to the fact that it takes a long time to telegraph, or wireless the thousands of dots required in the make up of a picture, only small simple pictures can be sent. Motion pictures by wire, or television, is considered impractical with present methods. It was a boy amateur, a young chap of about eighteen, who perfected the sending of still pictures by wire, and by wireless, and what young Le Roy J. Leishman did for the still picture some other young chap may do for motion pictures. Leishman believes motion pictures by radio to be impossible, but there were doubtless others who, six or eight years ago, when Leishman was experimenting with his telegraph picture project, would have declared the transmission of any picture by wire an absurdity, utterly impractical.

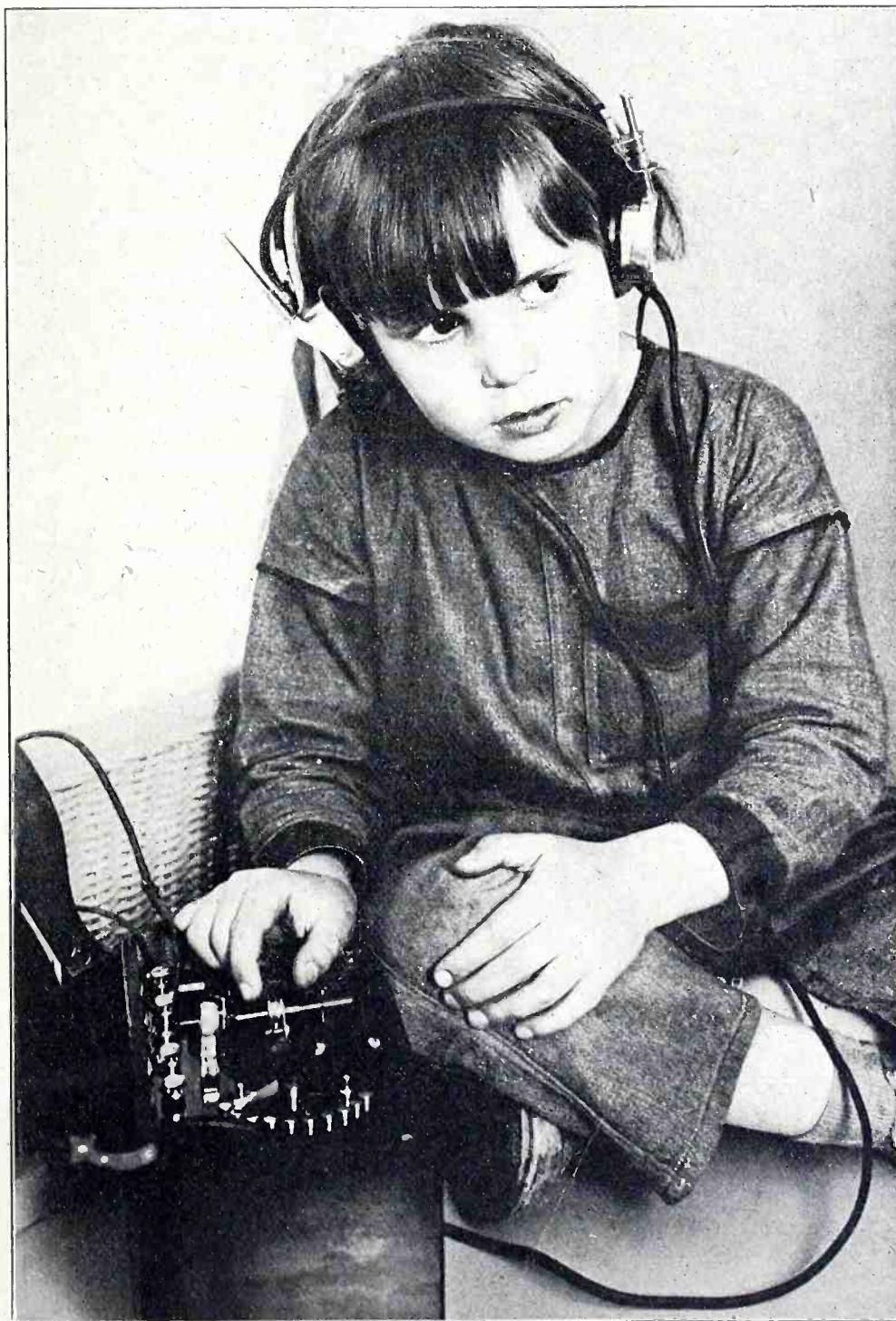
According to Leishman moving pictures will never be sent by wire or by radio until there is developed some agency for the sending and detection of energy which is a thousand times as rapid and sensitive as is the audion

tube of today. It is not inconceivable that some one will come along within a year and invent some form of radio reception that will far surpass the audion, but to do this much experimentation will be necessary.

The best form of amplification now known is by the audion tube. A few days ago I listened to a little device that for clearness of tone was equal to any audion I had ever heard. This device was attached to a simple non-regenerative detector, yet produced a volume of music and speech loud enough to fill an ordinary sized room, equivalent, I would say, to a two step amplifying unit. No tubes were employed. The device is simple, small, compact, and inexpensive. Its inventors will have to do some laboratory

experimentation before it can be successfully put on the market, but unless all signs fail it will eventually come on the market, and with the experimentation along similar lines that will immediately follow, it is not far-fetched to say that within another year or two it will rival the amplifying tube in the production of sound volume.

From Maine to California, in every state, city, or hamlet, you will find the boy amateur, and many of these young chaps are experimenters as well, though, of course, a large number are content with their radio work when they have succeeded in hearing through their home-made sets. The true experimenter, however, is never satisfied. To him the accomplishment of one object serves but as the start-



HERE'S A TYPICAL KID WHO WILL WARM THE COCKLES OF ANY ONE'S HEART. OF COURSE JACKIE COOGAN WOULD BE INTERESTED IN RADIO. WE'LL WAGER HE HAS TAKEN HIS SET TO PIECES TO "SEE THE WHEELS GO 'ROUND."

ing point for experimentation along different channels to produce something else.

In practically every city of any size in the United States there is an amateur radio association, composed of boys and young men, and occasionally an older man, which has for its prime purpose the development of radio. Get in touch with this association. Learn what its objects and its purposes are. Become acquainted with its leaders and its members, and by so doing you will learn something of the background of radio. In Los Angeles the association meets twice a month, and at each meeting there are upwards of a hundred boys, all eager to learn, all bent upon getting the best out of radio, all putting their best into the game. They are a straight-shooting, square-living set of young fellows. They have to be, for, in a large measure they are on their honor to obey certain rules, to keep their sets tuned sharply, to keep off all waves except the ones assigned them, and to otherwise obey the radio laws and uphold their government inspector. Any boy who affiliates with this organization is taking a step forward, both as to his radio work and as to his education in other things that count.

This organization is the nucleus around which radio is developing. Among its members will be found the

foremost experimenters of the present day. The boys who come into it are welcomed, are aided, and if a member wants to do experimental work any other member will assist him in any way possible. The experimentation that has been done by members of this organization has gone far in the upbuilding of radio interest in the United States, and further experimentation by these same members, or by new members, will carry the radio development onward. If you have a boy interested in radio urge him to join this organization, then encourage him in experimentation. Give him the proper urge, and if he has any interest, as soon as he gets into the atmosphere of the radio association, he will commence to do things, for, essentially, the members of this organization are doers.

Amateur radio experimentation is necessary for the development of the radio game, and the development of the radio game is essential to the proper welfare of our nation. The Army, the Navy, and other branches of the government are anxious that the amateur do as much experimental work as possible, and it behooves the individual to aid in this matter by encouraging the boy wherever possible.

Radio is destined to revolutionize civilization as did the steam engine; electricity; the automobile; and the

development of the steel and iron industry. Radio is young, however; but it has gone far. Radio has developed as far in twenty years as the steam engine developed in half a century—and this rapid development has come about because, where with the steam engine only a few mature minds were working on its principles, with the radio work thousands upon thousands of boy amateurs have been working. It is your duty as a father or a mother of an interested boy, or as a plain American citizen, to keep these boys everlasting at it. The product of their work, the progress of their experimental work are needed.

Help the good work along however and whenever possible.

In England the big radio companies do not sell radio apparatus. They rent it. Several broadcasting stations are to be erected throughout the British Isles, and daily programs, including a domestic and continental news service, will be supplied.

* * *

Here is a problem for statisticians to solve: Based upon the development of civilization and the growth of knowledge as a result of the invention of the printing press, what will be the ratio of growth due to the activities of radio?

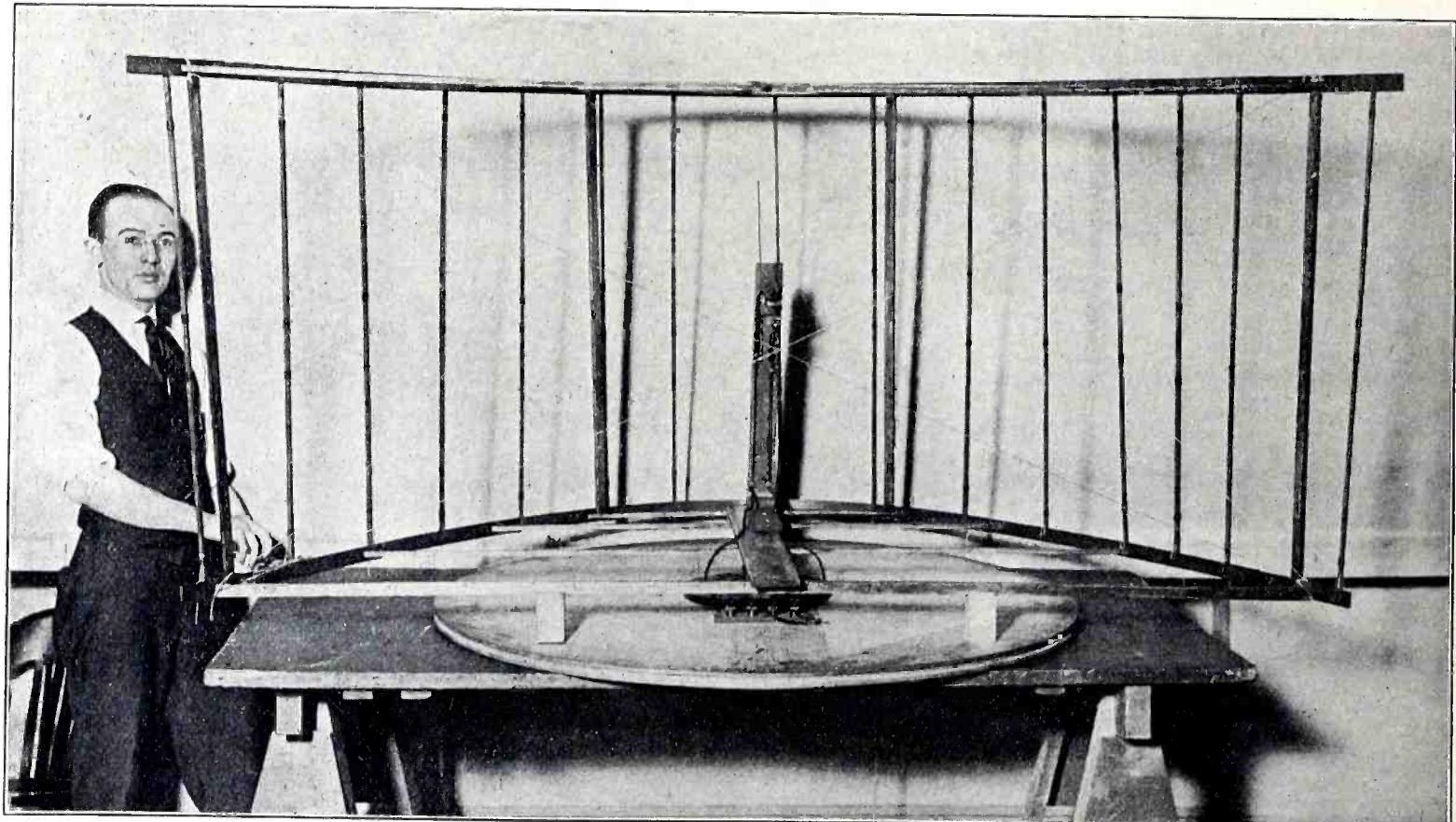


Photo by International Newsreel

DESPITE ITS LOOKS—THIS IS NOT A MODEL OF A NEW KIND OF BABY CRIB. IT'S A RADIO SEARCHLIGHT, AND SEARCH US, IF WE CAN FIND THE LIGHT. GUGLIELMO MARCONI INVENTED IT AND HE SAYS RADIO WAVES CAN BE DEFLECTED LIKE LIGHT WAVES AND SENT IN A GIVEN DIRECTION INSTEAD OF BEING SCATTERED. THE INVENTOR THINKS THE INSTRUMENT CAN BE UTILIZED TO RID THE SEA OF ITS TERRORS. WITH A REVOLVING REFLECTOR THE TRANSMITTER WOULD CONSTITUTE A RADIO LIGHTHOUSE CAPABLE OF FLASHING GUIDING SIGNALS TO VESSELS NEARLY ONE HUNDRED MILES THROUGH FOG AND DARKNESS.

Radio Installation and Fire Insurance

By WM. D. WIDENHAM

New ideas and inventions mean new rules and regulations All of which means growth and progress. And that's what we want. "The old order changeth," said the savant. "Gosh, ain't radio goin' some?" says the enthusiastic boy. And they both voice the same truth.

The experimental activities on the part of beginners in the radio art have stirred the bureau of standards to the extent that that department has made revisions and amplifications of the national electrical fire code to cover the increased fire risk. The revisions together with amplifications, will become permanent after September first. Most of them are at present in effect, and failure to observe them will result in the loss of insurance.

Naturally the radio student is interested in experimentation with lighting circuits and other high voltage systems, and in installing his receiving set he often does not realize, or does not care, that his method of installation is increasing the fire hazard. The law has taken a hand in the control of the installation of receiving sets to the extent that it places bounds upon the nearness of light and power wires.

One of the main provisions prohibits antennae crossing over or under electric wires of more than 600 volts, or being placed in such a way that they may come in contact with power wires. Soldering of splices and joints also is ordered, unless they are made with approved clamps or splicing devices.

The size of the antennae will depend largely on the span. For the ordinary receiving antenna about 100 feet long, No. 14 gauge, soft drawn copper wire may be used, or any other wire of equivalent strength. Keep in mind that where the span is long or where the antenna crosses other wires, it should be larger. The requirements for soldering or using approved splicing devices are made to minimize possibility of antennae falling on other wires.

In order to obtain a good result, the outdoor antennae should be of rugged construction, held securely in place and kept well away from electric light and power wire. It is advisable for the amateur not to make any connections to poles carrying light or power wires. Those unfamiliar with electric wiring will do well to have antennae and other apparatus installed by competent electricians. Antennae that are installed inside of buildings are not covered by the above specifications.

In Los Angeles a permit is not re-

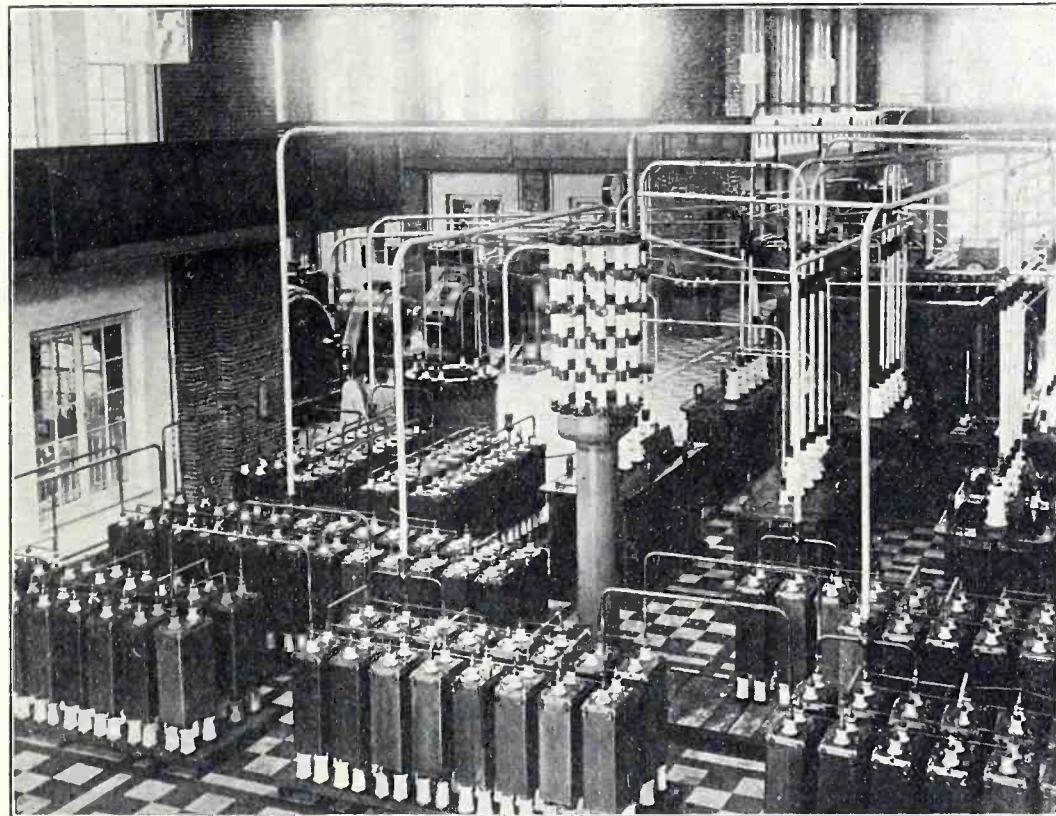


Photo by International Newsreel

FROM NEUEN, GERMANY, TO RIVERHEAD, LONG ISLAND, IN 1/20 OF A SECOND, IS SOME FLASH, WE CONTEND. SUCH IS THE RECORD OF THE WORLD'S LARGEST RADIO STATION NEAR BERLIN. THIS PHOTOGRAPH IS THE FIRST EVER TAKEN OF THIS STATION AND SHOWS THE SENDING ROOM WITH THE GIANT ACCUMULATOR.

quired to erect an aerial costing less than twenty dollars, so the average amateur aerial consisting of a few strands of wire on the house or garage is not taxed. On the other hand the erection of an aerial at a cost of from twenty to seventy-five dollars inside the fire district requires a permit costing one dollar. For erecting any aerial at a higher cost than seventy-five dollars the fee is one dollar and a half.

To be on the side of safety the lead-in wires must be of copper or some approved metal wire such as copper-clad steel that will not corrode excessively, and in no case should they be smaller than No. 14 B & S gage except that approved copper-clad steel not less than No. 17 B & S gage may be used.

Caution should be given in installing the lead-in wires on the outside of buildings so that they shall not come nearer than 4 inches to electric light and power wire unless separated therefrom by a continuous and firmly fixed non-conductor, and in this way

will maintain a permanent separation. Use the non-conductors in addition to any insulation on the wire. Lead-in wires must enter a building through a non-combustible, non-absorptive, insulating bushing.

Although desirable from a signaling viewpoint to prevent partial grounding in wet weather, these rules do not require the insulating of lead-in wires except where they pass through the building wall, where a bushing is specified. The reason for this is to protect against possible contact with wires, pipes, or any other grounded metal which may be concealed in walls.

Proper installation calls for an approved protective device for the lead-in wire that is properly connected and located, either inside or outside the building. This protective device must not be placed in the immediate vicinity of easily ignitable stuff or where it is exposed to inflammable gases, or dust or flyings of combustible material. The protective device called for is an approved lightning arrester, one



MR. E. E. BUCHER

Photo by International Newsreel

WE ARE GLAD TO PRINT YOUR PICTURE, MR. BUCHER AND TO TELL OUR READERS THAT YOU ARE MANAGER OF THE SALES DEPARTMENT OF THE RADIO CORPORATION OF AMERICA, THE LARGEST OF ITS KIND IN THE WORLD. ALSO TO INFORM THEM THAT YOU HAVE WRITTEN SEVERAL HONEST-TO-GOODNESS BOOKS ON RADIO.

which will operate at a potential of 500 volts or less. The use of cheap home-made devices should be discouraged. The fuses are not required, but if installed should be between the lead-in and the lightning arrester.

Even though it may be desirable a word of caution is necessary against the use of an antenna grounding switch unless the approved protective device is used. If an antenna grounding switch is used, however, it must, in its closed position, form a shunt around the protective device.

It is not necessary for the ground wire to be insulated, but it should be of copper or approved copper-clad steel. If copper, the ground wire must be not smaller than No. 14 B&S gage and if of approved copper-clad steel it must be not smaller than No. 17 B&S gage. One of the requirements is that the ground wire shall be run in as straight line as possible to a good permanent ground, preference being given to water piping. Under no condition use gas piping for grounding protective devices. You are not confined to water piping, but may use grounded steel frames of buildings or other grounded metallic work, in the building or artificial ground such as driven pipes, plates, and cones, etc. Keep the ground wire protected from mechanical injury. Use an approved

ground clamp wherever the ground wire is connected to pipes or piping.

By using the proper connections of the antenna to the ground the lightning hazard is minimized. A satisfactory ground and properly run ground wire are of primary importance.

Install the wires inside buildings in a workmanlike manner and see that all wires are securely fastened so that they shall not come nearer than 2 inches to any electric light or power wire unless separated therefrom by some continuous and firmly fixed non-conductor making a permanent separation. This non-conductor is in addition to any regular insulation on the wire. Porcelain tubing or approved flexible tubing may be used for incasing wires to comply with this rule.

It is not necessary for the ground conductor to be insulated, but it must be of copper, approved copper-clad steel or other approved metal which will not corrode excessively under existing conditions. It is imperative that the ground wire be not less than No. 14 B&S gage except that approved copper-clad steel not less than No. 17 B&S gage may be used.

The ground wire may be run inside or outside of the building, but when receiving equipment ground wire is run in full compliance with rules for protective ground wire, as previously

stated, it may be used as the ground conductor for the protective device.

In the September number of Radio Journal an article will deal with the transmitting stations with relation to the antennae, lead-in wires, protective grounding switch, protective ground wire, operating ground wire, operating ground, power from street mains, protection from surges and suitable devices, to meet fire insurance requirements.

We have on good authority that at a very early date we will be enabled to listen on three or four wave bands at our option, as the probabilities are that the recommendations of the Radio Convention held lately in Washington will soon become law. When this occurs we will be able to listen on wave bands ranging from 285 meters to 425 meters, and thus if our receiver is sufficiently selected will be able to choose either a sermon, grand opera or jazz, this being made possible by the operating of broadcasting stations on three or four different wave bands simultaneously.

* * *

A \$20,000,000 American corporation has been organized to establish wireless stations in all parts of the world.

Amateur Radio Call List

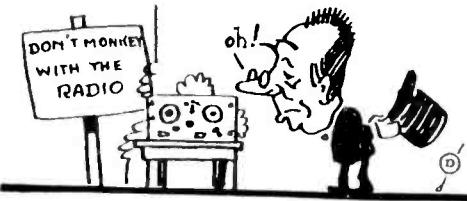
— 7th District —

In the July issue of Radio Journal we published the Amateur Radio Call List for the Sixth District. It proved to be such a popular and valuable feature that we will continue the list. This issue contains the Government list of Amateurs in the Seventh District who are licensed to send. The Seventh District comprises the States of Oregon, Washington, Idaho, Montana, Wyoming and the Territory of Alaska.

- | | | |
|---|---|---|
| 7AA H. E. Renfro, 7319 48th Avenue S., Seattle, Wash. | 7BZ Ernest O. Robbins, 300 Fir St., Olympia, Wash. | 7DR Howard E. Baker, 153 Harrison St., Seattle, Wash. |
| 7AB D. F. Craib, 2146 N. 69th St., Seattle, Wash. | 7CA Edward A. Schaaf, 6302 22d Ave. S., Seattle, Wash. | 7DS D. E. Larson, 777 5th St., Astoria, Ore. |
| 7AC Vincent I. Kraft, 6838 19th Ave. N. E., Seattle, Wash. | 7CB Winifred E. Dow, 2329 S. K St., Tacoma, Wash. | 7DT R. P. E. Mortell, 102 W. Mercer St., Seattle, Wash. |
| 7AD Francis J. Brott, Walk 1, No. 10, Seattle, Wash. | 7CC F. C. Olney, Front St., Stanwood, Wash. | 7DU W. G. Ludgate, Jr., 977 Multnomah St., Portland, Ore. |
| 7AE E. H. Forsnan, 2846 W. 73d St., Seattle, Wash. | 7CD A. F. Liffring, Creston, Mont. | 7DV H. N. Pinkman, 617 28th Ave. N., Seattle, Wash. |
| 7AF F. C. J. Spike, Division St. and Yakima Ave., Tacoma, Wash. | 7CE H. G. Reichert, 818 N. L St., Tacoma, Wash. | 7DW L. N. Seger, 5633 S. L St., Tacoma, Wash. |
| 7AG H. M. Truesdale, 2770 E. 53d St., Seattle, Wash. | 7CF Roy J. Alexander, 5046 S. K St., Tacoma, Wash. | 7DX J. G. Upthegrove, 344 E. 41st St. N., Portland, Ore. |
| 7AH Clarence Benzon, 3637 14th Ave. W., Seattle, Wash. | 7CG C. J. Kennison, 1521 Alturas St., Boise, Idaho. | 7DY J. E. Middleton, 145 N. Normal St., Burley, Idaho. |
| 7AI Donald L. Woodward, 369 14th St., Portland, Ore. | 7CH John R. Hoover, 1005 Harrison Blvd., Boise, Idaho. | 7DZ H. C. McCracken, 460 E. 13th St. N., Portland, Ore. |
| 7AJ F. B. Mossman, 3015 N. 26th St., Tacoma, Wash. | 7CI M. G. Carlton, 1067 E. Burnside St., Portland, Ore. | 7EA N. A. Clodfelter, 1221 Madison St., Portland, Ore. |
| 7AK J. E. Bellings, 3232 13th St. W., Seattle, Wash. | 7CJ H. H. Anderson, 1721 35th Ave., Seattle, Wash. | 7EB W. D. Simpson, 1543 Court St., Salem, Ore. |
| 7AL Kenneth A. House, 130 Polk St., Moscow, Idaho. | 7CK Joseph Rooney, 214 Olympia Pl., Seattle, Wash. | 7EC R. M. Shinnington, 1247 Tillamook St., Portland, Ore. |
| 7AM A. R. Tingstad, 2507 I St., Tacoma, Wash. | 7CL Wellington McMillan, 157 Harrison St., Seattle, Wash. | 7ED W. V. Russ, 831 Michigan St., Portland, Ore. |
| 7AN Chas. E. Williams, 8326 13th Ave. NW., Seattle, Wash. | 7CM John C. Vogler, 122 Belmont Ave. N., Seattle, Wash. | 7EE R. E. Marshall, 1135½ Albina Ave., Portland, Ore. |
| 7AO L. G. Haw, 14th St. S. and Bayview, Seattle, Wash. | 7CN Wayne K. Harris, 543 N. Broadway, Marshfield, Ore. | 7EF H. B. Bogue, 907 Clark St., The Dalles, Ore. |
| 7AP T. T. Smith, 1306 E. 75th St., Seattle, Wash. | 7CO Geo. W. Fitzpatrick, 3252 Ferdinand St., Seattle, Wash. | 7EG G. R. Stewart, W. 8th St., Ellensburg, Wash. |
| 7AQ P. B. Maginnis, 364 S. 5th St., Marshfield, Ore. | 7CP E. G. Martin, 2316 N. Broadway, Seattle, Wash. | 7EH L. W. Cardinal, Du Pont, Wash. |
| 7AR R. Bostwick, Jr., 2906 W. Eaton St., Seattle, Wash. | 7CQ Robert G. Stone, Post Office Box 616, Boise, Idaho. | 7EI A. L. Fisher, Jr., 2443 N. Yakima Ave., Tacoma, Wash. |
| 7AS F. Eastman, 1506 28th Ave. W., Seattle, Wash. | 7CR Ralph T. Galyean, 460 Miller Ave., Portland, Ore. | 7EJ W. E. Gurley, 2332 Monroe St., Corvallis, Ore. |
| 7AT Earl La Pine, 2301 E. Madison St., Seattle, Wash. | | 7EK Leslie Lunan, 806 S. M St., Tacoma, Wash. |
| 7AU J. L. Webster, 2568 12th Ave. W., Seattle, Wash. | | 7EL G. H. Folsom, 7427 Olympic Court, Seattle, Wash. |
| 7AV L. F. Mahoney, 461 Schuyler St., Portland, Ore. | | 7EM E. M. Stone, 4215 Aurora Ave., Seattle, Wash. |
| 7AW B. C. Gamer, 3750 N. 30th St., Tacoma, Wash. | | 7EN Bernard Altick, 1715 Revenna Blvd., Seattle, Wash. |
| 7AX Bert W. R. Hagen, 101 S. 11th Ave., Yakima, Wash. | | 7EO H. T. Louis, Dayton, Ore. |
| 7AY Jesse F. Ives, 1942 4th Ave. W., Seattle, Wash. | | 7EP Fred C. Driffeld, Unga Island, Unga, Alaska. |
| 7AZ James A. Solomon, 7200 28th Ave. NW., Seattle, Wash. | | 7EQ J. S. Ramsay, 215 E. 9th St., Ellensburg, Wash. |
| 7BA Merle Chas. Richard, 3024 S. 9th St., Tacoma, Wash. | | 7ER Chas. M. Emigh, 2123 3d Ave. W., Seattle, Wash. |
| 7BB Merrit G. Cunningham, 516 N. Cushman Ave., Tacoma, Wash. | | 7ES Arthur J. Fries, 1010 N. 11th St., Tacoma, Wash. |
| 7BC Neville R. Benoit, 5046 S. L St., Tacoma, Wash. | | 7ET I. N. Robinson, 623 Boyleston Ave. N., Seattle, Wash. |
| 7BD Richard R. Atchison, 656 E. 44th St. N., Portland, Ore. | | 7EU Jos. Mazuranich, 211 Joliet St., Helena, Mont. |
| 7BE Harold H. Bitter, 3015 E. 11th St., Tacoma, Wash. | | 7EV Lester E. Obrien, 902 S. G St., Tacoma, Wash. |
| 7BF Edward Rebman, 3110 Sunderland St., Seattle, Wash. | | 7EW W. S. Palmer, 6308 S. Yakima Ave., Tacoma, Wash. |
| 7BG Karl W. Weingarten, 3219 N. 24th St., Tacoma, Wash. | | 7EX E. L. Wharton, Glasgow, Mont. |
| 7BH Clive Scott, 345 S. 14th St., Salem, Ore. | | 7EY C. N. Ashla, 1650 E. Terrace St., Portland, Ore. |
| 7BI Lester Smith, Tekoa, Washington. | | 7EZ E. W. Morgan, 530 Tenino Ave., Portland, Ore. |
| 7BJ George Sturley, 206 E. 17th St., Vancouver, Wash. | | 7FA J. C. Forrest, 438 High St., Bellingham, Wash. |
| 7BK Howard F. Mason, 3335 33d Ave. S., Seattle, Wash. | | 7FB C. E. Richie, 631 Main St., Klamath Falls, Ore. |
| 7BL A. Dailey, Lake Burien, Wash. | | 7FC L. S. Young, 1055 Hancock St., Portland, Ore. |
| 7BM C. W. Ball, Rt. 1, Bellingham, Wash. | | 7FD Alvin Moore, 634 E. 65th St., N., Portland, Ore. |
| 7BN Geo. C. Henny, 530 Heights Terrace, Portland, Ore. | | 7FE F. T. Richards, 6323 5th Ave. NE, Seattle, Wash. |
| 7BO D. X. Lavallee, 4034 38th Ave. S., Seattle, Wash. | | 7FF G. B. McCullough, 608 S. 2d St., Tacoma, Wash. |
| 7BP R. A. Willison, Jr., 765 Melrose Dr., Portland, Ore. | | 7FG Roy Fifield, 278 Baldwin St., Portland, Ore. |
| 7RQ Hugh E. Allen, 701 State St., Pullman, Wash. | | 7FH E. W. Collins, 315 Market Ave. W., Marshfield, Ore. |
| 7BR E. N. Swan, 1461 Portsmouth Ave., Portland, Ore. | | 7FI D. W. Campbell, 204 Spaulding St., Pullman, Wash. |
| 7BS O. J. Humphrey, Jr., 605 Boylston Ave. N., Seattle, Wash. | | 7FJ L. A. Byerly, 909 Bryce St., Portland, Ore. |
| 7BT George A. Nelson, 4028 E. K St., Tacoma, Wash. | | 7FK T. A. Wetzel, 904 Vancouver St., Portland, Ore. |
| 7BU Morris Hoag, Sheridan, Wyo. | | 7FL F. F. Gray, 1208 2d St., Butte, Mont. |
| 7BV C. F. Kennedy, Kelso, Wash. | | 7FM J. E. McBride, Cor. Bella and 25th St., Boise, Idaho. |
| 7BW Carl A. Hoffman, 618 Sunset Ave., Seattle, Wash. | | 7FN Roy M. McMillan, 3727 Pacific Ave., Tacoma, Wash. |
| 7BX Floyd F. Taylor, 227 N. Miller Ave., Burley, Idaho. | | 7FO Lloyd Wallgren, 2124 Westmore Ave., Everett, Wash. |
| 7BY Wilfred K. Bert, 1924 9th Ave. W., Seattle, Wash. | | |



- 7FP J. D. Shaver, 939 The Alameda, Portland, Ore.
 7FQ L. R. Goddard, 527 Water St., Tekoa, Wash.
 7FR H. L. Jones, 1208 W. 70th St., Seattle, Wash.
 7FS A. A. Webster, 7 S. Naches Ave., Yakima, Wash.
 7FT Currie N. Teed, Kuna, Idaho.
 7FU Willis Oldfield, 1221 Colby Ave., Everett, Wash.
 7FV Winston Countryman, 2022 Oakes Ave., Everett, Wash.
 7FW H. Tenny, 418 Union St., Seattle, Wash.
 7FX Theo. McKeon, 2920 Rucker St., Everett, Wash.
 7FY C. A. Harrington, 104 N. 6th St., Boise, Idaho.
 7FZ C. M. Yadon, 1611 Johnson Ave., Klamath Falls, Ore.
 7GA C. R. Beamer, 343 E. 35th St., Portland, Ore.
 7GB C. B. Hurley, Jr., 808 N. Yakima Ave., Tacoma, Wash.
 7GC Victor Aldrich, 337 N. 4th St., Corvallis, Ore.
 7GD J. M. Pearson, 740 Schuyler St., Portland, Ore.
 7GE L. C. Maybee, 828 Bridge St., Pescos, Wash.
 7GF L. S. Dyer, 761 75th St. N., Seattle, Wash.
 7GG G. D. Crockett, 1120 Hawthorne Ave., Portland, Ore.
 7GH Gale Mix, Moscow, Idaho.
 7GI E. F. Barber, St. John, Wash.
 7GJ Paul V. Noorlin, 45 69th St., NE, Portland, Ore.
 7GK C. H. Linsley, 1249 Center St., Evanston, Wyo.
 7GL C. E. Jean, 1103 E. 6th St., Tacoma, Wash.
 7GM J. B. Hendry, 720 S. Grant Ave., Tacoma, Wash.
 7GN C. A. Newton, 3920 N. 26th St., Tacoma, Wash.
 7GO C. R. Goodwin, 445 N. Commercial St., Salem, Ore.
 7GP Allen Gunston, 903 6th St., Olympia, Wash.
 7GQ M. D. Koupal, 610 W. 5th St., Eugene, Ore.
 7GR C. R. Schrotke, Bothell, Wash.
 7GS Lyle Evenson, 518 N. 79th St., Seattle, Wash.
 7GT C. R. Offield, 8415 Dayton St., Seattle, Wash.
 7GU Jos. M. Deady, 150 27th Ave., Seattle, Wash.
 7GV E. D. Pollock, 2707 10th Ave. N., Seattle, Wash.
 7GW M. E. McCullough, 814 S. 15th St., Tacoma, Wash.
 7GX Fred L. Patterson, 865 Williams Ave., Portland, Ore.
 7GY E. O. Selby, 1401 N. 20th St., Boise, Idaho.
 7GZ Leo C. Clark, 1509 24th Ave., Seattle, Wash.
 7HA H. B. Churchill, 705 Belmont St., Salem, Ore.
 7HB G. M. Smith, Eatonville, Wash.
 7HC Gifford Emery, 611 Malden Ave., Seattle, Wash.
 7HD A. A. Thibodo, Seaside, Ore.
 7HE D. W. Coffey, Kalama, Wash.
 7HF H. M. Skipworth, 1151 Charnelton St., Eugene, Ore.
 7HG H. C. Williams, 402 E. Jefferson St., Boise, Idaho.
 7HH W. S. Tucker, 2832 N. Broadway, Seattle, Wash.
 7HI W. B. Robinson, 1113 E. 1 St., Auburn, Wash.
 7HJ Fred Brown, Rt. 5, care Mrs. R. P. May, Boise, Idaho.
 7HK E. R. Heifort, 3716 Colby Ave., Everett, Wash.
 7HL M. D. Richardson, 500 N. Williamette St., St. Helens, Ore.
 7HM Merwin Elton, 611 5th Ave. N., Great Falls, Mont.
 7HN Delmer Jeans, 1090 W. 7th St., Eugene, Ore.
 7HO Carroll Freeland, White Swan, Wash.
 7HP Thos. E. Widrig, 1132 8th Ave. W., Seattle, Wash.
 7HQ T. J. Bidner, 2024 6th Ave., Seattle, Wash.
 7HR A. D. Cole, 430 15th Ave. E., Eugene, Ore.
 7HS O. C. Kent, Glasgow, Mont.
 7HT E. H. Weimer, Cohagen, Mont.
 7HU Sol Hasbrouck, 224 E. Idaho St., Boise, Idaho.
 7HV James Ray, 1831 24th Ave., Seattle, Wash.
 7HW V. K. Roberts, Apartment 62, Monticello, Helena, Mont.
 7HX P. A. Schumacher, Box 116, St. John, Wash.
 7HY W. T. Vale, 111 Pine St., Klamath Falls, Ore.
 7HZ P. L. Schreiber, Cohagen, Mont.
 7IA J. E. Jenkins, Rural Rt. 2, Olympia, Wash.
 7IB J. G. Nordahl, 809 24th Ave. N., Seattle, Wash.
- 7JC Albert Onsum, 806 E. 55th St., Seattle, Wash.
 7JD Benedict Barr, Mount Angel, Benedict, Ore.
 7IE C. J. W. Tibbetts, 1813 Broadway, Helena, Mont.
 7IF R. M. Dansfield, 662 Charnelton St., Eugene, Ore.
 7IG P. B. Jackson, 431 Broadway, Seaside, Ore.
 7IH G. W. Selvidge, 4321 9th Ave. NE, Seattle, Wash.
 7IJ A. B. Rotering, Box 43, Glasgow, Mont.
 7IM Everett Dunnette, 892 S. 12th St., Salem, Ore.
 7IK Harry H. Olson, 310 4th Ave., Seaside, Ore.
 7IL T. C. Hall, 1126 Taylor St., Eugene, Ore.
 7IM L. J. Simms, 311 N. 27th St., Billings, Mont.
 7IN A. L. Adams, 321 W. Main St., Silverton, Ore.
 7IO H. E. Welch, Rt. 8, Salem, Ore.
 7IP A. A. McCue, Klawock, Alaska.
 7IQ Donald C. Gannon, Central Ave., Kent, Wash.
 7IR J. R. Harris, Cohagen, Mont.
 7IS F. W. Lawrence, 406 S. Crosby St., Tekoa, Wash.
 7IT Roy Anderson, Ketchikan, Alaska.
 7IU George Meacham, 915 30th Ave. S., Seattle, Wash.
 7IV Arthur Fletcher, Woodbine St., Boise, Idaho.
 7IW P. R. Hoppe, 1633 Willamette St., Eugene, Ore.
 7IX T. L. Estes, 318 Ave. E., Snohomish, Wash.
 7IY Danzil Cutler, Vashon, Wash.
 7IZ Charles Burson, 716 42d Ave. E., Seattle, Wash.
 7JA E. L. Crawford, 1340 Court St., Salem, Ore.
 7JB F. H. Stephens, 63 68th St., Portland, Ore.
 7JC Keith Frazier, 829 3d Ave. S., Glasgow, Mont.
 7JD Francis McKee, Cor. E. 11th and E. Court, Weiser, Idaho
 7JE H. C. Boardman, 112 W. 5th St., Port Angeles, Wash.
- 7JF Clyde Anderson, 5095 Washington St., Moscow, Idaho.
 7JG H. R. Drinker, 497 E. 16th St. N., Portland, Ore.
 7JH J. D. Hertz, Vancouver, Wash.
 7JI Albert McGuflin, 346 1st Ave. N., Glasgow, Mont.
 7JJ Gough Dix, Box 151, Gresham, Ore.
 7JK Frank P. Bloss, 792 E. 34th St., Portland, Ore.
 7JL Waverly Miller, 1704 E. 14th Ave., Spokane, Wash.
 7JM O. R. Anderson, 1114 E. Market St., Portland, Ore.
 7JN Roy Rice, Wapinitia, Ore.
 7JO Marvin Larsen, 2024 Spofford St., Spokane, Wash.
 7JP P. W. Dann, Box 974, Astoria, Ore.
 7JQ R. A. Gould, Basin, Wyo.
 7JR C. L. Pitcher, 723 E. 5th St., Moscow, Idaho.
 7JS L. C. Tate, 807 6th St., Anacortes, Wash.
 7JT O. S. Van Olinda, Vashon, Wash.
 7JU J. M. Morris, 650 12th Ave. E., Eugene, Ore.
 7JV H. M. Moon, R. F. D. No. 2, Meridian, Idaho.
 7JW J. D. Tait, 851 E. 26th St. S., Portland, Ore.
 7JX A. E. Wilkinson, 1919 2d St., Baker, Ore.
 7JY Bruce Duncan, 923 31st St. N., Billings, Mont.
 7JZ R. B. Curnutt, 703 9th Ave. S., Great Falls, Mont.
 7KA H. J. Kirk, 658 Glisan St., Portland, Ore.
 7KB E. M. Sheets, Oak Grove, Ore.
 7KC R. R. Zylstra, Lynden, Wash.
 7KD Herbert Wurst, Apt. 8, Jensen Apartments, Glasgow, Mont.
 7KE L. L. Baker, Myrtle Point, Ore.
 7KF T. D. Ferguson, 1258 Chemekita St., Salem, Ore.
 7KG S. A. Wicks, 712 W. Meeker St., Kent, Wash.
 7KH L. E. Shatto, 426 15th St., Astoria, Ore.
 7KI V. W. Bidlinghafer, Shannon Hotel, Glasgow, Mont.
 7KJ W. McGoffin, 450 Chinault St., Hoquiam, Wash.
- 7KK L. P. Crowson, 896 Boulevard, Ashland, Ore.
 7KL G. C. Stocking, 413½ Beattie St., Helena, Mont.
 7KM W. O. Nicholson, 3115 S. 8th St., Tacoma, Wash.
 7KN Wm. Haferkorn, Clinton, Wash.
 7KO Paul E. Lung, 936 S. Grant St., Tacoma, Wash.
 7KP James Holcombe, 137 N. 79th St., Seattle, Wash.
 7KQ C. L. Stephens, 1166 Alder St., Eugene, Ore.
 7KR T. E. Olson, 528 Market St., Portland, Ore.
 7KS A. H. Whittle, 7 Grand Ave., Astoria, Ore.
 7KT R. A. Denham, Prairie City, Ore.
 7KU W. K. McIntosh, 1395 Rodney Ave., Portland, Ore.
 7KV M. W. Edwards, Camp Lewis, Wash.
 7KW G. H. Metcalf, 1443 W. 53d St., Seattle, Wash.
 7KX Errol Hurt, 250 N. Miller St., Burley, Idaho.
 7KY E. C. Anderson, 317 6th St., Marshfield, Ore.
 7KZ F. G. Ashall, 536 N. Warren St., Helena, Mont.
 7LA David Phillips, 6601 Union Ave., Tacoma, Wash.
 7LB Alvin Stenso, 1922 S. J St., Tacoma, Wash.
 7LC Eugene Zaluskey, 8257 Stroud Ave., Seattle, Wash.
 7LD O. F. Torgeson, 7044 17th Ave. NW, Seattle, Wash.
 7LE Harry E. Redeker, 1213 17th St. N., Boise, Idaho.
 7LF E. A. Kraft, 5042 11th Ave. NE, Seattle, Wash.
 7LG J. C. Burke, 1186 E. Lincoln St., Portland, Ore.
 7LH C. P. Cowper, 1419 Boulder Ave., Helena, Mont.
 7LI C. D. Brumbaugh, 354 Central Ave., Marshfield, Ore.
 7LJ W. M. Bonar, Plainview, Ore.
 7LK J. R. Mendenhall, 1007 6th St., Boise, Idaho.
 7LL Wm. Carlton, 4302 Nevada Ave., Seattle, Wash.
 7LM D. E. Oberg, 617 S. 5th St., Yakima, Wash.
 7LN L. L. Martin, Nampa, Idaho.
 7LO W. C. Burkhart, 261 Warm Springs Ave., Boise, Idaho.
 7LP J. D. Killgreen, Milwaukie, Ore.
 7LQ K. C. Preuit, 803 8th Ave. NW, Helena, Mont.
 7LR Royal Howard, 425 Ellsworth St., Albany, Ore.
 7LS Hunter Anstine, Ferndale, Wash.
 7LT D. H. Vollmer, 1205 Worden Ave., Klamath Falls, Ore.
 7LU F. N. Mitchell, Greybull, Wyo.
 7LV H. E. Rankin, Northbend, Ore.
 7LW Ray T. White, 51 E. 24th St. N., Portland, Ore.
 7LX Arthur Lindsley, R. F. D. No. 3, Oregon City, Ore.
 7LY H. E. Cutting, 420 W. Hoch St., Bozeman, Mont.
 7LZ R. T. Thelberg, 4230 Brooklyn Ave., Seattle, Wash.
 7MA E. V. Olson, 223 W. 29th Ave., Spokane, Wash.
 7MB H. F. Osterburg, 621 S. Jackson St., Butte, Mont.
 7MC M. V. Moller, Myrtle Point, Ore.
 7MD C. F. Osterman, 1140 Court St., Salem, Ore.
 7ME C. V. Finch, 201 S. 6th St., Bozeman, Mont.
 7MF Arthur Smith, 261 Jefferson St., Eugene, Ore.
 7MG A. L. Sams, 468 Helm St., Ashland, Ore.
 7MH E. J. Gordon, 320 Summit Ave. N., Seattle, Wash.
 7MI H. S. Horton, Lyndon, Wash.
 7MJ Jack Stranger, 1215 E. 3d Ave., Spokane, Wash.
 7MK H. J. Jigl, Jr., 2727 32d Ave. S., Seattle, Wash.
 7ML D. D. Smith, Collister St., Boise, Idaho.
 7MM Frank Pugh, Philomath, Ore.
 7MN R. V. Bishop, 2124 W. York St., Spokane, Wash.
 7MO Felix Thompson, 1st St., Douglas, Wyo.
 7MP Ralph Lindahl, Bozeman, Mont.
 7MQ L. L. Long, Cornelius, Ore.
 7MR Carl Soderlund, 116 13th St., Vancouver, Wash.
 7MS R. H. Hughes, 1758 Main St., Hillsboro, Ore.
 7MT P. H. Euler, 1819 Commercial St., Astoria, Ore.
 7MU P. F. Peyton, 1060 S. Commercial St., Salem, Ore.
 7MV F. L. Edwards, Rt. 8, Box 39, Yakima, Wash.
 7MW H. W. Edmondson, 637 N. 14th St., Corvallis, Ore.
 7MX Raymond E. Stien, 339 Jefferson St., Eugene, Ore.



7MY J. R. Hill, 703 9th Ave. E., Eugene, Ore.
 7MZ Asa Phillips, Tenino, Wash.
 7NA E. E. Ames, 349 N. 32d St., Portland, Ore.
 7NB H. O. McCoy, 4328 Park Ave., Tacoma, Wash.
 7NC R. W. Morse, 955 13th Ave. W., Seattle, Wash.
 7ND Roland Sudman, 115 W. 20th St., Olympia, Wash.
 7NE C. J. McClure, Leavenworth, Wash.
 7NF F. F. Henriot, Winlock, Wash.
 7NG W. D. Cheney, 1321 E. 31st St., S., Portland, Ore.
 7NH J. C. Wilson, 295 N. 24th St., Portland, Ore.
 7NI F. S. Flesher, 387½ Burnside St., Portland, Ore.
 7NJ G. A. Hunter, 518 Willow St., Port Townsend, Wash.



7NK H. R. Hildreth, 2064 23d St. N., Seattle, Wash.
 7NL G. E. Langford, 2927 Ash St., Spokane, Wash.
 7NM K. C. Evening School, 290 Grand Ave. N., Portland, Ore.
 7NN D. E. McGee, 616 5th St., Hoquiam, Wash.
 7NO E. K. Carriere, 337 Morris St., Portland, Ore.
 7NP B. J. Glein, Gig Harbor, Wash.
 7NQ F. L. Carty, Eatonville, Wash.
 7NR H. V. Koontz, Buffalo, Wyo.
 7NS F. H. Alverdes, 142 E. 47th St., Portland, Ore.
 7NT Cecil Hughes, 601 7th Ave. S., Glasgow, Mont.
 7NU E. J. Moe, 1209 S. Ivanhoe St., Portland, Ore.
 7NV G. C. Henry, 1214 1st Ave. S., Great Falls, Mont.
 7NW E. L. Clark, 2301 Cherry St., Hoquiam, Wash.
 7NX C. V. Henkle, John Day, Ore.
 7NY J. R. Watson, Rt. 2, Forest Grove, Ore.
 7NZ J. J. Wilson, 34 E. 62d St., Portland, Ore.
 7OA William Thurber, 300 N St., Hoquiam, Wash.
 7OB Arthur Hagerman, Y. M. C. A., Baker, Ore.
 7OC H. H. Clark, 386 E. 11th St., Portland, Ore.
 7OD M. B. McBride, Jr., 1031 N. 23d Ave., Seattle, Wash.
 7OE H. S. Pyle, 810 Warren Ave., Bremerton, Wash.
 7OF V. C. Johnson, 1014 Glass Ave., Spokane, Wash.
 7OG E. A. Elge, 418 N. Brenton St., Helena, Mont.
 7OH G. S. Feikert, 402 N. 17th St., Corvallis, Ore.
 7OI P. M. Smith, R. F. D. 3, Powell, Wyo.
 7OJ L. U. Bennett, Port Townsend, Wash.
 7OK Frederick Koelsch, 103 Jefferson St., Boise, Idaho.
 7OL Roy Smith, 202 1st St. S., Burley, Idaho.
 7OM Harold Woodyard, Sunnyside, Wash.
 7ON Sheldon Hagen, 807 24th Ave., Seattle, Wash.
 7OO G. O. Leonard, 1827 4th Ave. W., Seattle, Wash.
 7OP H. E. Williamson, 316 Union St., Seattle, Wash.
 7OQ R. E. Peratovich, Bay View, Alaska.
 7OR A. H. Lillibridge, 506 E. A St., Moscow, Idaho.
 7OS C. F. Burdick, Casper, Wyo.
 7OT B. B. Bliss, Jr., 417 Bannock St., Boise, Idaho.
 7OU W. K. Stockdale, Prosser, Wash.
 7OV F. J. Campbell, 2d St. N., Forest Grove, Ore.
 7OW Edwin Eby, 782 Front St., Salem, Ore.
 7OX W. A. Hazelwood, Myrtle Point, Ore.
 7OY J. R. Truman, 848 Ocean Drive, Bandon, Ore.
 7OZ Garrett Lewis, 767 Hawthorne Ave., Portland, Ore.
 7PA H. W. Randall, 1212 Star Route St., Pullman, Wash.
 7PB R. T. Jones, 116 Edison St., Portland, Ore.
 7PC Herbert Chase, 2010 Water St., Olympia, Wash.

7PD B. C. Hendricks, Cornelius, Ore.
 7PE L. C. Grove, Kenai, Alaska.
 7PF Glen Goudie, 2818 Victor Pl., Everett, Wash.
 7PG K. H. Ellerbeck, 2019 Nob Hill, Seattle, Wash.
 7PH R. M. Gardner, R. A., Box 292, Eugene, Ore.
 7PI R. J. Moore, 115 1st St., Wolf Point, Mont.
 7PJ D. P. Scaife, 288 8th St., Marshfield, Ore.
 7PK D. K. Boyd, 2d Ave., Glasgow, Mont.
 7PL C. H. Ackerman, 305 5th St. S., Glasgow, Mont.
 7PM H. C. Manning, 4324 8th Ave. NE, Seattle, Wash.
 7PN B. L. Davis, 8523 12th Ave. NW, Seattle, Wash.
 7PO G. E. Kinsey, 907 W. 58th St., Seattle, Wash.
 7PP Stadium High School, 1st and E Sts., Tacoma, Wash.
 7PQ Arthur Harding, 1120 N. 97th St., Seattle, Wash.
 7PR Leland Harris, 3232 38th Ave. SW, Seattle, Wash.
 7PS Arthur Randall, 2802 22d Ave., Seattle, Wash.
 7PT E. P. Coulter, 529 3d St., Helena, Mont.
 7PU E. L. Hansen, R. F. D. 2, Powell, Wyo.
 7PV J. M. Dickenson, 434 17th St., Corvallis, Ore.
 7PW C. W. Gabrielson, Puyallup, Wash.
 7PX L. A. Kobe, Powell, Wyo.
 7PY Hans Waale, Nampa, Idaho.
 7PZ Walter Bone, Carneyville, Wyo.
 7QA H. M. Hassell, 120 E. 60th St., Seattle, Wash.
 7QB Kenneth Field, 306 E. Olive St., Seattle, Wash.
 7QC J. F. Bunting, 1907 1st Ave. W., Seattle, Wash.
 7QD D. H. Bunch, 1015 Spur St., Aberdeen, Wash.
 7QE W. H. Motz, 4608 J St., Tacoma, Wash.
 7QF S. W. Ostrom, 4840 84th St. SE, Portland, Ore.
 7QG G. R. Salisbury, 1951 3d Ave. W., Seattle, Wash.
 7QH H. M. Reynolds, 3817 Densmore Ave., Seattle, Wash.
 7QI J. D. Keating, 1315 Sandy Blvd., Portland, Ore.
 7QJ Frederick Lindstrom, Powell, Wyo.
 7QK R. R. Patrick, Eatonville, Wash.
 7QL Alva Flippin, Rainier, Ore.
 7QM R. E. Welch, 1005 N. Normandie St., Spokane, Wash.
 7QN A. Z. Lillian, 620 21st Ave. N., Seattle, Wash.
 7QO J. C. Mitchell, Mutual Life Building, Seattle, Wash.
 7QP Howard Liebe, 204 N. 22d St., Portland, Ore.
 7QQ Chris Engleman, Jr., 321 W. 32d St., Vancouver, Wash.
 7QR C. V. Annin, Myrtle Point, Ore.
 7QS E. W. Henry, 5505 36th Ave. SE, Portland, Ore.
 7QT Clarence Hurd, 1514 Williamette St., Eugene, Ore.
 7QU F. R. Cartan, 1461 Monroe St., Corvallis, Ore.
 7QV John Munzenrieder, 515 First St., Helena, Mont.
 7QW Jay Isham, 820 Dalton Ave. W., Spokane, Wash.
 7QX F. A. Koehler, 314 S. 12th St., Corvallis, Ore.
 7QY Victor Chambers, Tenth St., Cottage Grove, Ore.
 7QZ D. W. Cathcart, 1505 E. 66th St., Portland, Ore.
 7RA M. A. Hauge, 5635 11th Ave. NE, Seattle, Wash.
 7RB R. G. Farrah, 700 E. 26th St., Vancouver, Wash.
 7RC Barton Stemmler, Spruce St., Myrtle Point, Ore.
 7RD Charles Parmelee, Sunnyside, Wash.
 7RE N. H. Foster, N. Water St., Ellensburg, Wash.
 7RF H. E. Nelson, Centralia, Wash.
 7RG E. J. Hoff, 927 Irving St., Astoria, Ore.
 7RH P. E. Nolte, Camp Lewis, Wash.
 7RI John Soderstrom, 823 Thornton St., Aberdeen, Wash.
 7RJ G. O. Campbell, 2443 5th Ave. W., Seattle, Wash.
 7RK H. L. Haven, 1123 Burwell St., Bremerton, Wash.
 7RL G. W. Garman, 1366 31st Ave. S., Seattle, Wash.
 7RM H. A. Burgess, 9260 California Ave., Seattle, Wash.
 7RN Kenneth Paton, Cashmere, Wash.
 7RO R. G. Heitkemper, 439 E. 10th St. N., Portland, Ore.
 7RP E. R. Simpson, 1004 Leonard St., Portland, Ore.
 7RQ D. E. Replique, Cashmere, Wash.
 7RR Jeffery Killehi, 319 N. 33d St., Billings, Mont.
 7RS L. E. Seriven, 2118 Ridgerwood St., Spokane, Wash.
 7RT E. S. Collier, 2815 Pacific Ave., Hoquiam, Wash.
 7RU N. J. Bruck, 744 Kearney St., Portland, Ore.
 7RV William Morton, 6523 45th Ave., Portland, Ore.
 7RW D. E. Schultz, 2423 Birch St., Astoria, Ore.
 7RX L. S. Shields, Box 21, R. F. D. 1, Salem, Ore.
 7RY L. F. Zimmerman, Owyhee St., Ontario, Ore.
 7RZ V. B. McCulloch, 223 N. Conant Ave., Burley, Idaho.
 7SA B. C. Barnes, 336 E. 9th St., Eugene, Ore.
 7SB L. E. Bracht, 1804 Bachelor St., Miles City, Mont.
 7SC W. A. C. Heinrich, 603 Melrose Ave., Seattle, Wash.
 7SD H. L. Fritz, 707 N. 65th St., Seattle, Wash.
 7SE T. L. Richardson, U. S. P. H. S. Hospital No. 59, Tacoma, Wash.
 7SF E. E. Griggs, 1518 1st St., Aberdeen, Wash.
 7SG Don Harris, 1711 Simpson St., Aberdeen, Wash.
 7SH A. J. Hinchick, 904 1st St., Aberdeen, Wash.
 7SI Hal Garrott, 4320 Meridian Ave., Seattle, Wash.
 7SJ R. P. Heatlie, 324 F St., Aberdeen, Wash.
 7SK C. C. Howard, 218 E. 63d St. N., Portland, Ore.
 7SL D. C. McManemy, 1309 Hood St., Aberdeen, Wash.
 7SM C. T. Hanes, 906 19th Ave. N., Seattle, Wash.
 7SN R. G. Wascher, 760 12th Ave., Seaside, Ore.
 7SO W. L. Duncan, 142 11th St., Corvallis, Ore.
 7SP M. W. Rice, 497 E. 28th St., Portland, Ore.
 7SQ R. F. Parglow, 522 S. Main St., Roseburg, Ore.
 7SR R. S. Bean, 579 E. 9th St., Eugene, Ore.
 7SS L. N. Seger, 5633 S. L St., Tacoma, Wash.
 7ST M. C. Knight, 3645 35th St. W., Seattle, Wash.
 7SU J. A. Kindle, 230 Sam St., Monroe, Wash.
 7SV D. H. Harvie, 705 Montgomery St., Albany, Ore.
 7SW C. M. Landaker, R. R. 4, Box 17a, Salem, Ore.
 7SX C. L. Hyer, 815 Thurston St., Albany, Ore.
 7SY G. M. de Broekert, 345 Mill St., Eugene, Ore.
 7SZ F. M. Curtin, 530 Thomas St., Hillyard, Wash.
 7TA R. K. Leonard, 421 N. Belmont St., Seattle, Wash.
 7TB V. R. Kem, 1509 W. Main St., Cottage Grove, Ore.

TRY A DOSE



7TC G. C. Perry, 3712 Woodlawn Ave., Seattle, Wash.
 7TD G. M. Leasia, 1116 Heron St., Aberdeen, Wash.
 7TE G. C. Henny, Bay Ocean, Ore.
 7TF J. K. Prescott, 504 N. 31st St., Billings, Mont.
 7TG M. E. Tait, 394 Guild St., Portland, Ore.
 7TH A. W. Emigh, 335 Grove St., Walla Walla, Wash.
 7TI H. T. Hayden, Jr., Monroe and Cosgrove Sts., Port Townsend, Wash.
 7TJ C. A. Lockwood, 2117 S. 12th St., Salem, Ore.
 7TK R. W. Mudgett, Powell, Wyo.
 7TL H. J. E. Young, 1163 E. 17th St. N., Portland, Ore.
 7TM A. H. Peterson, 2304 N. 39th St., Seattle, Wash.
 7TN J. B. Darragh, Jr., 2560 Fifth Ave. W., Seattle, Wash.



The Armstrong Patent Decision

This resumé of the recent Armstrong Patent Decision will prove of interest to our readers. With countless thousands experimenting in Radio conflicting claims are bound to result and with absolute sincerity on the part of those concerned. Such cases must be patiently worked out with justice to all.

It is entirely in keeping with the history of radio that one of the most important inventions in the development of radiotelephony should have resulted from the experiments and researches of an amateur. Edwin H. Armstrong was but a boy of school age when he began experimenting with radio. He continued his experiments after entering Columbia College, and became particularly interested in the fundamental action of the audion. His researches resulted in the famous "feed-back circuit," which makes the amplification of incoming radio waves possible. Without this invention neither long distance radiotelephonic communication nor broadcasting would be possible.

Failing to obtain the support of his family in making an application for a patent on this device, Armstrong made a diagram of it and had it witnessed before a notary. It was this document that caused the United States Circuit Court of Appeals to uphold the decision handed down a year ago by Federal Judge Julius Mayer in the legal contest between the young inventor and Dr. Lee de Forest and the deForest Radio Telephone and Telegraph Company, in which Armstrong was adjudged the inventor of the device. The really interesting part of the decision is here given:

"The patent in suit was granted for a wireless receiving system on October 6, 1914, and on an application filed October 29, 1913. There are twelve claims in suit. All are held to be infringed by the decree below. The invention relates to improvements in the arrangements and connections of the electrical apparatus and receiving station of a wireless system and particularly a system in which the so-called audion is used as the Hertzian wave detector, the object being to amplify the effect of the received waves upon the current in the telephone or receiving circuit, to increase the loudness and definition of the sounds in the telephone or other receiver, whereby more reliable communication may be established or a greater distance of the transmission becomes possible.

"The patentee, while a student of Columbia University, living in Yonkers, was an amateur wireless operator and had a station at his home.

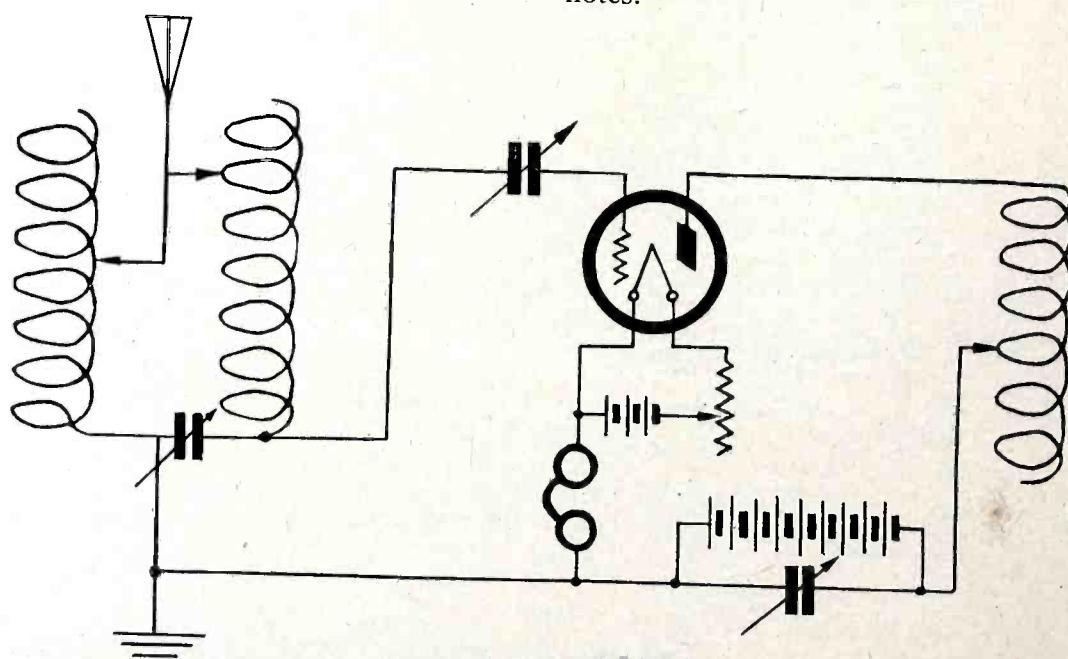
There he made observations which led him to suspect that the radio frequency oscillations might be carried over into the plate circuit with some improvements in the detecting action of the audion. He tuned the plate circuit to radio frequency by inserting in the plate circuit such inductance and capacity as to make it responsive to the radio frequency waves. Then he found not only that the radio frequency waves could be carried over into the plate circuit, but that they could be there amplified by the energy derived from the local battery in the plate circuit without change of frequency or wave form and that they could be fed into the grid circuit where they increased the potential variations on the grid and the operation continuously repeated itself, producing the feed-back regeneration which increased normally the sensitivity of the device and the loudness of the receiving signals. It was in this way that he thought out his invention which has been a great advance in the wireless art.

"But it is sought to defeat the patentee by the claim of prior date of invention by DeForest and some patents in the prior art are also submitted as defenses.

"The testimony of DeForest has been offered in evidence by which it is attempted to show that he had conceived the invention in 1912 and 1913, and that he is, in point of fact, the prior inventor. The appellant offered

in evidence DeForest's experimental note books, showing entries made under date of June 21, 1912, where there is the observation of a beat or high frequency note with a straight audion hook-up. The note shows this to have been transient and incapable of reproduction, and he recognized that it was not the true heterodyne effect. This was due to the gas action in the tube, an effect which has always been observed by users of the straight audion hook-up.

"On February 20, 1915, DeForest published in the "Electrical World" an article in which he made claims with respect to his early work on the oscillating audion and referred to two such experiments, the first of which he said occurred in the latter part of 1910 or 1911, and the second on August 26, 1912. In these there is no mention of the feed-back circuit of the Van Etten August 6 entry, which it is now claimed represents his first real discovery of a controllable oscillating audion. These and other circumstances seem to us inconsistent with the idea that DeForest had any real knowledge of or understood the Van Etten accidental circuit arrangement of August 6, 1912. Nowhere in the notes which are in evidence is any reference made to the terms which would ordinarily be used if such a discovery were made and understood. The terms 'feedback' or 'regeneration,' 'input circuit' or 'output circuit' or 're-amplification,' are not found in the notes.



THE ARMSTRONG "FEED-BACK" CIRCUIT

"We do not agree with the claim of the appellant that the patent is for a principle. It is for an instrumentality. It should be construed to cover the uses of the apparatus which are described and claimed. As the testimony of the expert called by the appellee indicates, the appellant's use infringes all of the claims of the patent in suit relied on.

"We think this excellent contribution to the wireless art should be accorded the full scope which the court below gave it in the decree. We think the decree is not too broad, but properly describes what the inventor conceived and for which protection must be accorded him. Decree affirmed."

MARCONI LECTURES BY RADIO

The wide world knows that Signor Marconi recently arrived in New York on his yacht Elettra, a floating radio laboratory, in which, among other things, he is striving to find a means of eliminating the atmospheric nuisance—static. Shortly after his arrival he broadcasted an address from WGY, the radio broadcasting station of the General Electric Company at Schenectady, N. Y., last evening at eight o'clock, eastern standard time.

* * *

A unique experiment was recently tried over the radio by the Fitzgerald Music Company from KYJ, Hamburger's broadcasting station, Los Angeles, when Olga Steeb played three numbers: "Rigandon," by McDowell, "Caprice," by Paganini-Liszt, and "Etude in D Flat," by Liszt, followed by the same selections by the Ampico as recorded by the pianist.

* * *

Government radio beacons are to be installed by the lighthouse service at Los Angeles harbor, at Boston, Nantucket, Cape Charles, on the Columbia river, at the entrance of Puget sound, Delaware bay and Blunt's reef.

The stations are the product of considerable effort on the part of the commerce department to make the seas that surround the country safe. To that end powerful radio stations have been designed to work in connection with the lighthouse itself, thus removing coast wireless from the control of the navy and placing it under the jurisdiction of the lighthouse service.

* * *

The Canadian government has appointed its first radio inspector in Ontario to make an investigation into all amateur sending stations against which there are complaints from time to time, and also issue licenses for receiving stations and examine candidates for government's certificate of

proficiency in the operation of radio equipment.

A new radio record was announced when it was reported that for four hours a powerful sending station of the General Electric Co. at Schenec-

tady, N. Y., conversed and sent music to the Rock Ridge, California, radio receiving station of the Atlantic-Pacific Radio Supplies Co. The musical program varied slightly in intensity, due to interference of the great magnetic terrain in the vicinity of Colorado Springs.

MARVELOUS NEW INVENTION AMPLIFIES RADIO FIFTY MILLION TIMES—ALSO ENABLES AMATEURS TO HAVE RECEIVING SETS WITHOUT AERIALS ON THE ROOF

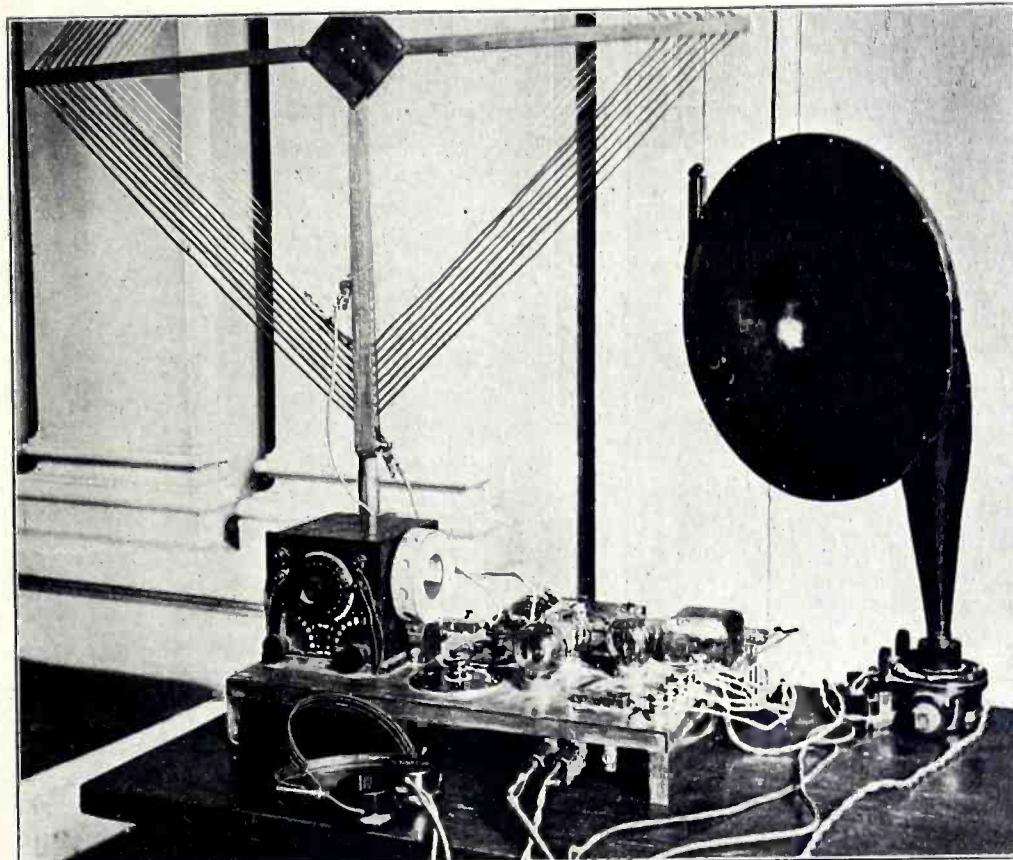


Photo Copyright by Ewing Galloway, N. Y.

This new super-generative circuit was invented by Major Edwin H. Armstrong and used in a demonstration the other evening before a meeting of the Institute of Radio Engineers in New York. This new amplifier will amplify an ordinary receiving set fifty million times, and its great power is explained by the fact one vacuum tube is made to do the work formerly done by three—but we will let Major Armstrong, in his own words, explain it in detail:

"A short way to describe the super-generative circuit is that one vacuum tube is made to do the work formerly done by three. It has been known for some time that the limit of amplification is reached when the negative charge in the tube approaches the positive. In experimenting I found that it was possible to increase the negative charge temporarily for about one 20,000th of a second, far above the positive, and still keep the average down. It is the possibility of increase which permits the enormous amplification which I have demonstrated, and

enables me to eliminate two tubes from the circuit."

Receiving sets without outside aerials have been possible for some time, but they have been too expensive for the general run of amateurs. With the super-regenerative circuit inside sets can be manufactured at the same price as those requiring cumbersome outdoor aerials.

"Another practical result of this circuit," says Major Armstrong, "will be the ability to detect wave-lengths under 200 meters with ordinary receiving sets. In the past short wave-lengths were undistinguishable for small receiving sets. Now that the range under 200 meters is available for the broadcasting stations, the cost of operating will be greatly lessened.

"To illustrate the difference between the receiving set equipped with the super-regenerative circuit and the ordinary set, I have found that a signal which can just be heard at the most critical zero point can be heard all over the room with the super-regenerative circuit."

Radio Rays!

Every invention of universal commercial value undergoes continuous improvement until perfection is reached, and radio apparatus will be no exception to the rule. It is reported that the General Electric Company has developed a little tube about 18 inches long and about 2 inches in diameter which radio experts think will revolutionize long-distance radio communication. This small contrivance of glass and wire, or some further development of it, is expected to take the place of alternators of several hundred times its size. It will also be virtually noiseless.

* * *

Scientists at the Carnegie Institute at Washington, D. C., have come to the conclusion that Mother Earth is losing pep. Their latest observations have convinced them that for some reason or other the magnetic power of the earth is decreasing.

* * *

Los Angeles fans will be glad to know that much of local interference frequently attributed to amateur spark stations is believed to be due to NPX, the naval transmitting station at Inglewood. This station is particularly hard to tune out and often causes considerable interference on 360 meters. The NPX spark is of the 500-cycle type, and rather high in note. It is very different from the musical rotary spark usually employed by amateurs and can be readily distinguished from them.

* * *

An experimenter at Calexico reports that in that region General Static has taken the offensive. At times sparks three inches long could be drawn from the antenna and part of the time a stream of sparks would jump across the condenser plates, while attempting to listen in. Reception of radiophone concerts was extremely difficult. Using two stages of radio-frequency amplification, one detector tube and two steps of audio-frequency amplification, signals could be heard, but not by any means understood.

* * *

So much music occupies the evening programs that it was a genuine pleasure recently when J. J. Jenkins of the City Dye Works, Los Angeles, and himself owner of the broadcasting station KUS, recited a poem in the dia-

lect of a Canuck from the Times station. Its successful rendition suggests the desirability of more entertainment of this nature. The tricks of the elocutionist do not "get across" very well in broadcasting, but nothing more can be desired than the straightforward, sincere delivery which characterized Mr. Jenkins' contribution.

* * *

Women are coming into their own in this day and generation. They no longer sit by the fire and spin as their grandmothers were expected to do. Miss Eunice Randall, a Massachusetts girl, has the distinction of being the only woman radio designer in the industry today. The work fell to her lot during the scarcity of man-power during the war, and one of the officials of the corporation has been brave enough to declare that her work is as good and much neater than that done by their male employees previously.

* * *

When the city council of Chino, California, was asked for an appropriation of \$2000 for summer band concerts one evening a week, some bright and coming citizen suggested the purchase of a radio set instead and have music every night and for a longer period than if a concert band was hired. The project met with instant favor. It is planned to install loud amplifiers and other instruments to make the open air concerts by radio a success.

* * *

Insurance companies are now offering policies covering radiophones against the following risks: Fire, lightning, burglary, theft and transportation.

* * *

Dr. Albert A. Michelson of the University of Chicago, is making experiments at the Mount Wilson Observatory to make more accurate measurements of the velocity of light than has been heretofore accomplished. He also plans to make tests in connection with Einstein's theory of relativity.

* * *

A chime of bells carried by wire lines from Watervliet, N. Y., to the General Electric broadcasting station at Schenectady, N. Y., where it was broadcasted to the listening public, was clearly heard in Canada. Following this the chimes were shipped to

Washington, D. C., where they are being installed in the McKim memorial tower of the Church of the Epiphany.

* * *

The ever-ready statistician has estimated that based upon the business of the first ten days in June, department stores alone will sell seventy million dollars' worth of radio equipment this year. The department stores welcome radio apparatus as a merchandising proposition because it is the business of the stores to handle anything that is popular; second, because of its advertising value, and third, because it brings more people into the stores searching for the radio department and incidentally seeing many other lines of goods.

* * *

It is believed that a new radio device now being perfected by C. F. Jenkins, Washington inventor, eventually will make it possible in the event of war for a battle to be watched via radio motion pictures by officers at their desks as they direct the operations by radio.

* * *

The Navy Department recently remodeled a former Shipping Board vessel of the "B" type and equipped and commissioned it as a radio repair ship to supply, repair and keep in touch with its eight radio traffic and two compass stations in Alaska. Its name is the "Gold Star." But few commercial vessels touch these stations because of their inaccessibility.

* * *

In less than two years a nation-wide service has been established by the department of agriculture for broadcasting weather, crop and market reports by radio telegraph and radio telephone. W. A. Wheeler, who is in charge of the department, says that this is having a far-reaching effect in extending knowledge of market conditions, and will inevitably contribute much toward a better system of marketing farm products.

* * *

At the Emergency Hospital at Washington, D. C., radio is being used to divert the patient's attention from his pains and aches. We rise to remark that we have known occasions when the remedy would have been indisputably worse than the disease.

El Universal, a Mexico City daily, in a news item declares communication has been established between Mexico and Chile through XDA, Mexico's big station which sends on a wave-length of about 5300 meters. The first message sent was one addressed to the President and people of Chile, extending greetings to them from President Obregon and the people of Mexico.

* * *

Weather reports for the States east of the Mississippi River are being broadcast from the naval radio. A similar program has been put into effect at the naval radio station at Great Lakes, Ill., for broadcasting the forecast for fifteen Western States and for the Great Lakes.

* * *

In Michigan every motorcycle used by the state police will be equipped with a wireless receiving set if experiments now being conducted by the state public safety department are successful. A broadcasting station will be set up and every agent of the state police kept in constant touch with general headquarters by code messages sent by wireless.

* * *

At a gathering of noted scientists the John Fritz gold medal was recently awarded to Guglielmo Marconi for the invention of radio telegraphy. In making his speech of acceptance, Marconi voiced the hope that radio would be used as a medium for the substitution of good will for suspicion among the nations of the world. He further expressed himself as having realized that "in America more than anywhere else, the most cordial and generous encouragement is given any honest endeavor to apply science to useful and practical purposes."

* * *

A new device has just been perfected and patented by Spencer B. Moxley, which it is said will enable radio broadcasting to be done without the use of transmitting bulbs in the sending station. Will Breniman, who is with Mr. Moxley in the laboratory of the Radio Concert Equipment Company, predicts that the new transmitter will in a short time eliminate the use of vacuum tube sending sets. Greater clarity of transmission and simplicity of operation over the tube sets are claimed.

* * *

Passing radio programs about the Shell Oil field on Signal Hill over a private exchange telephone is a nightly occurrence, according to Arthur Edwards, of Long Beach, Calif., who is giving his fellow-employees a free concert daily. He attaches one of his receivers to the telephone microphone and the private exchange telephone operator switches the lines to

various telephones in all parts of the field.

* * *

C. K. McHarg, supervisor of the Cour d'Alene National Forest, has announced the installation of a high power radio receiving station capable of intercepting messages from a distance of 3000 miles near Priest River, Idaho, by the United States forestry service.

* * *

The Los Angeles Times suggests that the difficulty in procuring good audions these days may be due to the fact that the world's supply of vacuum may be exhausted. This is in line with Life's brilliant remark that "after careful investigation, the New York police report that the crime wave is caused by ultra-violent rays."

* * *

The Air Service has succeeded in steering airplanes by radio; the U. S.

Navy has succeeded in starting, steering and stopping a ship by radio alone, and the government has further demonstrated the possibility of guiding torpedoes from planes through the air and through the water from planes and from ships, by radio. It has been estimated that the U. S. Navy has more than twenty-five million dollars invested in radio equipment.

* * *

In answer to the statement of publishers of radio books that "the fad is dying out" because they get few requests for books on radio, Arthur Brisbane says "that does not mean anything. When the automobile was new, everybody talked about it, bought books about it and organized automobile races on public highways.

"Now the races are over, the automobile is taken for granted, but it hasn't 'died out' exactly.



Photo by International Newsreel

SHE ORDERED LIGHT AND GOT MUSIC

BUT THAT ISN'T A HALF BAD SUBSTITUTE. THERE ARE THOSE WHO PREFER MUSIC TO LIGHT. MISS PAMELA RAINS OF LOS ANGELES INVENTED THE THING. IT'S A GOOD IDEA. SHE CALLS IT HER RADIO PHONOLIER.

The First Newspaper Broadcasting

Said Caesar, with a triumphant flourish, "Veni, Vidi, Vici." And there was no doubt about it—he had and he did. But say, Caesar's conquering journey is like a jaunt around the block in comparison with Radio. A flash—and Radio conquered the world. This article tells how Radio started.

THE original conception of the radio broadcasting idea as a journalistic enterprise had its source in the mind of the editorial staff of the Sunday Call, of Newark, New Jersey, William F. B. McNeary, who returned from four years in Europe in connection with the military intelligence department of the United States Army to resume his newspaper work in that city in August of 1921. While engaged upon a series of articles on conditions in Poland and adjacent European countries in which he had spent the last two years of his stay abroad, he developed the idea of putting a definite program of news, sports, musical concerts and children's stories by radiophone in the air and linking this up with a special department of his paper.

The idea sprang from a visit with Edward J. Malone Jr. of Bloomfield to the home of Louis Weber Jr. of Englewood, where Mr. McNeary was invited to listen-in on a new radio receiving set which Mr. Weber had just installed at a cost of \$2,000. Over this apparatus, which is one of the most elaborate amateur stations in the United States, came the voice of another amateur in Jersey City chatting with a fellow amateur in Brooklyn. The effect of those voices in the air was at first startling, but the subject matter of the conversation was uninteresting. It became apparent that the utility of radio could be greatly enhanced by substituting something of real public interest for the aimless chatter that was then filling the air. Setting to work upon this principle, Mr. McNeary in a few days perfected a tentative program of interesting material and laid it before the managing editor of the Sunday Call, who immediately saw its utility, indorsed the plan, and gave it his enthusiastic cooperation and support.

It was the original plan of the Sunday Call to establish in its Market street building a powerful radiophone broadcasting station. An appropriation sufficient to defray the cost of the latest and best type of transmitting station was voted by the board of directors of the Call, and Mr. McNeary was sent to Washington to interview government officials concerning the license and wave length. These details were tentatively settled to the satisfaction of the Department of Commerce, when it became apparent

that a more efficient working arrangement might be made with the Westinghouse Electric and Manufacturing Company, which had constructed on its East Pittsburgh, Pa., and Springfield, Mass., plants radiophone transmitting stations of the type proposed for the Sunday Call Building.

Returning to Newark with this plan, a conference was held with officials of the Westinghouse Company, at which the Sunday Call's project was outlined in detail. Immediate co-operation was obtained from the Westinghouse Company, which set to work on the construction of a high-powered station on the roof of its Newark plant at Orange and Plane streets, Newark. Parts and apparatus were rushed to Newark by courier and within two weeks the Sunday Call-Westinghouse station was licensed to broadcast by Arthur Batcheller, United States radio inspector of the Second District, Radio Division of the Bureau of Navigation.

The famous Man in the Moon of WJZ is no other than Mr. McNeary.



WILLIAM F. B. McNEARY

RADIO EDITOR OF THE NEWARK, N. J., SUNDAY CALL, WHO IS KNOWN TO THOUSANDS OF NEW YORK CHILDREN AS THE "MAN IN THE MOON." BILL, WE HAND IT TO YOU, YOU STARTED SOMETHING BIG. WE WOULD LIKE TO HEAR YOU OURSELVES. COME OUT TO LOS ANGELES AND LET'S GET ACQUAINTED.

These "Man in the Moon" stories were the first in the country to be broadcasted for children. They were a part of the original program. The first of these stories was told early in October, 1921, and since that time there has never been a Tuesday or a Friday night when the army, at least 65,000 strong, of big-eyed little listeners have not gathered about their receiving sets to hear the voice of the "jolly old story-teller from the Milky Way."

The Man in the Moon stories come from the sympathetic pen of another member of the Sunday Call staff, Miss Josephine Lawrence, a writer of juvenile stories and editor of the children's page of the Call. To Miss Lawrence's interpretation of the Man in the Moon idea is due the great popularity which these stories enjoy. The request of children to have stars named after them has been so great as to threaten the depletion of the Milky Way. As a corrector of children's morals, the Man in the Moon wields great sway, and in the last eight months he has endeared himself to numbers as large as they are inestimable. Letters have been received from parents and children as far east as Maine and as far west as the Rockies. It has been necessary to add to the Sunday Call staff in order to handle the Man in the Moon's mail.

His method in gaining the co-operation of the children is fascinating, as may be seen from the following extract from a recent issue of the newspaper originating the feature.

"Good evening, boys and girls. This is the Man in the Moon speaking. Tra-la! Tra-la! I feel as blithe and gay as a—as a sunflower! Yes, sir, I'm as chipper as a butterfly and as happy as a lark. There now, doesn't that tell you I'm smiling? You'll never in the wide world guess where I've been, so I'll tell you. I have been to a May pole dance! The Star children took me and we danced around the May pole and wove the ribbons in and out, till there were no more streamers left to weave. I had a yellow ribbon and Baby Twinkle Star had a blue one and Belle Star's was pink and Hercules had a lavender ribbon. I wish you could have seen that pole when we had finished—it was as pretty as pretty could be.

"Then we had ice cream and cake, and we laughed and talked so long

after that, the Star children and I had to run all the way home so that I wouldn't be late to tell you a story tonight. The May pole dance was a birthday party—one of the Star children's cousins had a birthday, and all the way home Twinkle Star was reminding me not to forget to speak to birthday children. As if I could! Goodness, I never have forgotten the birthday children, and I don't think I'll begin now.

"The very first birthday star tonight shall go to little Vivian Grace Clark, who is 5 years old today. Vivian, you'll find your star just over your house on Perry street, New York. And now if you would like me to tell you where there are some birthday presents hidden I will. Do you want me to tell you, Vivian? Well, then, I will. I am quite sure that if you look in your doll house you will find a locket and chain from your daddy; and look in the doll carriage, Vivian, and see if there isn't a bracelet there from mother, dear; now look carefully all around, and you ought to find a new dress and some hankies from grandma and a jumping rope from sister Edna. But, oh, Vivian—before you go hunting for presents let me name a star for each of your little guests: that is, a star for your sister, Edna; a star for Carol Fistere, Ruth Cornelius, Nettie Cornelius and Edith Cornelius. And don't forget to keep your own star brightly polished, Vivian, will you?

"Another little girl who is 5 years old today is Winifred May Mills. I have named a happy, smiling birthday star for you, Winifred, and it shines down on One Hundred and Fifty-fifth street, New York, where you live. You had a birthday party, didn't you, Winifred? That was fine. And I hope the birthday cake was just delicious.

"Then I have named a chip of a baby star for you, little Marie Edith Sonn, because you are just 1 year old today. You had a birthday party this afternoon, didn't you? Of course you did, a real birthday party, like a big girl. You have taken good care of the little star I named for you some time ago, I know, because I've seen your picture since, and you looked as smiling and happy as only a very good baby girl can look."

After this comes the story, which winds up with—"And that is the end of the story, and I'll have to hurry up if I am to send you a few messages before Mr. Sandman gets here. Hercules has just whispered to me that he has seen the last butterfly flying over to Mr. Sandman's with a dream for him to carry to a little girl. I want to tell Bernice McCrea that I have named a star for her, a Hillside avenue, Glen Ridge Star, and close

beside it, a chip of a baby star for her little brother, Lenox McCrea, who is only 2 years old. You'll take good care of your star, won't you, Bernice, and never mind if Baby Brother does cut up your paper dolls or tear them; he is too little to know that he should not destroy your things."

To our mind this is sheer genius, and we can imagine that veritable hosts of children within hearing of WJZ sit wide-eyed on Tuesday and Friday nights at seven o'clock when the Man in the Moon is "on the air," entranced with their nearness to fairy-land.

The Detroit, Mich., City Council recently approved an appropriation of \$2500 for installing radio equipment for the police department of that city, for the purpose of increasing the efficiency of the department. Apparently criminals will be caught "on the fly" hereafter.

* * *

It is predicted that signatures and thumbprints can be sent by radio for purposes of identification. The recent success in the transmission of a picture by radio leads to this belief.

LONG DISTANCE RECORD

What is believed to be a new record in distance transmission of the human voice by radio has just come to light in the receipt of a postal card post-marked Chignik, Alaska, and mailed April 30, 1922, via the S. S. Reuse. The message which was received by Mr. F. P. Dalton of 121 East 23rd St., reads as follows: "Radio 6KY. I believe I heard a phone station that seemed to sign your call. Here's the dope—6:10 p. m. (coast time): Heard voice on two hundred meters loud but hard to make out words, seemed to be calling 6 AAT. Then you came on with buzzer and said Q. R. M. (interfering) and gave him C. U. L. (see you later) and that's all I got. It being full daylight, signals were of course rather weak. Please verify it this is true. Write to 7BJ. Mail will be forwarded. 73 (best regards) from Geo. Sturley." Mr. Dalton states that data in his log confirms this message.

Since that time Mr. Dalton has disposed of this telephone set to the Y. M. C. A. Radio School of Los Angeles, where it is being used for instruction.

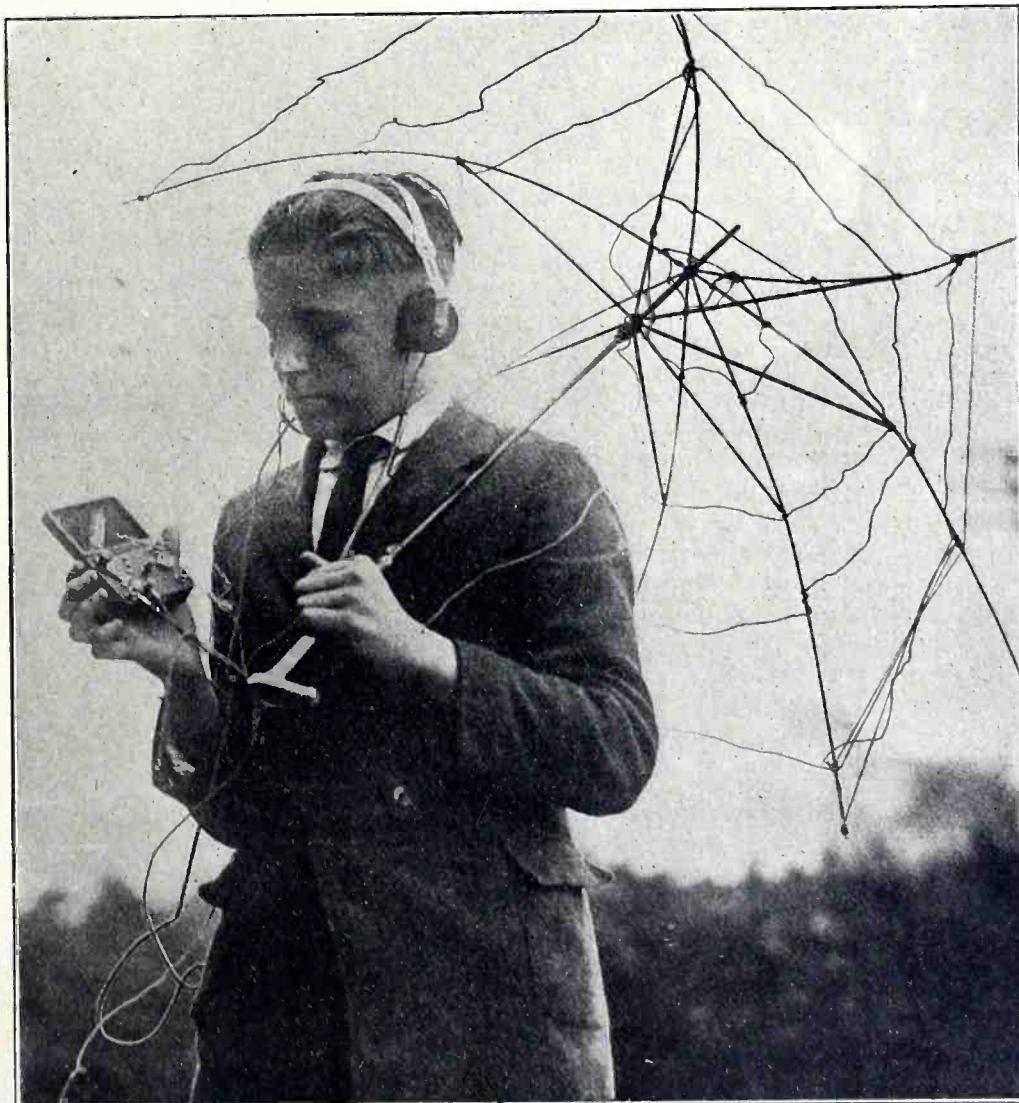


Photo by International Newsreel

WHOO'DA THOT IT?

HERE'S YOUNG EMORY ZIMMER OF CINCINNATI USING AN OLD BUMBERSHOOT FOR AN AERIAL. IT WORKS, TOO. BUT EMORY DOESN'T, WHEN "LISTENING IN," AT LEAST. WHAT'S NEXT? IS IT POSSIBLE THAT OUR W. K. FLAPPERS DISCARDED THEIR STAYS TOO SOON?

Wave Lengths

By E. S. FARNSWORTH

There are waves—and then there are some more waves. There are wet waves, and dry waves; hot waves and cold waves; pink waves and yellow waves; short waves and long waves; marcel waves and water waves and permanent waves, and some don't. If you have gotten thus far you owe it to yourself to read this article and learn some about Radio Waves.

WHAT does '150 to 680 meters wave-length' mean? is a question invariably asked by the layman in radio communication. Those having purchased a radio receiving set especially for the reception of the radiophone have tried to settle in their own minds just what this means.

The metric system which is here used is a system of weights and measures using the meter as the unit of measurement. The meter is one-tenth-millionth of the distance on the earth's surface from the pole to the equator, and is legalized as equivalent to 39.37 inches in the United States, and 39.37037 inches in France and Great Britain. Reduced to our linear system, 150 meters is 5905.5 inches, 151 meters is 5944.87 inches, etc.

"Wave" is the disturbance of the equilibrium of a body or medium which is propagated from point to point by elastic forces with a continuous motion, and is applied to various forces, such as sound waves, light waves, electric waves, etc.

"Length" as applied to waves is the distance from crest to crest or from any two similar points. Therefore in periodic motion taking place in any medium the length of the wave is the distance from any given particle in the medium to the next particle which has similar displacement and motion. The wave lengths used in radio communication range from 100 to several thousand meters, the radiophone or broadcasting in general being assigned a wave length of 360 to 680 meters.

Let us apply these definitions. With a certain device we cause stones to be dropped into a pond of quiet water every second of time, the stones being of the same size and weight, each stone producing one wave only. All of the waves that are produced will be the same height and an equal distance apart, and will spread out in all directions until they meet the shore or appear to our eye,—which is the detector of these particular waves,—to die away. The height of the crest of these waves depends upon the size of the stone which causes the displacement of the water's surface from its position

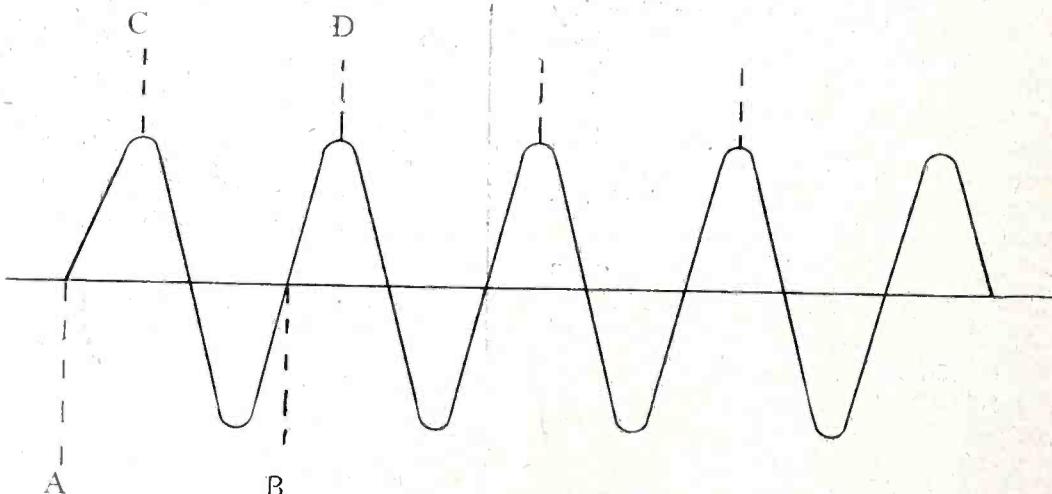
of rest. The velocity of waves of all kinds depends upon the nature and amount of elastic forces which cause the displacement of the particles making up the wave. If a fixed point is watched upon the surface of the pond over which the waves are moving, it will be noted that a wave crest appears at that point every second of time. This number is the "frequency" or number of the waves. Different kinds of waves have frequencies which vary greatly. Large ocean waves may have a frequency of only two per minute and one-half mile in length. That is, the crest of one wave will pass a given point every thirty seconds, and the distance between them will be one-half mile—or a "wave-length" of 804.37 $\frac{1}{2}$ meters.

Waves of yellow light have a velocity of 300,000,000 meters per second, a frequency of 600,000,000 meters per second, and a wave length of only one-twenty-thousandth of a centimeter. Electric waves have a velocity of 300,000,000 meters per second and a fre-

The wave length decreases as the frequency increases.

We find, therefore, that "150 to 680 meters wave length" means that the receiving system is so designed that it may be tuned to any desired wave length between 150 and 680 meters, and that when so tuned only the waves of that length will act upon the receiving instrument. The wave length depends upon the frequency of the oscillations propagated at the sending station and does not indicate the distance over which the waves will travel. The amount of power used in sending at any given wave length, together with the resistance of the medium through which the wave must pass, determines the distance to which it can be sent.

"Tuning" is accomplished by manipulating the various parts of the receiver unit to secure a point of resonance or harmony between it and the sending instrument.



FROM C TO D ONE WAVE LENGTH 680 METERS
FROM A TO B ONE WAVE LENGTH 680 METERS

quency which may be varied thereby changing the wave length. Using a simple formula, λ —wave length, V —velocity, N —frequency of oscillation, enables us to determine the wave length when the frequency is known or the frequency when the wave length is known.

V
 λ
 N

An apartment house in South Pasadena provides radio service for its guests. It has two magnavoxes, one of which is kept in the music room. The other may be taken to any one of the fourteen apartments as desired. A building association in Chicago advertises that it will not only wire every home for electric light and power but install aerials and attachments for radio receiving sets.



Mirandy at the Tub

By FLORENCE G. ROGERS

Illustrated by C. H. Dillinger



Laws, Honey, run erlong and play.
Don't stan' dere lak a oogley gloo!
Yo' want to lissen in, yo' say?
Well, jes' yo' wait till Ah gets through.
Ah needs dis radio in mah biz—
It maks mah washin' go *Gee Whiz!*

Laws! dis am jes' de scandalous tune!
Wiggely, jiggely, rip, zip, bing!
Gibs new life to dis ole coon.
Maks me wuk lak anything!
Rub-a-dub-dub—mah ahms jes' fly
When de band gets busy in de sky.

Now what's dis noise?—fo' massy sake!
Screechin' lak de cyars go by!
Lak to mek mah ole haid ache.
Must be ructions in de sky.
'Umph! wha's dat he says it wuz?—
"Du-screechy" sung by Madam Huzz.

Won't nevah get mah washin' done
Unless dey jazzes up de band.—
De "Coontown Blues!"—tum, tum, te tum!
Dat's de bizness!—Dat's jes' gran'!
Mah wash gets done afo' Ah knows
A-keepin' time as Ah rubs de clo'es.

Wha's dat he sayin'?—Spo't events!
Well, glory be! mah washin's done.
Whar's Rastus?—ain't dat boy got sense?—
Oh, dar yo' is!—Yo' want some fun?
Den lissen how de baseball goes
Whiles M'randy's hangin' out de clo'es.



Directional Radio

No one could accuse radio of being exclusive. Everything put "on the air" has been for all who cared to "listen in." Broadcasting is one step of progress. Now we want to shoot radio to one person. Can it be done?

From its beginning, all radio transmission has been broadcasting. While the exclusion of undesired reception has become simple and of a good order of accuracy, thanks to the marvelous selectivity of resonant circuits, intentional sending of a message to one destination only or even in one direction only has remained to be solved.

This is somewhat odd, for the reason that the investigations of Hertz, the first creator of artificial waves of the kind we now call radio waves, fully developed the facts that such radiations can be refracted in passage through materials transparent to them, and can be reflected by surfaces of materials not transparent to them. It is by these means that light waves are collected into beams, directed along chosen paths, and observed at a receiving station.

The very first radiophone system was one in which such predetermined directional transmission was fully accomplished. It transmitted electromagnetic waves of an average length of one fifty-thousandth of an inch. These very short waves were brought into a parallel beam by reflection from curved surfaces, were modulated by further reflection changing their degree of parallelism, thence transmitted through the ether to a destination, where they were finally converged by a last reflection upon a detector.

In this system, a high degree of selection of destination was possible at the source, and a similar degree at a receiving station. The whole system was a true radiophonic one, and was successfully operated before Marconi first forwarded the work of Hertz and Branly. For what has just been described is the photophone of Alexander Graham Bell.

Signor Marconi has recently announced, at a joint New York meeting of the Institute of Radio Engineers and the American Institute of Electrical Engineers, that he has developed directional transmission to a further degree by the use of radio waves of the usual order of length, though perhaps in some cases short ones as those waves go. His methods utilize primarily the possibilities of reflection, and he proposes such use for a special form of broadcasting wherein the destinations may be selected in advance.

With the perfection of such beams

of radiation, of which we have almost an exact counterpart in the familiar searchlight, we may become heirs to a new form of communication, lying in scope between the exceedingly private individual telephone line and the exceedingly non-private radio broadcasting service of the present time. Perhaps a closer analogy for the new form of radio communication is the heliograph, in which a narrow beam of parallel rays of light are aimed at the receiving station and there detected by the eye, aided, if necessary, by a telescope as an amplifier.

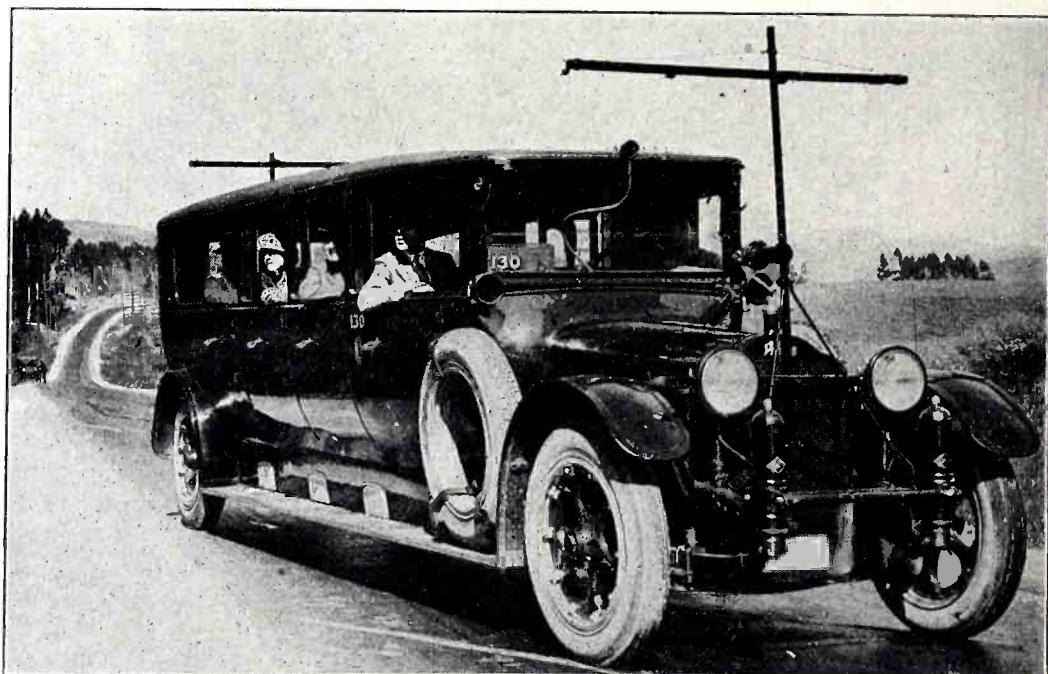
Signor Marconi suggests as a valuable specific application of reflected and directed waves the establishment of radio "lighthouses," as well as their use in detecting on one ship the proximity of another. In this case the radiation is to be emitted by a ship, reflected by the hull of another if near, and detected by the same ship that sent it out.

In these several new uses, there is the common feature that it is the short waves that are utilized. Signor Marconi expressed in the address referred to above the belief that what we now would call very short waves—say twenty meters—merit some of the attention which heretofore has been expended on the long waves.

Nature seems less prodigal in the manufacture of static in short-wave

than in long-wave forms. Possibly there is a minor limit below which there will be no static bugbear. If for no other reason than this, the subject is one that ought to claim the attention of that army of independent research students who have made citizen radio what it is. In a number of ways this new field of research should offer a fascination of technique for the ingenious experimenter. The inductances and capacitances will be small ones. Compactness of both transmitting and receiving sets can be carried to very interesting extremes. And the whole arrangement will have a new gamut of electrical dimensions, because of the interesting fundamental frequency of fifteen million cycles per second.

The first motor bus to serve music with rides is now operated by the California Transit Company. The installation is made on the instrument board of the bus, so that the driver can "tune in" without leaving the wheel. The antenna is supported on uprights, which are securely braced to stand the vibration it will be subjected to while in motion. A magnavox attachment is supported on the back of the driver's seat, and every passenger can plainly hear the music. This equipment works successfully over a distance of more than 120 miles.



WHAT COULD BE SWEETER?

ROLLING OVER CALIFORNIA'S MATCHLESS BOULEVARDS LISTENING TO RADIO CONCERTS IS OUR IDEA OF ONE CORKING GOOD WAY TO ENJOY LIFE. IT ISN'T EVERYONE WHO CAN GET AN EARFUL AND AN EYEFUL AT ONE AND THE SAME TIME.

Questions and Answers

Q.—What is meant by a radio compass?

A.—It is a special form of receiving aerial with which one can determine the direction of the transmitting station. It consists of a loop of a few turns of wire and the loudest signals are received when the plane of the loop takes in the transmitting station. It is much used in giving ships their positions during fogs.

Q.—I have a crystal set, and would like to know how to build a loop aerial for it.

A.—It is impossible to use a loop aerial with a crystal set. A loop aerial requires several steps of amplification, and amplification is only possible through the use of vacuum tubes.

Q.—Would it be possible to get permit to use telephone pole which is on boundary line of lot for one pole of aerial? Where would I get such permit?

A.—If it would be possible for you to attach your aerial to the telephone pole you would have to get permission from the telephone company.

Q.—Is an "A" battery potentiometer of any use in a receiving set?

A.—A potentiometer is desirable when using a gas content detector tube. These tubes usually require a critical adjustment of "B" battery voltage, and this is best obtained with the use of the "A" battery potentiometer.

Q.—1. What is a variometer and for what is it used? 2. What is a variocoupler and for what is it used?

A.—1. A variometer is an instrument used in tuning to give a very close adjustment of wave length. 2. A variocoupler is used to vary the amount of energy transferred from the primary to the secondary. Also the primary is used to change the wave length.

Q.—I have a 100-foot aerial, loose coupler, crystal detector and 2000-ohm receivers. Why is it when I shunt a variable condenser across the secondary of my loose coupler it kills all signals?

A.—You do not mention if your fixed condenser was shunted across the phones or in series with the circuit. Your variable condenser is intended to keep your secondary or closed circuit in resonance with your aerial circuit. If your coupling is loose you need more capacity and less inductance; if tight, vice versa.

Q.—Will a pair of telephone receivers like those used by the telephone linemen work on a wireless set?

A.—These receivers will not work satisfactorily, as they are only of 75 ohms resistance. For radio work they should be of at least 2,000 to 3,000 ohms resistance.

Q.—Is it necessary to have the license altered if my station is licensed for spark work and I want to put in a C. W. set?

A.—No. Simply notify the inspector.

Q.—What is meant by a loading coil?

A.—When a receiving set does not tune to wave lengths as long as desired, the range of tuning is often increased by inserting a coil of wire between the lead-in and the set. This may be either a honeycomb coil or a tuning coil with a single slider or taps leading off to contacts to get the desired number of turns through a rotary switch.

Q.—Is a knowledge of the wireless code necessary to receive radio broadcasts?

A.—No; a simple adjustment of a few knobs to receive 360-meter wave is all that is required.

Q.—There are tall trees all about my house. Would the wireless aerial have to be put above the trees or could I run the wire from a tree to the house?

A.—You can run your aerial from the tree to the house, but insulate your aerial so that the end of it does not come closer than 10 feet to the tree.

Q.—How far can a broadcasting station be heard?

A.—This depends upon the power the station is using. The average 100-watt station should have a range of 500 miles.

Q.—On what wave length are the San Diego and San Francisco time signals given out?

A.—The San Francisco wave is 2400 meters (undamped), and the San Diego wave is 9800 meters (undamped).

Q.—I do not want to spend much money on a radio set and would like to know if I can receive opera on a tuning coil. If not, what do I need? I live about ten miles from Broadway.

A.—You can receive opera from Los Angeles with a tuning coil, detector, head telephone and a condenser. About the cheapest crystal detector set which would do this work would cost from \$15 to \$25.

Q.—What is the difference between radiophone and radiotelegraph receiving sets?

A.—There is no difference.

Q.—Can a partly deaf person work in radio?

A.—You will no doubt need an audion set with an amplifier.

Q.—I am situated about 25 miles from the mountains and 75 feet below sea level. Would I be able to receive from broadcasting stations 150 miles away? How high should the antenna be and what kind of wire used? Would strong winds interfere with receiving?

A.—You should be able to receive broadcasting music from two to three hundred miles range provided that you use a regenerative set. With this you would be able to receive from 200 to 300 miles very clearly. The antenna would be at least 75 feet high, two wires, 100 feet long. Strong winds should not interfere with your receiving provided your antenna is properly guyed.

Q.—I wish to install a radio telephone with 1000 mile radius. Is it practical for wireless music?

A.—With a small regenerative receiving vacuum tube set you should be able to get the music very clearly, from two to five hundred miles, and possibly you would be able to get it from seven to eight hundred miles.

Radio Signals for Airplanes

Radio is proving to be of benefit to human activity in many ways. It is fast becoming a necessary and essential adjunct to the successful operation of airplanes. The Government Bureau of Standards has prepared a paper on the use of Radio Landing Signals for Airplanes, of which this article is a résumé.

Radio direction finders and other radio devices have been in use for some time to assist airplanes to land during the night, during fog, or at other time of poor visibility. The most usual method of using radio for this purpose is to transmit from an ordinary elevated antenna at the landing field radio signals which are received on a direction finder located on the airplane. On small planes the direction finder may be simply a coil of wire wound on the fuselage; in larger planes a small rotatable coil may be mounted vertically aft in the plane. This method gives the direction of the landing field, but does not give accurate information as to its distance when the plane is near the landing field.

Several years ago the Bureau of Standards was called upon to develop a method to assist airplanes to accurately locate the landing field when the airplane was quite near. It was desired to develop a method which would give a good signal which would be easily audible over a comparatively large area when the airplane was at comparatively high altitudes, but would be localized within a small area when the airplane was near the ground. The accurate location of the landing field is very important when near the ground.

A method of induction signaling was first tried, using 500-cycle alternating current. This current flowed through a large horizontal single-turn coil, 600 by 800 feet, at the landing field. The coil was tuned to 500 cycles, so that a large current flowed. For the induction signaling the reception on the airplane was made using horizontal coils wound on the lower wings of the airplane. It was found that this method gave a signal which was audible over a wide area when the airplane was near the ground, but was confined to a small area when the airplane was at an elevation of about a mile. This was not satisfactory.

The use of radio-frequency waves was therefore undertaken. Two horizontal coils were placed one above the other. The coils were identical in construction, and placed so that their axes coincided. The current in one coil flowed in a direction opposite to the current in the other coil. A fairly high radio-frequency, suitable for direction-finding work, such as 300 kilocycles, was used.

A calculation was made which indicated that the signals radiated from the two coils would be strongest for an airplane flying in a given horizontal plane, whenever the plane was inside a comparatively small ring-shaped area located above the landing field. After the coils had been constructed a careful experimental investigation was made under actual flying conditions, and the results of this calculation were verified. Signals were received on the airplane only when it was nearly above and in the immediate vicinity of the landing field. A Curtiss Type R plane was used for the experimental work for both the induction signaling and the radio signaling.

The Bureau of Standards has just published a paper giving the theory of the radiation from an antenna consisting of two horizontal coils, as used in this work. It is found that if a vertical coil antenna is used for reception on the airplane, and if the airplane flies horizontally, the maximum signal is received when the line joining the airplane to the transmitting coils makes an angle of 30° with the vertical, assuming that the effect of the earth is negligible. The region of space within which the signal can be detected by receiving instruments of given sensibility has nearly the form of the space between two inverted coaxial vertical circular cones of finite length having their common apex at the transmitting station. The upper limit of the region within which the signal is audible depends on the sensitivity of the receiving apparatus and is not as clearly defined as the bounding conical surfaces. The signal vanishes when the airplane is directly over the transmitting station, and vanishes rather soon after the airplane passes over the region of maximum signal and flies away from the transmitting station.

The effect on the transmission of having a perfectly conducting earth directly under the transmitting coils has also been investigated, and it has been found that in this case a maximum signal is obtained when the line joining the airplane to the transmitting station makes an angle of $26^\circ 34'$ with the vertical. It is expected that these theoretical studies will be very useful in the design of radio transmitting stations for sending localized landing signals to airplanes.

The results of these investigations are given in Bureau of Standards Scientific Paper No. 431, "The Field Radiated from Two Horizontal Coils," by Gregory Breit. A copy may be purchased for 5 cents from the Superintendent of Documents, Government Printing Office, Washington, D. C.—Submitted by Bureau of Standards.

A PROPOSED RADIO LIGHT-HOUSE

In an address before the Institute of Radio Engineers and the American Institute of Electrical Engineers on his recent trip to the United States, Signor Marconi announced the invention of a searchlight by which the utilization of radio waves would flash beams of light nearly a hundred miles. His invention takes the form of wires specially arranged on a tower or masts. By means of the reflecting beam of electrical radiation it is possible for ships, when within a certain distance, to ascertain in thick weather the bearing and position of the light-house.

In addressing the joint meeting Marconi expressed himself as believing "it should be possible to design apparatus by means of which a ship could radiate or project a divergent beam of the short-wave rays in any desired direction, which rays, if coming across a metallic object, such as another steamer, would be reflected back to a receiver on the sending ship and thereby immediately reveal the presence and bearing of the other ship in a fog." To illustrate his lecture he exhibited pictures suggesting the weird apparatus described and pictured in imaginative tales of life on other planets.

MORE STATIC

Marconi has discovered that a certain kind of static called "grinder" originates over Africa and another violent "click" type over South America. He has further discovered that when short waves are used disturbances caused by static are practically nil.

Marconi recently expressed himself as being of the opinion that there was something in the idea of the wireless waves traveling around the earth by various ways and reuniting at the

antipodes. He declared that the great station built by the Radio Corporation of America at Port Jefferson, Long Island, the most powerful on this continent, sent waves that "preferred to travel three-quarters of the way around the earth rather than to come by the shortest way round."

Of around-the-world wireless he said he had obtained results "which go far to show the relative facility with which radio signals can now be sent from England to Australia. He explained that if the signals are unreadable because of static, the measuring apparatus is used to send to an operator at a standard rate of 20 words per minute, five letter code, and the voltage applied to aerial from the local sender is increased until complete readability is obtained. In this way he obtained at once a very correct estimate of how much power was needed to drive the signal through.

The Presidio Fire Department is the latest addition to the army of ra-

dio fans. The military reservation is to have a radio fire alarm system. Sergeant Chas. Durenmatt, U. S. A., Presidio fire chief, is working hectically to get it completed. When they are not fighting fires they'll be enjoying themselves with the broadcasted concerts. When the new radio system is completed, the Presidio will be the first syncopating fire department in the United States.

* * *

The Federal Government, in the person of Assistant Attorney General John W. H. Crim, says that the sale of worthless radio equipment would come under the head of fraud. The Department of Commerce has been the recipient of complaints of excessive prices on radio equipment, but the Government has no way of controlling prices.

* * *

The naval radio station at Arlington, Va., has just installed its radio-telephone equipment and will start a regular broadcasting program on a

wave length of 2650 meters. The new Arlington set will be much more powerful than the naval air service station at Anacostia, D. C. It has been intimated that Arlington, with its new equipment, will be the broadcasting center for important governmental announcements, such as presidential addresses before Congress, and it is even possible that the proceedings of Congress will be broadcasted through this station.

* * *

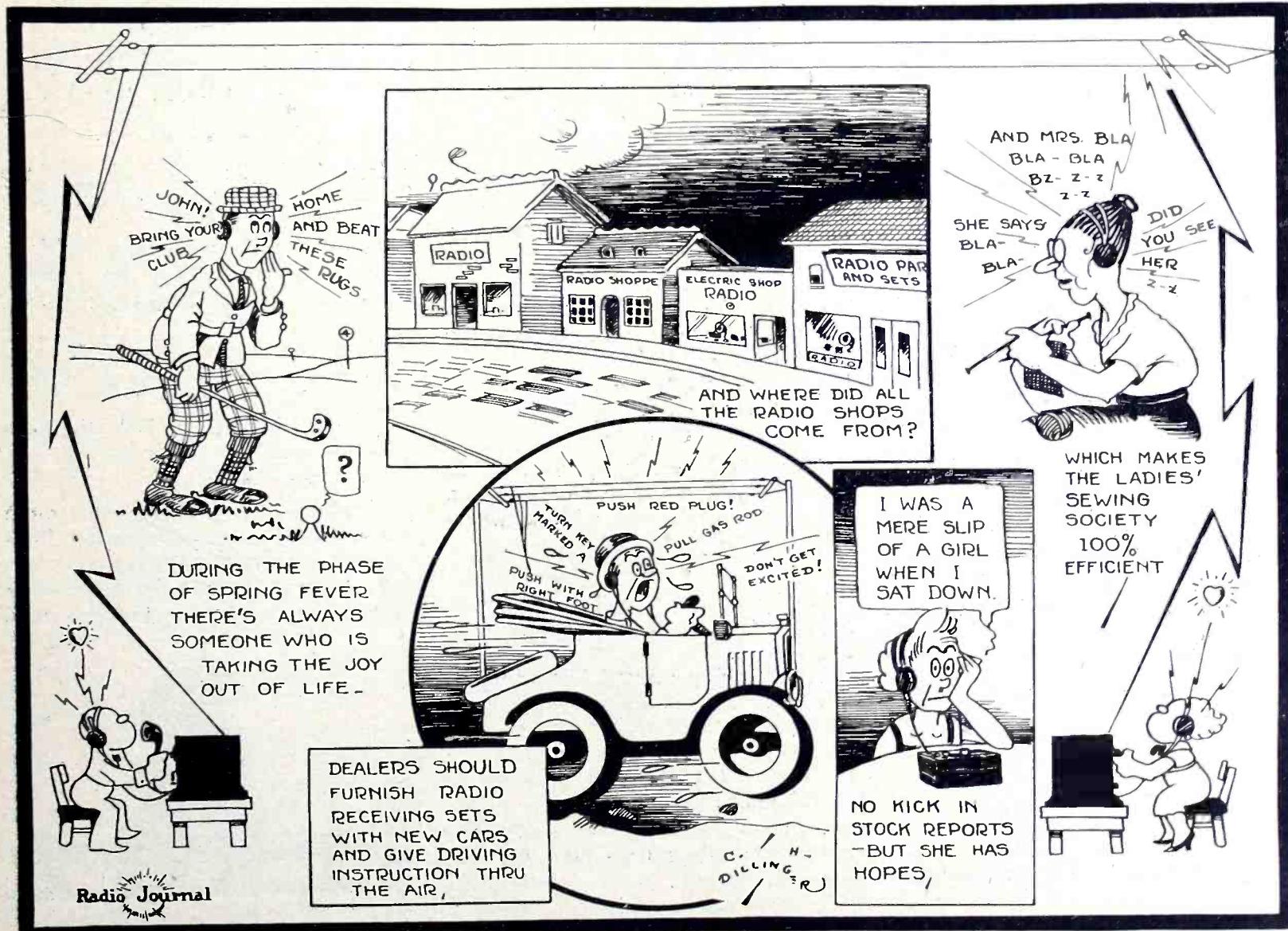
Another dog has been reported as having been paged by radio. A man in Los Angeles called his dog in Pasadena by radio, and the animal went to the receiving horn as he would a rabbit hole in an effort to find his master.

* * *

In Washington a reconvention of the National Radio Conference is being held. It is expected that in this conference all matters relative to radio regulation will be placed on a satisfactory working basis.

Radio, as Seen by

C. H. Dillinger



Cat Whiskers

by C.H.Dillinger

When a man is compelled to get into his evening clothes to listen in on a radio concert at his own fireside,—well, we have his wife's number.



While performing before a large audience one evening a concert harpist found that the strings of his instrument formed a perfect radio aerial, and the music from a broadcasting concert seemed to emanate from them. The audience never knew the difference, and the harpist went under the stage and played put-and-take with the stage hands, and the harp kept right on playing. Of course, the harp gave the music an Irish touch.

* * *

It's about as easy to convince some people of the possibilities of radio as it is to raise an umbrella in a telephone booth, and the chances in the following case were as thin as a banquet sandwich. After two or three minutes of listening in on the evening concert via a loud speaker, the obliging lady on the left turned to the operator and said, "Say, Mister, that will run down if you don't wind it up."

* * *

"Oh, Clarice, isn't it just too grand for anything—they say that you can *listen in* on this radio!"

* * *

Recruiting by radiotelephone for the Air Service of the United States was inaugurated recently at Mitchel Field, Garden City, Long Island, New York.



The crime wave.

Margie: —And he had radio eyes!
Sue: What do you mean, radio eyes?

Margie: Oh just eyes with a broad cast.

* * *

After a two weeks' vacation at the seashore Eddie came back to work with a heavy coat of sunburn. Upon arriving at the office the following conversation took place:

"Got a radio at home now boys."
"But why all the sunburn?"

"Been down to the beach measuring wave-lengths."

* * *

Visitor: Why all the excitement, dear?

Mrs. Uptodate: Oh, my dear, the radio program starts in a half hour; it keeps up all day, you know, and I just can't get a thing done!



One day an idea crept into my dome
That I'd have a radio in my home.
So with the aid of some junk and a
couple o' jerks
I put one together,—and the darn
thing works!

* * *

President Harding has installed in his study at the White House a high power radiotelephone with a wavelength capacity of 25,000 meters.

* * *

Hubby (returning home on the 5:15): Ain't dinner ready yet? What the !cxzy!?

Wife (flying around like one possessed): Oh dear, Professor Lovely was giving the loveliest talk on The Primal Oodlums of the Super Twiddlees, and I just had to listen in until he got through.

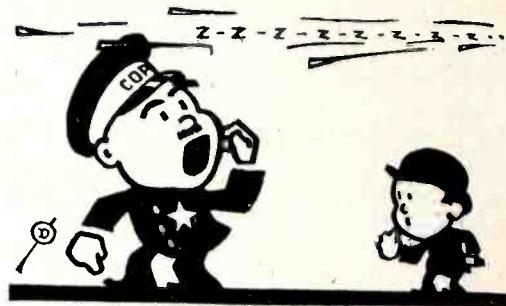
* * *

Harold: First time Dave listened in he got seasick.

Otto: How come?

Harold: The waves were too rough.

When the sheriff of Skeedunk first heard the radio concert he called out the volunteers. He thought a riot was on.



Down Santa Ana way the judge passes up the speed of radio—186,000 miles a second is too fast for a mere traffic cop.

* * *

"What are your husband's symptoms, madam?" asked the famous alienist.

Patient's wife: "Why, John always seemed sensible enough up to last night, and then he sat all evening listening in—and didn't have his set hooked up."

* * *

Irate husband: Norma! Why the Samhill have I got to wear buttonless shirts, I'd like to know!

Apologetic wife: But Harvey, dear, how can I sew buttons on when it takes me all day to keep tuned in?

* * *

All broadcasting in the U. S. being done cafeteria style—help yourself.

* * *

Get the screwdriver, Bob, the darn thing stopped!

* * *

Michigan is establishing state radio stations to disseminate weather forecasts, crop reports, bulletins on conditions of roads, forest fires and other information relative to public safety.



Ecstatic

Radio's Place in The Sun

There are always those who are "fervinst" anything new. Why, the farmer who first used an iron plow was almost mobbed by his neighbors, who thought the iron would poison the soil! Interested parties need have no fear that radio will displace the theatre and phonograph. Rather, it is creating its own place in the sun—and doing it well.

THE manager of the Westinghouse Electric and Manufacturing Company's broadcasting station in East Pittsburgh, Pa., is but one of many authorities who hold the following views on the present and future status of radio.

Enlistment in the army of radio fans still keeps in advance of the supply of equipment. But history repeats itself as in the instances of the automobile and phonograph and photoplay—once a cheap set is tried out the enthusiasm of the buyer leads him almost invariably and immediately to wish to possess a better set, with amplifiers and loud speakers so that everyone in the family may share in the entertainment, not merely the one who gets the head-phones first.

It may be said in parenthesis that no alarm need be felt, either by the purveyors of show-house amusements or preachers in their pulpits, lest this new form of entertainment will have a bad effect on attendance at their formal gatherings. It will merely serve to whet the appetite of hearers for complete satisfaction wherever the radio samples are found desirable and delightful.

Neither will radio entertainment supplant the purchase of phonograph records or curtail automobiling. It cannot rival either. There is no more reason to think that radio will dwarf any existing business to its detriment than there is to believe that radio broadcasting as a new form of publication will put newspapers out of business.

Radio intelligence and entertainment will occupy its own field and not interfere materially—or more than temporarily, anyhow—with other business pursuits. It adds, however, a wonderful thrill to the routine of daily life, a new spur to interest in things outside of ourselves, and brings us into contact and comprehension of much that otherwise we might know nothing about.

Another authority has pointed out that up to the time of the Great War's beginning radio was largely experimental, being about 75 per cent theoretical and 25 per cent practical. The radiophone was still more of a dream than an actuality. Individual experimenting was too costly for development to progress rapidly. But the war demanded a more rapid means

than any then in use, and the possibilities of radio were immediately recognized. Governments gave their support, and years of development were crammed into a few short months. On account of the necessity of maintaining secrecy the public was kept in ignorance of the details of development, and now that radio has been handed over for general use in an almost perfected condition, everyone is bewildered with the suddenness of its accomplishment.

Now everyone yearns for a set in his own home. It is part of human nature to want to know what is going on in this busy world and the wireless telephone is the latest means for gathering that information.

As a direct result of the spread of public interest in radio broadcasting, there has grown up a new and important American industry—the manufacture of the equipment necessary to receive the speech and music broadcasting from the transmitting stations, of which there are now about 200 in the United States. The total amount

of business anticipated in this field is estimated at close to \$100,000,000 a year.

Production does not have to wait upon the practical perfection of the phenomenon. That has been accomplished. True, improvements are being made, and always will be, but radio is a practical, working reality.

Broadcasting of news, market and financial reports and concerts has developed quickly, the entire country is clamoring to "listen in" and the demand is increasing at a pace little realized by the public. As has been ably said recently:

"In its popular conception, radio broadcasting is the transmission of recreational and educational material by radio telephone for the benefit of all those who may choose to listen. It is an irresistible magic which has several millions of people in its grasp; it is a fountain source of enlightenment and culture opening a medium of education that surpasses the facilities of all the colleges and universities in the country."

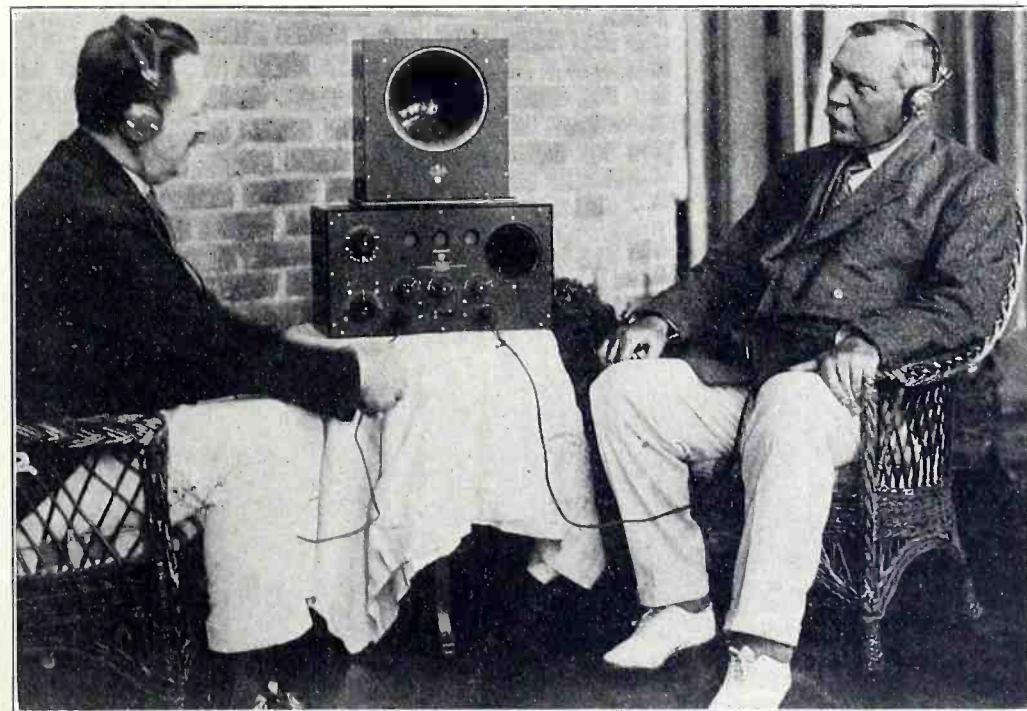


Photo by International Newsreel

QUICK, WATSON, THE TUBE!

OUR LUSTY YOUNG FRIEND, RADIO, WASN'T SATISFIED TO INVADE THE MATERIAL WORLD, BUT HE NOW MUST NEEDS GET INTO THE SPIRITUAL WORLD. SIR ARTHUR CONAN DOYLE (SEATED AT THE RIGHT) BELIEVES THAT WE WILL BE ABLE TO COMMUNICATE WITH SPIRITS. HERE HE IS SEEN TALKING ABOUT IT TO HIS FRIEND, F. D. WALLER (SEATED AT THE LEFT). IF ANYONE CAN DO IT THAT ONE OUGHT TO BE "SHERLOCK HOLMES."

Apparatus That



The TOURIST

Size 11x6x8 inches over all.

—hearing the news, the concerts with the world at your finger tips, yourself and your camp companion. The California "TOURIST." Range, broadcasting wherever you are in the state.

Priced at \$75.00 complete.

Hobbs Battery occupies space where phones are shown, in cut. Phones and antenna wire, insulators occupying space in lid. Heavy nickeled carrying handle, one cabinet lock, two keys.

For sale by Western Auto Supply Company. Forty stores in the States.

The "TOURIST" Audion Receiver, as clear as a bell itself. It is the most compact complete self-contained receiver that was ever conceived and offered to the world. The cabinet is of hand-finished black walnut, each a separate product. The panel of velvet finish XXX Bakelite. The metal parts of hand-buffed nickeled brass. The condenser, a vernier variable with a thousandth part of a meter adjustment. Tuning away static and other disturbances with the slightest variation. The tube base a California patent. The grid leak and condenser a California patent. The plate "B" battery designed by California. The storage cells designed by California. Manufacturing by Hobbs.

The case contains phones, aerial wire, two moulded insulators, ground stake and wire, storage cells, dry cells, tube (Audion) resistance, variable condenser inductances and all small parts. For autoists the battery charges from the dash socket or uses the car battery at will.

Far from civilization, still in constant touch, is what the "TOURIST" offers.

Bunked down by the old camp fire—smoking up on the ole jimmy pipe

"TOURIST." Range, broadcasting wherever you are in the state.

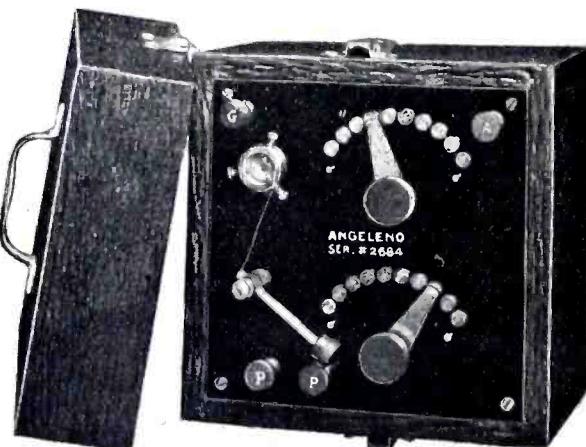
Priced at \$75.00 complete.

Hobbs Battery occupies space where phones are shown, in cut. Phones and antenna wire, insulators occupying space in lid. Heavy nickeled carrying handle, one cabinet lock, two keys.

For sale by Western Auto Supply Company. Forty stores in the States.

The "CALIFORNIAN," the supreme concert receiver for home use. Crystal clear it is. California quality throughout. It is the most accessible cabinet receiver made. The panel swings out with all parts mounted thereon, everything before you as it should be, a California feature. The cabinet contains a twenty-three-plate condenser, inductance, tube base, grid condenser and leak, rheostat and accessory parts. The panel is of genuine XXX Bakelite. All metal parts polished nickel plate. Genuine Bakelite dials and knobs. Cabinet of genuine mahogany. Size 8x8x7 inches. With plate battery and above equipment, priced at \$35.00.

With Truetone phones, 70 ampere Hobbs battery and tube (Audion), \$65.00.



The ANGELENO

The ANGELENO Concert Crystal Receiver. For those closer in to the concerts and not desiring to make a larger expenditure, we have made this receiver.

In crystal sets it is unique and is the leader. The circuit was originated at the Bureau of Standards, Washington, D. C., as the most efficient possible for radiophone work. Its range is conservatively estimated at 50 miles for good clear reception. The panel is of genuine Bakelite. Bakelite knobs. Metal parts are of brass, heavily nickeled and polished. Bakelite binding posts. The case is of Leatherette, Dupont finish, and is indestructible. Nickeled carrying handle and hinges. Furnishing a generous piece of True-tone mineral—every spot a good one. Ask the man that owns one as to the efficiency of the California Angeleno Receiver.

Priced right within the reach of all. Without phones, \$12.00. With Truetone phones, \$17.00.

SOME OF THE SOUTHERN CALIFORNIA DEALERS

Woodill Hulse Electric Co., Pasadena, Cal.
King Furniture Co., Santa Paula, Cal.
Orange County Piano Co., Santa Ana, Cal.
Southern Electric Co., San Diego, Cal.
Brode Electric Co., Los Angeles, Cal.
Crescent Music Co., 1st and Spring Sts., Los Angeles.

J. M. Kennedy Co., Los Angeles, Cal.
Electric Engineering Co., Los Angeles, Cal.
Electric Appliance Co., Pasadena, Cal.
R. E. Brackett Co., Pasadena, Cal.
The Electric Shop, Pasadena, Cal.

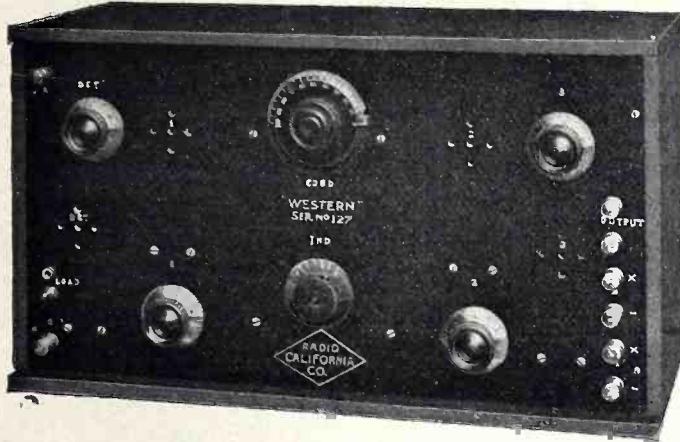
The Radio Shop, San Diego, Cal.
Radio Specialty Co., San Diego, Cal.
Manual Arts Radio Shop, Los Angeles, Cal.
X-Ray Supply Co., Los Angeles, Cal.
Richmond Hardware Co., Los Angeles, Cal.
The Light House Service, Venice, Cal.

If your dealer does not handle California apparatus, we would appreciate your sending his name and address.

Lives:

Apparatus, built to stand the test of tests—Time. Built to a principle, that principle being, to build the best that skill and brains can conceive, weaving into each small part that principle. It is the handiwork of skilled artisans whose years of radio knowledge is crystalized in California apparatus. As the ancients built the pyramids, the artisans of today have made California Radio Apparatus a monument to the art. As the pyramids have stood the test of time, so shall the apparatus originating in the shops of California Radio stand throughout the age of radio. Not to be obsolete in a day or month or year, but to live on and on. Apparatus with a soul—IT LIVES.

They came in '49 for gold; and again they come, for radio, from the world over. California is supreme.



The Great Western receiver, with this set, receives signals from all over the world. Amplifying from its first tube, it brings signals in with tremendous volume through its three steps of amplification. Power transformers, permitting the use of five-watt tubes for amplifiers, are possible, opening a new vista for those that have been striving for a long distance concert and signal receiver. Piano finish mahogany cabinet. Bakelite panel. Size 10x19 inches. Plenty of space, preventing induction. All parts mounted on back of the panel with unit construction, allowing easy removal.

It pleases the eye and satisfies the most critical listener or expert. Three-step and detector with tuner, vernier condenser.

Priced, without tubes, at \$125.00. Complete with tubes and all accessories, \$200.00. Magnavox extra, \$45.00.

Western representatives for ESTRU Lattice Variometers and Variocouplers. The most compact and efficient made. Size 2½ inches. Ideal for portable sets. Using only ten volts on the plate of the tube. Variometers, plate and grid, \$6.00 each. Variocoupler, \$5.50 each.

Western distributors TRUTONE Phones, 2500 ohms, \$5.00 pair.

Detector Panel may be used for table mounting as a unit or may be mounted in any panel by drilling two holes. Mounted on panel is the tube base, rheostat, mica grid condenser and grid leak, and the necessary binding posts for all possible connections. The panel itself is of genuine Bakelite.

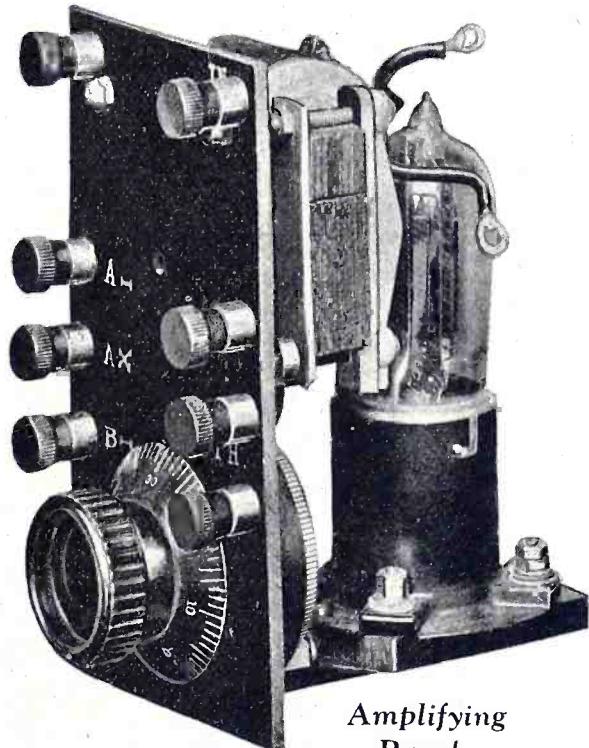
Amplifier Panel is the same as the detector panel, with the addition of one California tone amplifying transformer.

Detector Panel \$4.00 Amplifier \$9.00

MACHINE SCREW AND MISCELLANEOUS PARTS

Nickel contact points with nut, each	\$0.05	Small Bakelite knobs, 3-32 center....	.05
Brass contact points, less nut, each	.04	Rheostats with 2-inch dial and knob	1.50
6-32 Hex brass nuts for contacts, per thousand	2.80	Alamo tube sockets.....	1.50
No. 24—Small Bakelite binding posts, each	.10	Genuine Bakelite or Condensite Cele- ron, per lb.....	2.00
No. 26—Large Bakelite posts, each..	.125	Hobbs 6-volt, 60-ampere battery.....	
*G—Nickel phone posts, each.....	.05	Raidiotron 5-watt transmitting tubes	8.00
Large machined three-screw crystal cups, each.....	.35	23-plate CW condenser transmitting	4.00
Detector posts, wire, cross rod and knob, as on Angelino set, each.....	.45	Detector tubes.....	5.00
Grid leaks for variable front mount- ing.....	.60	Amplifier tubes.....	6.50
Grid condensers.....	.30	44-plate vernier variable condenser.....	7.75
Phone condensers.....	.60	22-plate vernier variable condenser, made by Reliance Co.....	6.25
Glass enclosed detector stands.....	1.50	11-plate plain variable condenser.....	2.25
Switch Lever and knob assembly.....	.40	23-plate plain variable condenser.....	2.50
Levers for switches, 1 ¼ -inch radius	.06	43-plate plain variable condenser.....	3.50
Marconi type Bakelite knobs, 1-inch diameter.....	.20	63-plate plain variable condenser.....	6.75
		63-plate vernier variable condenser.....	9.50
		Two-inch Bakelite dial and knob.....	.60
		Three-inch Bakelite dial and knob....	1.00

(We pay the postage)



Amplifying
Panel

Gillilan Bros. Products for Radio in
Stock at All Times

Panel Engraving to your own speci-
fications, 5c per letter, and up.

California Radio Company

331 NEW HIGH STREET, LOS ANGELES, CALIFORNIA
Dealers and Jobbers Communicate for Territory

"On The Air" Schedule of Broadcasting Stations of the Western States

THIS SCHEDULE SUBJECT TO CHANGE

Station	Schedule	Feature	Wave Length
ABERDEEN, WASHINGTON No. Coast Prod. Co. (KNT)			360
BAKERSFIELD, CALIFORNIA Bakersfield Californian (KYI) F. E. Siefert (KDZB)			360 360
BELLINGHAM, WASHINGTON Bellingham Pub. Co. (KDZR)			360
BERKELEY, CALIFORNIA Hotel Claremont-Maxwell Elec. Co. (KRE)	Sunday, 1-2 P.M. Sunday, 6-7 P.M.	Concert Concert	360
CENTRALIA, WASHINGTON E. A. Hollingsworth		News, Concert	360
DALLAS, TEXAS Police Dept. (WRR)	Sunday, 11 A.M.—7:30 P.M. Daily, 7 P.M.—8:30-9:30 P.M.	Sermon Weather Reports, News	450
DENVER, COLORADO Y. M. C. A. Fitzsimmons Hospital Reynolds Radio Co., Inc. (KIZ)	Daily, 10 P.M. Thursday, 8-9:30 P.M. Daily, 8:30 A.M. Sunday, 8-10 P. M.	Weather Reports, News Concert Weather Reports Concert	360
EL MONTE, CALIFORNIA Coast Radio Co. (KUY)	Daily, 4-4:30 P.M. Thursday, 9-10 P.M.	News, Concert News, Concert	360
EUREKA, CALIFORNIA T. W. Smith (KNI)			360
FRESNO, CALIFORNIA San Joaquin Light & Power Co. (KMJ) Evening Herald (KDZH)		News, Concert News, Concert	360 360
GLENDALE, CALIFORNIA Glendale Press (KFAC)	Monday, 3-3:15 P.M. Monday, 8-9 P. M. Wednesday, 3-3:15 P.M. Thursday, 8-9 P.M. Friday, 3-3:15 P.M. Saturday, 7-8 P.M.	News, Concert News, Concert News News, Concert News News, Concert	360
GRIDLEY, CALIFORNIA Precision Shop (KFU)	Sunday, 3-4 P.M. Monday, 8-9 P.M. Thursday, 8-9 P.M.	Concert Concert Concert	360
HOOD RIVER, OREGON Blue Diamond Elec. Co. (KQP)			360
KLAMATH FALLS, OREGON Herald Pub. Co. (KDYU)		News, Concert	360
LACEY, WASHINGTON St. Martin's College (KGY)			360
LONG BEACH, CALIFORNIA Prest and Dean Radio Lab. (KSS)	Monday, 4-5 P.M. Tuesday, 4-5 P.M. Wednesday, 4-5 P.M. Thursday, 4-5 P.M. Friday, 4-5 P.M. Saturday, 4-5 P.M. Saturday, 7-8 P.M.	News, Concert News, Concert News, Concert News, Concert News, Concert News, Concert News, Concert	360
LOS ALTOS, CALIFORNIA Colin B. Kennedy (KLP)	Sunday, 4-5 P.M. Monday, 7:30-8:30 P.M. Thursday, 8:30-9 P.M.	Concert Concert Concert	360

Station	Schedule	Feature	Wave Length
LOS ANGELES, CALIFORNIA			
A. Hamburger & Sons, Inc. (KYJ) (Operated by Leo J. Meyberg Co.)	Monday, 5-6 P.M. Tuesday, 8-9 P.M. Wednesday, 5-6 P.M. Friday, 5-6 P.M. Friday, 8-9 P.M. Saturday, 5-6 P.M.	Concert, Lecture Concert News, Concert Concert, Lecture Concert Concert, Lecture	360
Kierulff & Co. (KJH) (Operated in conjunction with L. A. Times)	Daily (Except Sat.), 1-1:45 P.M. Daily, 7:15-8 P.M. Sunday, 10-10:45 P.M.	News, Concert News, Concert Sermon, Music	360
Los Angeles Examiner (KWH)	Daily, 1-1:15 P.M. Monday, 12:45-1 P.M. Monday, 6-7 P.M. Monday, 7-7:15 P.M. Tuesday, 12:30-1 P.M. Tuesday, 5-6 P.M. Tuesday, 6-6:15 P.M. Wednesday, 12:30-1 P.M. Wednesday, 6-6:15 P.M. Wednesday, 8-9 P.M. Thursday, 12:30-1 P.M. Thursday, 5-6 P.M. Thursday, 6-6:15 P.M. Friday, 12:30-1 P.M. Friday, 6-6:15 P.M. Saturday, 8-10 P.M. Sunday, 7-8 P.M.	Market Reports News, Concert News, Concert Weather Reports News, Concert News, Concert Weather Reports News, Concert Weather Reports News, Concert News, Concert News, Concert News, Concert News, Concert News, Concert Dance Music News, Concert	485 360 485 360 485 360 485 360 485 360 485 360 485 360 485 360
California Theatre (KNX) (Operated by Elec. Lighting Supply Co.)	Daily (except Sat.), 2:15-3 P.M. Monday, 8-9 P.M. Saturday, 7-8 P.M.	Concert Concert Concert	360
Western Radio Elec. Co. (KOG) (Operated in conjunction with the Los Angeles Herald)	Daily, 12:30-1 P.M. Daily (except Sat.), 12-12:30 P.M. Daily, 4:30-5 P.M. Monday, 9-10 P.M. Wednesday, 9-10 P.M. Thursday, 8-9 P.M. Saturday, 12:30-1 P.M. Daily, 1:45-2:15 P.M. Tuesday, 9-10 P.M. Wednesday, 6-7 P.M. Friday, 9-10 P.M. Saturday, 6-7 P.M. Sunday, 10:45-11:30 A.M. Sunday, 4-5 P.M. Sunday, 7-9 P.M.	Market Reports News, Concert News, Concert News, Concert News, Concert News, Concert News, Concert Market Reports News, Concert Dance Music Concert Dance Music News, Concert Sermon, Music News, Concert Dance Music	485 360 485 360 485 360 485 360 510 360
Earl C. Anthony, (KFI) (Operated in conjunction with the Los Angeles Examiner)	Monday, 4-4:30 P.M. Tuesday, 6-7 P.M. Wednesday, 4:4-30 P.M. Thursday, 3:45-4:30 P.M. Friday, 6-7 P.M. Sunday, 5-6 P.M.	Concert, Education Concert, Education Concert, Education Concert, Education Concert, Education Concert	360
City Dye Works (KUS)	Daily (except Sat.), 7-7:15 P.M. Tuesday, 3-4 P.M. Thursday, 3-3:45 P.M. Saturday, 3-4 P.M.	Concert, Lecture Concert Concert, Lecture Concert, Lecture	360
Bullock's Dept. Store (KNN)	Monday, 3-4 P.M. Tuesday, 10-10:30 A.M. Thursday, 10-10:30 A.M. Friday, 10-10:30 A.M. Friday, 3-4 P.M.	Concert, Education Concert, Education Concert, Education Concert, Education Concert, Education	360
Bible Institute (KJS)	Sunday, 11:30-12:30 P.M. Sunday, 8-9 P.M. Thursday, 6-7 P.M.	Sermon Sermon Sermon	360
Beacon Light Co. (KNR) Radio Supply Co. (KNV) Braun Corp. (KXS) Irving S. Cooper (KZI) Western Radio Mfg. Co. (KZC) A. A. Kluge (KQL) Elec. Lighting Sup. Co. (KGC) Newbery Elec. Co. (KDZP) W. R. Mitchell (KDZD) Auto Club of So. Calif. (KDZF)			360 360 360 360 360 360 360 360 360 360
MEXICO CITY, MEXICO			
(XDA)	Daily, 7-7:30 P.M. Daily, 10 P.M.	News News	5500 5300
MODESTO, CALIFORNIA			
Modesto Evening News (KOQ) Herald Pub. Co. (KXD)		News, Concert News, Concert	360 360
MONTEREY, CALIFORNIA			
Noggle Elec. Works (KLN)		News, Concert	360

Station	Schedule	Feature	Wave Length
OAKLAND, CALIFORNIA			
Warner Bros. (KLS)	Daily, 12-1 P.M. Sunday, 12:15-1 P.M. Saturday, 7:30-8:15 P.M.	Concert Concert Concert	360
Rock Ridge, Atlantic & Pacific Radio Supply Co. (KZY)	Daily, 3:30-4:30 P.M. Daily, 6:45-7 P.M. Sunday, 11-12:15 P.M. Sunday, 3-4 P.M. Wednesday, 7:30-8:15 P.M. Saturday, 8:15-9 P.M.	Concert News Concert Concert Concert Concert	360
Hotel Oakland, Preston D. Allen (KZM)	Daily, 7:15-7:30 P.M. Tuesday, 7:30-8:15 P.M. Friday, 8:15-9 P.M.	News Concert Concert	360
OGDEN, UTAH			
Rocky Mountain Radio Corp. (KDZL)		News, Concert	360
PASADENA, CALIFORNIA			
J. J. Dunn & Co. (KLB)	Tuesday, 8-9 P.M. Friday, 8-9 P.M. Sunday, 3-4 P.M. Sunday, 7-8 P.M.	Concert Concert Concert Concert	360
Altadena Radio Lab. (KGO)	Monday, 5-6 P.M. Tuesday, 5-6 P.M. Wednesday, 5-6 P.M. Thursday, 8-9 P.M. Friday, 5-6 P.M. Saturday, 8-9 P.M.	Concert Concert Concert Concert Concert Concert	360
PHOENIX, ARIZONA			
Smith, Hughes & Co. (KDYW)		News, Concert	360
POMONA, CALIFORNIA			
Pomona Fixture & Wiring Co. (KGF)		News, Concert	360
PORTLAND, OREGON			
Halleck & Watkins (KGG)	Daily, 4:30-6 P.M. Monday, 7-7:30 P.M. Tuesday, 7:30-8 P.M. Wednesday, 7:30-8 P.M. Thursday, 7:30-8 P.M. Friday, 7:30-8 P.M. Saturday, 7:30-8 P.M. Saturday, 9-10 P.M.	News, Concert Concert Concert Concert Concert Concert Concert Concert	360
Northwestern Radio Mfg. Co. (KGN)	Daily, 12-1 P.M. Daily, 2:30-3:30 P.M. Tuesday, 7-8 P.M. Wednesday, 7-8 P.M. Thursday, 7-8 P.M. Friday, 7-8 P.M. Saturday, 7-8 P.M. Sunday, 9-10 P.M. Monday, 9-10 P.M. Friday, 9-10 P.M.	Concert Concert Concert Concert Concert Concert Concert Concert, Education Concert, Education Concert, Education	360
The Oregonian (KGW) (Operated by Ship Owners' Radio Service)	Daily, 3:30-4:30 P.M. Monday, 7:30-8:30 P.M. Wednesday, 8-10 P.M. Friday, 8-9 P.M. Sunday, 7-8 P.M.	News, Concert News, Concert News, Concert Concert Concert	360
Willard P. Hawley Jr. (KYG)	Tuesday, 9-10 P.M. Wednesday, 9-10 P.M. Saturday, 8-9 P.M.	News, Concert News, Concert News, Concert	360
Stubbs Elec. Co. (KQY)	Daily, 1-2 P.M. Daily, 6-7 P.M.	Concert Concert	360
REDWOOD CITY, CALIFORNIA			
Gt. West. Radio Corp. (KDYN)		News, Concert	360
REEDLEY, CALIFORNIA			
Lindsay, Weatherill & Co. (KMC)			360
RENO, NEVADA			
University of Nevada (KOJ) Nevada Mach. & Elect. Co.		News, Concert	360 360
SACRAMENTO, CALIFORNIA			
Hobrecht (KVQ)	Daily, 5:30-6:30 P.M. Sunday, 5-7 P.M. Saturday, 8-9 P.M.	News, Concert Concert Concert	360
SALT LAKE CITY, UTAH			
Utah Telegram Pub. Co. (KDYL) The Deseret News (KZN) Cope & Cornwell Co. (KDZV)		News, Concert News, Concert News, Concert	360 360 360

Station	Schedule	Feature	Wave Length
SAN DIEGO, CALIFORNIA			
Government Station (NPL)	Daily, 5 A.M.	News	9800
Southern Elec. Co. (KDPT) (Operated in conjunction with S. D. Union & Tribune)	Daily, 7:30-8:15 P.M.	News, Concert	360
Holzwasser's Dept. Store (KON) (Operated in conjunction with S. D. Sun)	Daily, 8:15-9 P.M.	News, Concert	360
The Radio Shop, Savoy Hotel (KDYM)		News, Concert	360
Carlson & Simpson (KDYO)			360
Holzwasser Co. (KOFT)			360
Theater Music Co. (KYT)			360
SAN FRANCISCO, CALIFORNIA			
Fairmont Hotel (KDN) (Operated by Leo J. Meyberg Co.)	Daily, 11-12 M. Daily, 1-2 P.M. Daily, 4:30-5:30 P.M. Daily, 7-7:15 P.M. Sunday, 10-11 A.M. Monday, 8:30-9 P.M. Thursday, 7:30-8:30 P.M. Daily, 5:30-6:45 P.M. Sunday, 2-3 P.M.	Time, Concert Concert Concert News, Concert Concert Concert Concert News, Concert Concert	360
San Francisco Examiner (KUO)			360
Lorden's (KDG)	Daily, 10-11 A.M.	Concert	360
The Emporium (KSL)	Daily, 3-3:30 P.M. Sunday, 5-6 P.M.	Concert Concert	360
Radio Telephone Shop (KYY)	Daily, 9-10 A.M.	Concert	360
Hale Bros., Inc. (KPO)	Sunday, 7-9 P.M.	Concert	360
Presidio (AGI)		News and Instruction	360
Government Station (NPG)	Daily, 1:15 A.M.	News	600
Government Station (NFG)	Daily, 12 Midnight	News	4000
SAN JOSE, CALIFORNIA			
Herrold Lab. (KQW)	Sunday, 5-6 P.M. Wednesday, 8:15-9 P.M.	Concert Concert	360
O. A. Hale & Co. (KSC)	Daily, 3-4 P.M.	Concert	360
SEATTLE, WASHINGTON			
Post Intelligencer (KFC)		News, Concert	360
Northwest Radio Service Co. (KJR)	Daily, 8-9 P.M.	News, Concert	360
Wasmer's (KHQ)		News, Concert	360
First Presbyterian Church (KTW)		Music	360
Northern Radio Elect. Co. (KTC)		Concert	360
The Rhodes Co. (KDZE)		Concert	360
SPOKANE, WASHINGTON			
Doer-Mitchell Elec. Co. (KFZ)		Concert	360
Spokane Chronicle (KOE)		News, Concert	360
STOCKTON, CALIFORNIA			
C. O. Gould (KJQ)	Daily, 5-5:30 P.M. Sunday, 10-11 A.M. Sunday, 7-8 P.M. Wednesday, 7-8 P.M.	News, Concert Concert Concert Concert	360
Portable Wireless Tel Co. (KGW)	Daily, 4-5 P.M. Sunday, 2-3 P.M. Tuesday, 8-9 P.M. Friday, 8-9 P.M.	News, Concert Concert Concert Concert	360
SUNNYVALE, CALIFORNIA			
The Radio Shop (KJJ)	Tuesday, 8:15-9 P.M. Friday, 7:30-8:15 P.M.	Concert Concert	360
TACOMA, WASHINGTON			
Mullins Elec. Co. (KGB)		News, Concert	360
Love Elec. Co. (KMO)			360
TUCSON, ARIZONA			
Ariz. Daily Star (KDZA)		News, Concert	360
WENATCHEE, WASHINGTON			
Elec. Supply Co. (KDZI)		News, Concert	360
YAKIMA, WASHINGTON			
Foster-Bradbury Radio Shop (KFW)		News, Concert	360
Elec. Power & Appliance Co. (KQT)		News, Concert	360

An Artistic Home Receiving Set

By C. H. DILLINGER

The feminine touch of symmetry and beauty is already apparent in the development of Radio. Take this Basket Radio Receiving Set, for instance. It is an indication that Rado sets will soon be built with an eye to beauty as well as utility. Lady, you are welcome.

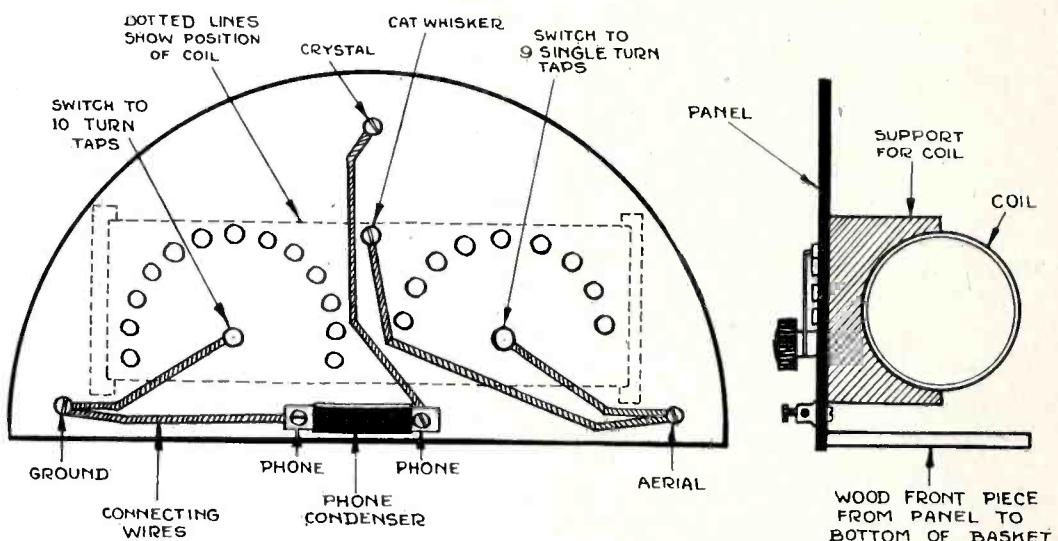
When we think back to the early days of the phonograph—not even the early days, in fact, but a comparatively few years ago—we recall the time before the finished cabinet made the phonograph a thing of beauty and a joy forever. It is only within very recent years that the manufacturers have seen the possibilities of the artistic line and form of early Venetian, Italian and Flemish chests, and have borrowed from these for cabinets for the instrument.

This is true of the radio receiving set today. It is in its unfinished state, artistically. At its best it is suggestive of the electro-therapy cabinet more than of anything else. The home-made sets are even less distinctive. Certainly none of the sets we have at the present time can be said to add artistic beauty to the home.

Along with the mechanical and technical developments in radio there naturally will follow improvements in the appearance of the cabinets containing the receiving apparatus, and it would seem that since it is the woman in the home who has most to do with the receiving set, it should bear the imprint of her personality. The man of the family listens in only after business,—in the two or three hours of leisure that he has after dinner. The woman listens throughout the day at many odd moments, and particularly

in the afternoon when she is resting. The radio receiving set thus becomes a part of the home, as the piano or phonograph has done, and this is one reason—and an important one—why the appearance of the set should conform to the requirements of artistic beauty. It should at least not be offensive to the eye. Giving so much of

The accompanying drawing explains itself as to the hook-up and the form in which it is constructed. The panel in this set has been made of three-ply veneer wood usually used for drawer bottoms. This has been painted with a coat of black enamel and shellaced to give it the appearance of the commercial patented rubber panels, and



VIEW SHOWING BACK OF PANEL

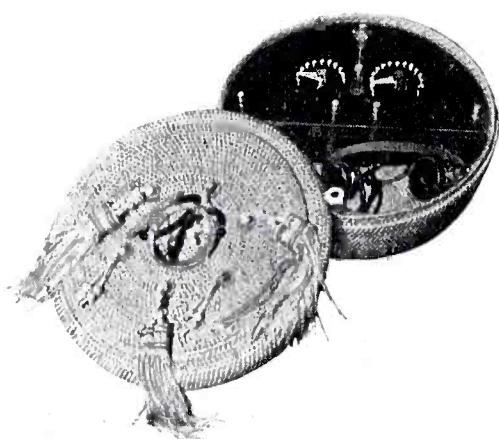
SIDE VIEW

pleasure, its appearance should also contribute to the joy of its possession.

With this idea in mind I built a receiving set to fit in the sewing basket illustrated, using half the basket for the set, and leaving the balance of the space to hold the head-set. It is never obtrusive, no matter where it is placed, but lends itself to the other furnishings. The space chosen for it is against a wall panel between a door and the window where the lead-in wires come through. A small groove has been drilled in the window ledge which allows the wires to remain connected with the window closed and locked, and the set is ready to be put to use merely with the removal of the lid and the adjustment of the headphones. When it is desired to listen in on the porch the basket is carried outside and the wires are brought through the window and again connected. The basket is sufficiently roomy to allow ample space not only for the head-set, but for the broadcasting schedule, a copy of the Continental Morse code, and a pad and pencil for use when its owner is inspired to get a little practice copying code.

also to add to the beauty of the set. The coil tube, three inches in diameter, has been wound with No. 27 single cotton covered magnet wire and shellaced to hold in place. The connections have all been made with the ordinary bell wire, with the exception of the wires from the coil to the contact points which are loops of the coil wire made while winding. The first switch, to which the aerial wire is connected, has access to the single turn taps, of which there are nine. The second switch has access to the ten turn taps. The combination of these switches affords close tuning. The aerial wire is of No. 14 bare copper and has been erected in a V shape each strand about fifty feet in length, the lead-in coming from the center of the wire (at the point of the V). This was erected in this way merely for convenience, and the set should work equally as well on another aerial. A good pair of 2200 ohm phones are being used.

The owner of this set has reported favorably on the results, stating that all local broadcasting and even close-in out of town stations have been heard clearly and audibly.



MILADY'S BASKET RADIO

A UNIQUE IDEA TASTEFULLY CARRIED OUT. A RADIO SET IN AN ARTISTIC BASKET WILL BE AN ORNAMENT IN ANY HOME AS WELL AS AFFORDING THE MEANS FOR THE HOUSEWIFE TO "LISTEN-IN" TO HER HEART'S CONTENT.

FITZGERALD'S
For the Advancement of Music



Announcing

the complete

De Forest

Radio Equipment

Ever alert to keep abreast with the latest developments, we have secured the agency rights for the distinguished DeForest line of Radio Equipment for the Western States. Our territory includes, in addition to California

Washington
Oregon
Arizona

Nevada
Utah
Montana

Wyoming
Idaho
New Mexico

In addition to this superior line, we are prepared to equip fully all amateur and commercial stations from our complete retail Division. We handle the celebrated Philadelphia Diamond Grid Storage Batteries.

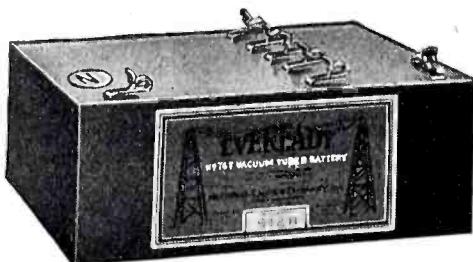
All communications with regard to agencies or mail orders for parts and requests for catalogues will receive prompt attention if addressed to
THE RADIO DIVISION



LOS ANGELES

CALIFORNIA

A New
EVEREADY
'B' BATTERY



No. 767

Made up of thirty large cells arranged in five rows of six cells each, gives 45 volts and is equipped with Fahnestock Spring Clips, allowing the following voltages: 16½, 18, 19½, 21, 22½ and 45 volts. This is a remarkably high quality, long life battery. Dimensions: Length, 8½ inches; width, 6¾ inches; height, 3½ inches over all. Weight, 9 lbs. Price \$5.50.

Two important characteristics are necessary for a satisfactory "B" battery: first, the battery must be designed for long life; second, the operation must be noiseless.

The Eveready "B" Battery meets these exacting requirements.

EVEREADY
'A' Radio Batteries

are carried in stock by the best radio dealers in three different types—60, 80 and 100 ampere hour capacity. These Eveready "A" Batteries have a large capacity and give longer service and require less frequent recharge than most other batteries of this type.

Made on the Pacific Coast by the world's largest battery manufacturers.

**National
Carbon Co.**

Incorporated

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San Francisco, Cal.**

**419 East Second Street
Los Angeles, Cal.**



Photo by International Newsreel

THE MOST POWERFUL RADIO TUBE EVER MADE

DR. IRVING LANGMUIR, ASSISTANT DIRECTOR OF THE RESEARCH LABORATORY OF THE GENERAL ELECTRIC COMPANY PLANT AT SCHENECTADY, N. Y., INSPECTING ONE OF THE NEW 20 KILOWATT RADIO TUBES, THE MOST POWERFUL EVER MADE. THIS IS THE TUBE WHICH MARCONI PREDICTS WILL REVOLUTIONIZE RADIO BY REPLACING THE GIGANTIC ALTERNATORS NOW USED IN TRANSEOCEANIC COMMUNICATION. IT IS FIVE TIMES LARGER THAN ANY THAT MARCONI IS AT PRESENT USING IN HIS EUROPEAN STATIONS. IN HIS RIGHT HAND DR. LANGMUIR IS SHOWN HOLDING ONE OF THE 201 RADIOTRONS, THE TUBE SO WELL KNOWN TO AMATEURS, WHICH SEEMS SO PUNY IN COMPARISON TO THE LARGER AND MORE POWERFUL TUBE.

A lad of nineteen years, incapacitated by an accident, got his first "kick" out of life for many dreary months when he listened in on a new receiving set, the gift of a friend. A local broadcasting station opened its program with a cheerful hail to him, calling him by name.

* * *

Two of the motorcycle members of Santa Monica's police force have installed equipment for the entertain-

ment of the officers at headquarters in their spare moments. It is also anticipated that it will prove to be a practical adjunct to their police business in receiving clews and running down criminals. A wire L flat top aerial eighteen feet high has been erected on top of the Santa Monica City Hall, with detector and two-stop amplifiers. A magnavox is in use so that the loud speaking can be heard at a distance without the use of earphones.

Major Dillon on Interference

Listeners-in on KHJ, the Times broadcasting station, recently heard the voice of Maj. J. F. Dillon, radio inspector of the sixth radio district, who sought to bring home to radio fans the real reasons why they find interference, and commended all for their courteous co-operation.

"I am glad of this opportunity to talk with you," said Maj. Dillon, "and to congratulate you all upon the excellent manner in which you have cooperated in the conduct of your stations in this zone."

"Some of you may have the impression that your interests are being overlooked in the recent rush of broadcasting. However, such is not the case for the Secretary of Commerce is himself an ardent amateur, and hence you may be sure that your interests are perfectly safe in his hands."

"I am receiving a number of complaints regarding interference with the reception of broadcast matter by ama-

teur transmitters, and I desire to impress you with the importance of having your stations adjusted accurately to 200 meters or under with a very sharp wave. If you will all give this matter your careful attention I am sure that there will be no just cause for complaint."

"To the citizens who are listening to the broadcasting station I desire to say that interference is more often the fault of receiving sets than of broad wave-tuned transmitters, and if you are not able to tune out a station transmitting from a considerable distance on a wave differing from the

one for which you are adjusted, you will know that the tuning of your receiver is broader than it should be, and hence the interference noticed is due to that cause."

"There is relief in sight for those whose reception is being interfered with, for there is a bill now before Congress which is expected to be passed within a few weeks, and which will provide a separate wave length for all broadcasting stations. You will then be able to receive any class of entertainment that you may desire, by adjusting for the various waves which are to be assigned."

Here It Is!

STEVENS
Radio Panel
WINDOW
Patent Pending
The one thing necessary to complete your panel



$\frac{1}{2}$ Actual Size
IT'S THE FINISHING TOUCH
Ventilates the cabinet and keeps out dust and insects. Black or Nickel Finish.
Price \$1.00 At your dealers or by mail.
DEALERS—Write for prices on this fast-selling accessory.

Stevens Makers of Radio Accessories
434 60TH ST., OAKLAND, CALIF.

Throw Away Your Galena

Nature and Science have at Last
Produced the Perfect

Detector

The Rare Mineral Crystal

Radio Argentite

Guaranteed to be the most highly efficient detector obtainable. Lasts indefinitely

Mounted
in nickel cup, ready for use

Price, \$1.00

Mail Orders Solicited. Money Refunded if not Satisfactory

GILMOR-LAYNE

Distributors

203 L. A. Railway Building
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Noiseless Typewriter

Twenty years ago, the typewriter was blind. Then came visible writing—a much-needed improvement. And now, today, the Noiseless Typewriter—as great an invention as the typewriter itself.

In a single sentence you can sum up the basic engineering principle behind this latest gift of science to the American business man and his stenographer—"The Noiseless prints by pressure and not by blow."

The Noiseless prevents the effect by removing the cause. The type is steel—the roller is steel—and yet there is no noise. The Noiseless refuses to make a noise. There is no need, therefore, for mufflers, soft rollers, felt pads or so-called shock absorbers. The noise is not created.

Greater speed, lighter touch, increased durability and better work have resulted from the elimination of hammer-blow wear and tear.

Where typewriters are needed noise has no place

Noiseless Typewriter DISTRIBUTING COMPANY

17 Second St., San Francisco
815 Broadway Central Bldg., Los Angeles
81 Fourth St., Portland
314 Maritime Bldg., Seattle
1754 Champa St., Denver



MOTORADIO

MOTORADIO is a compact, portable radio receiving set of the utmost simplicity but of the highest quality. It employs the Armstrong regenerative circuit having fixed antenna condenser of two different values and variometer for tuning. Two stage audio frequency amplifier, having jack for detector and for second stage of amplification. Range 150 to 600 meters.

Ideal for automobile or home use. *We believe this to be the best mechanically constructed and finished set on the market.*

Attractive discounts to dealers. Immediate delivery.

RADIO DIVISION

Parle C. Anthony, Inc.

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Los Angeles, California

RADIO SERVICE CO.

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LOS ANGELES, CALIF.

Manufacturers of Radio Supplies and
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**Headphones and Materials
For Making Your Own**

Radio Receiving Sets

Stromberg-Carlson Headphones - Kellogg Headphones - Everett Headphones

Antennae Wire No. 14 Copper

40c a pound. In lots of 5 lbs. or more, 35c a pound

Variocouplers
Tuning Coils
Tested Galena
Binding Posts

Amplifying Transformers
Plate Condensers
Magnet Enamel Wire
Cotton Covered Wire

Knobs
Insulators
Contacts
Slides

...and Radio Outfits Complete

Our Location at 647 So. Main in the same block with the Pacific Electric Station makes our store especially accessible to commuters.

J. M. Kennedy

647 South Main St.

Broadcasting Technique

A series of interviews with expert listeners to broadcasting develops a variety of expressions of opinion, and one of them at least is of interest in these times of change and of effort toward better quality.

It has to do with the results of echo suppression. Our broadcasters in some cases have resorted to extensive use of drapery for this purpose, and have been very successful in such suppression. In so doing, however, they have taken away an indefinable something that makes for lifelikeness, and there is a strong feeling that the cure may have been over-applied.

When one comes to think of it critically, it becomes apparent that in one's usual experience he hears mighty little speech in which there is an entire absence of reflection. From infancy we hear speech within four walls, and it is seldom that those walls are as fully draped as at many present-day broadcasting stations. Most lectures, sermons, plays and concerts are given in places where there is echo—sometimes a lot of it, but always some. It is only natural, therefore, that one should feel a positive sense of unreality in the reception of radio concerts and addresses from rooms wherein the echo has been largely or wholly suppressed.

A good way to test the differences between the usual and the ultra-modern forms of broadcasting in this regard is to tune quickly from one to the other of a simultaneous Sunday forenoon sermon and concert, if there is such a pair of events in your neighborhood. The sermon is almost sure to provide the usual set of church echoes, while the concert, if from a regularly equipped broadcasting studio, will be free from them in a considerable degree. If your reaction to the experience is that of many persons we have interviewed, we suppose you will agree with us that there is room for further thought and experiment in this as in so many other details of the fascinating art.

An adjustable set of screens giving full variation from minimum damping (full normal wall-echo) to maximum damping (the most the fabric can give) can be had by the use of narrow panels of fabric on frames pivoted after the manner of Venetian blinds. When these panels are inclined edge-wise to the performer the echo from that particular portion of wall is at its most.

Another effective rig is that using cord portieres instead of fabric, the cords lending themselves readily to the breaking up of the wall space into bare areas of any shape and size.

Lizzie Listens In

Time was when, to paraphrase a poet anent a certain primrose,

An auto in a garage dim
A simple auto was to him,
And it was nothing more,

but in point of progress that state of mind which we all had respecting our automobiles is in the dark, unenlightened past. Today our tin Lizzies, Raws-Oysters and Fierce-Marrows have become potential auditoriums wherein we may sit at our ease and absorb all the music, lectures and what-not let loose on the defenseless air. And all because a mere man or two "didn't know it couldn't be done, and went ahead and done it"—fixed up a little box wherein a sound wave might wander and get caught. They're putting them on automobiles now, so that when you take the kids for a picnic into the great out-doors, and you get tired of hand ball and foot races, you can connect up with Riley's band and have a dance or two under the trees. Or you can turn on something creepy and dreamy when you have your girl out in the moonlight—a "you-find-the-girl, we'll-do-the-rest" proposition.

It is a simple matter to place the equipment on your car. For an aerial a bare copper wire No. 14 is laid in the shape of the letter U about the top of the car. The fabric of the top acts as insulation. A wire soldered to the frame provides a ground. The ground wire and aerial lead wire are connected to a crystal receiving set which is between the two front seats. Another method of making the aerial is to make a cross of two boards four feet long and one by six inches, with eight winds of bare copper wire around the circumference, insulated at the corners. An automobile receiving set will require at least two stages of amplification in conjunction with an audion detector. Such a system would have a range of from 5 to 20 miles.

Colorado is planning to have a comprehensive system of radio communication which is now being evolved by the police and military authorities. Every sheriff's office is to be equipped to listen in under a regularly timed schedule and word of escaping criminals or fugitives from justice will be broadcast to ensnare the malefactors.

* * *

The Japanese of Los Angeles have succumbed to the radio enthusiasm, and the publisher of the Japanese Daily News has applied for a broadcasting license to operate from his newspaper office. In the Japanese quarter many homes are being equipped with receiving stations. Who

knows?—they may yet be able to "listen in" on the entertainments broadcast from the Land of the Cherry Blossoms.

* * *

The September issue will contain an article by Mr. Lex B. Benjamin on "How to Build an Audion Set" that is a winner. (Both the article and the set.) Excellent hook-ups will enable you to build this set.

* * *

An appropriation of fifty thousand dollars has been allowed for the installation of a municipal broadcasting on top of the Municipal Building in

New York City, together with the purchase of many portable receiving stations which may be set up in parks and public places. All important orders and directions of the fire, police and health departments will be broadcast from the municipal station. Concerts will also be supplied.

* * *

In the Wyandotte county jail, Kansas, the prisoners want to "listen in" on the radio concerts broadcasted in their vicinity. They have started a fund with their "tobacco money" with which to purchase a receiving set with a loud speaker.

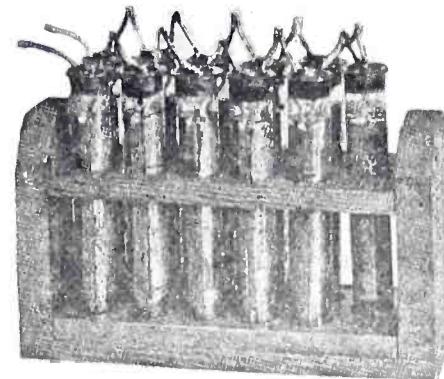
Constant, steady voltage
No battery noise in your V. T.
Easily recharged at home
A life of from 3 to 5 years
Jelly electrolyte, no spillage
Clip on for any required voltage

. a few of the reasons why

Snell Cells Storage 'B' Battery

should be on your set.

At your Radio Dealer or



22 volt, 11 cells.....	\$ 5.50
44 volt, 22 cells.....	10.00
Chemical rectifier	1.25
F.O.B. San Francisco.	

An increase in prices will take effect on August 15th

Mann & Snell

4733 Geary Street

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San Francisco, Cal.

Never a Better Time

To Visit One of America's
Most Famous Mountains

MT. LOWE

Delightful at All Seasons

The Pleasant Odor of Woods, the Clear,
Distant Vistas, the Pleasant, Winding
Trails, Insure a Glorious Outing.

ROUND TRIP \$2⁵⁰
FROM LOS ANGELES

Pacific Electric Railway

ROMANCE OF RADIO
(Continued from Page 135)

In 1882 when the telegraph cable between the Isle of Wight and Southampton broke down, Romance jogged his elbow and aroused him to the opportunity thus presented to demonstrate wireless signalling between these two points. He used the Morse code, and the signals were heard clearly. The cable was repaired the following day,—which was indicative of efficiency, although it ended any further need for experiment,—and he therefore discontinued his work. Two years later he carried



Reliable Radio Service

Howland & Dewey Co., long known in Southern California for the dependability of its merchandise and service, now has a complete Radio Department under the direction of a licensed operator.

Complete Receiving Sets, Head Sets, and a full line of parts, all of reputable make, are sold under the guarantee of

**Howland
& Dewey Co.**

EASTMAN KODAK CO.
510 S. BROADWAY

Los Angeles, Calif.

on extensive experiments, using two closed wire circuits extending about 14 miles, each stretched on telegraph poles parallel to the shores of the Severn River between Gloucester and Bristol. Upon continuous pressure upon the transmitting key a continuous sound was heard through the telephone receiver across the river, about five miles. On Newcastle-on-Tyne telephonic speech was conveyed over a distance of a quarter of a mile without connecting wires.

It was in this year, 1885, that Edison in America invented a wireless telephone system for use between moving trains by means of induction, utilizing the ordinary telegraph wires for one inductive circuit, and equipping the train with another. The system was utilized successfully in 1887 on the Lehigh Valley Railroad, but never became an indispensable factor in passenger convenience.

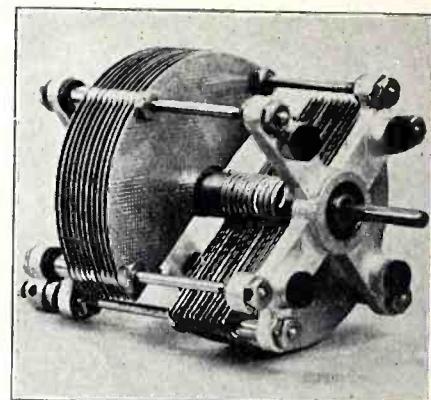
In the meantime Clerk-Maxwell's theory had intrigued a young German scientist, Henrich Rudolf Hertz, who in 1883 was a *privat docent* at Kiel. In 1888, when but thirty years of age, he was professor of physics in the University of Bonn where his numerous experiments which were undertaken at the suggestion of the famous German physicist, von Holmholtz, were epoch-making. These provided the basis of radio-telegraphy and radio-telephony, although none of his brilliant contemporaries dreamed this.

However, inasmuch as he did not succeed with his apparatus in producing waves of any remarkable length, it was perhaps but natural for him to believe that the transmission of messages with these waves as a vehicle of sound, was impracticable. He stopped just a thought too short for Romance. His vision was not sufficiently far-reaching to penetrate the gray fog of the future, massed as it was destined to be, with inventions of men of brilliant minds, indomitable patience, and untrammelled faith. How Romance must have blushed for him when a civil engineer of Munich asked him if he considered that electric waves could be utilized in telephonic communication, and he replied in the negative!

Romance was all but shouldered out of the way by Hertz who was about to give up his experiments as barren of definite results when an accident involving the unpremeditated proximity of two coils directed his attention to the phenomenon of sparks occurring in the second coil simultaneously with an electric discharge in the first. This was the same phenomenon that Hughes had observed, but whereas Hughes failed to relate it with the Clerk-Maxwell theory of electro-magnetic waves, Hertz immediately made

The Perfect Condenser

Designed and manufactured by an expert Electrical Engineer, Mr. R. W. W. Grigsby.



Plates that are absolutely straight and will never warp are made by a patented process.

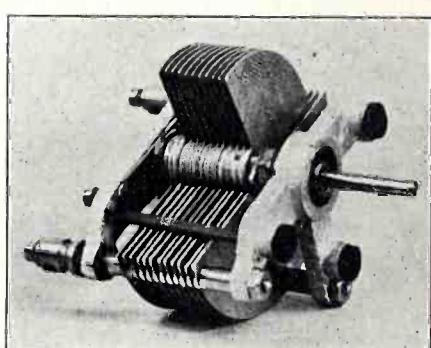
The most critical radio expert will find nothing to improve or add.

Ready to connect up and use.

Adjustable tension on the plates prevents binding or slipping. Soldering clips and binding posts. Spiral copper spring soldered to rotary shaft. Insulated stop for rotary plates.

Prices no higher than for inferior condensers.

23 plate	Unbalanced	\$3.75
43 plate	Unbalanced	5.00
23 plate	Balanced	7.00
43 plate	Balanced	9.50



No retail orders filled except by mail.

Immediate delivery. Postage prepaid.

Send money order or stamps. Write for our prices on all other equipment. Discounts to dealers.

Sole Distributors

Lloyd Electric Co., Inc.

947 South Figueroa St.,
Los Angeles, Calif.

the connection, and plunged anew into his experiments.

To him belongs the glory of the discovery of the progressive propagation of radioactivity throughout space, and he actually measured the length and velocity of electro-magnetic waves and proved their exact accordance with the waves of light and heat in so far as the transverse nature of their vibration and their susceptibility to refraction and polarization are concerned. His experiments, conducted with exceedingly simple instruments, tended to prove the main contentions of Clerk-Maxwell's theory, notwithstanding that he succeeded in transmitting impulses over but a few yards. He set forth in writing the results of these experiments in the two years between 1887 and 1889, covering practically the whole field, and establishing the present laws of electric wave propagation. In his honor these electro-magnetic waves have since been known as "Hertzian waves." His experiments closed the discussion of theories, and to him undoubtedly remains the credit of lighting the torch that kindles the world today with enthusiasm for the art of Radio Telephony.

While Hertz was carrying on his astonishing experiments another man, A. W. Heaviside, not so conspicuous in the public eye, succeeded in establishing telephonic speech communication between the upper ground and the galleries of the Broomhill Collieries three hundred and fifty feet below the surface, by laying above and below ground two complete metallic circuits parallel to each other, but with no connecting wires. Two years after this Elihu Thompson suggested the use of electric waves for the transmission of signals through fogs and material objects, but apparently failed to make any demonstration of his theory.

At first the scientific world was not more greatly aroused to the practical importance of Hertz' revolutionary discovery than it had been to the astonishing theory of Clerk-Maxwell. Its vision was dulled with so much scanning of theories that it could not at once see the transcendental possibilities of the reality. Nevertheless there were exceptions to this indifference among many serious students, one of whom was a scientist connected with the College of the City of New York, Professor Ogden Doremus, who had followed Hertz' experiments with keen interest, and recognized their ultimate value to the world. He had one of Hertz' associates make for him exact replicas of his apparatus, and these are now a part of the equipment of the College of the City of New York.

With the established knowledge of Hertzian waves, however, the minds

of the scientists and inventors were soon turned to flow in the same channel. Many improvements were made in the apparatus which Hertz had used in his demonstration. Professor Rhigi of Bologna, instructor of the youthful Marconi, was one of the enthusiasts, and M. E. Branly and Sir Oliver Lodge and others stamped the seal of their genius upon their inventions at this time. Rhigi used his own perfected apparatus in making his experiments, and attained greater results, although he did not wholly bridge the gap between theory and fact.

*(To be continued
in September Radio Journal)*

Nicola Tesla believes that the mechanical modus operandi of the world is destined to be radically changed through the development of radio. He is planning a power plant which will transmit radio energy for commercial purposes. Gossip has it that the Westinghouse laboratories have already seen a dog carried a distance of forty feet by radio energy alone.

* * *

Recently a program entirely by blind entertainers was broadcasted to blind ex-service men at the Soldiers' Home at Sawtelle.

Frank Creswell, Jr.

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Los Angeles

A wedding ceremony performed in an airship was heard by spectators on the ground by radio.

* * *

When additional units are added the commercial radio station at Port Jefferson, Long Island, will be the most powerful radio station in the world. After this comes the station built by the United States at Lafayette, near Bordeaux, France, and sold to France afterwards. It operates on a wave length of 23,000 meters, and sends radio messages over 4,000 miles.

* * *

When an invitation is accompanied with the letters "B. Y. O. H." in one

corner, be sure that you provide yourself with a radio headpiece, because your hostess intends that you shall "listen in" at her party.

* * *

Radio is responsible for undoing the work of many centuries. It has smashed to smithereens the mask of stolidity which the ages have moulded on the face of the Chinaman. The typical "poker face" went into the discard when members of the Chinese Nationalist Party Club of Los Angeles "listened in" on an entertainment program. Their smiles and expressions of wonder were quite normal and human.

"Stone walls do not a prison make" now that radio has arrived. The convicts' band in the federal prison at Atlanta was allowed recently to go under guard to a radio station and there broadcast their music to the outside world.

* * *

The range of army radiophones is three hundred miles; that of radiotelegraph is a thousand miles. Longer distances make use of relay stations for the transmission of messages.

* * *

The Department of Commerce suggests that some relief might be obtained from so-called strays, static and atmospheric disturbances occurring in the summertime by using a coil antenna instead of the usual elevated antenna or by using ground antenna.

* * *

Report has been made of the success of recent experiments in the wireless transmission of pictures between American and Italian battleships in Italian waters, through the assistance of a machine and process invented by a German, Dr. Korn, professor of mathematical physics at the Technical High School, Berlin, and inventor of the "telautograph." In several instances these were actual photographs, and in another a facsimiled message from an Italian admiral, sent in his handwriting.

* * *

A restaurateur of Los Angeles provides radio entertainment for his guests.

* * *

The National Radio Chamber of Commerce has been organized, with Alex. Eisemann president. Its purpose is to standardize radio products and regulate conditions in the radio industry. All manufacturers, large or small, are eligible for membership, after their apparatus has been passed on by the board. Concerns organized for stock jobbing purposes or which issue carelessly constructed merchandise or which ignorantly or unscrupulously infringe on existing patents will be rigidly excluded.

* * *

Complaints that radio magazines at the Los Angeles Public Library are being cut up by radio enthusiasts and articles on the subject removed to other parts indicate the desire for information on radio is great. The Public Library has issued an appeal that the valuable and much sought after radio magazines be preserved.

* * *

Announcement is made that elimination of the crackling and buzzing accompanying radio signals, which have proved one of the greatest obstacles in the development of radio, has been accomplished by United States army experts.

UNIVERSAL RADIO & RESEARCH CO.

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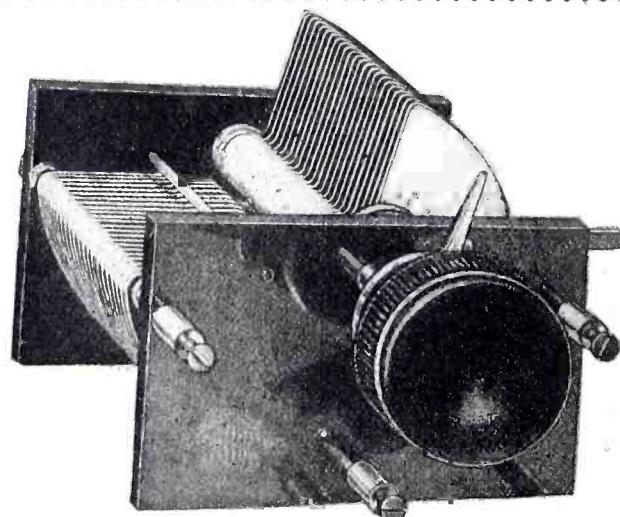
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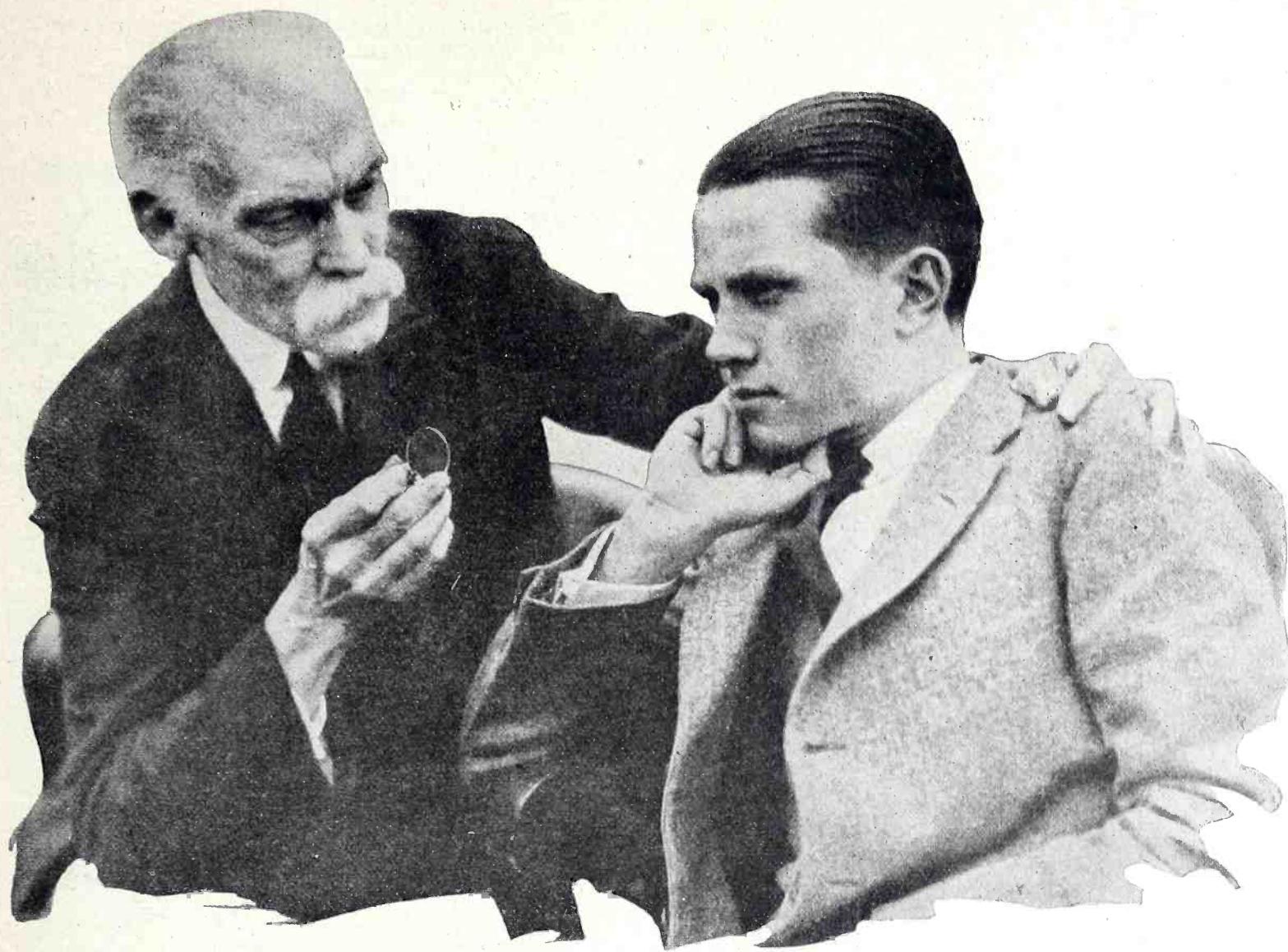
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"Don't Wait Until It's Too Late"

When I was your age, Tom, I was just where you are today. I had what was then considered a good job in Black & Turner's Accounting Department. My friends predicted great things for me.

"Then your mother and I were married and pretty soon we began to need more money. But when I discussed the salary question with the head of the department he told me frankly that the firm was paying me all my work was worth.

"I tell you, son, it was a bad night when I brought that news home to your mother.

"It has been the same way ever since. Man after man has been advanced over my head while I have just plodded along.

"Many of our old friends have grown away from us because we could not keep pace with them. I haven't been able to send you to college. . . And through it all your mother has been patient and uncomplaining.

"The pity of it is that a single word would have changed my whole life!

"Training! That was all I needed.

"I had as much energy and ambition and as good a brain as any of the men who went ahead of me, but when the bigger jobs opened up I wasn't equipped to step into them.

"Don't wait until it's too late, Tom. My own life would be a different story if some one had only talked to me when I was young as I am talking to you today."

Ask any man of 40 or 50 what he would do if he could only go back and start over and he will tell you that he would study his work.

These older men speak from experience. They know that every year it becomes harder and harder for any man to win even moderate success without specialized training.

This is particularly true of the young man in business. For business is becoming more complex every day. And as it becomes more complex, there is increasing demand for men who are trained to do some one thing well.

And the best of it is, there is an easy, fascinating way for you to get this training without losing a day or a dollar from your present occupation. You can get it right at home through the International Correspondence Schools.

Jesse G. Vincent was earning barely a living wage when he enrolled with the I. C. S. Today he is one of the Vice-Presidents of the Packard Motor Car Company.

Six months from the day Frank E. Fehlman enrolled for the I. C. S. Advertising Course he started an agency of his

own. Today he is Vice-President of Lord & Thomas and President of the New York Advertising Club as well.

J. G. Kingsbury, President and Treasurer of the Grant Manufacturing Co., is a former I. C. S. student. So are Overton Fulton, Secretary and Treasurer of the Alabama Fuel & Iron Co., and J. F. Richman, Production Manager for the Cole Motor Company.

Robert E. Ramsay, former editor of Advertising and Selling, and now Vice-President of the J. F. Newcomb Company, of New York, is another man who says that the I. C. S. laid the foundation for his success. So does A. B. Hall, of Boston, who won the Associated Advertising Clubs cup for the best sales letter campaign.

Frank A. Bayer rose from assistant shipping clerk to Traffic Manager of the National Paper Can Company; Clarence W. Collins became Freight and Passenger Agent with the Southern Pacific Railroad, and George A. Grieble, of The Grieble Co., erected more than \$6,000,000 worth of buildings in Cleveland in 1920.

Aubrey B. Carter secured a Civil Service appointment within six months after he started to study with the I. C. S. and is now Secretary to the Comptroller of the United States Currency.

The success of the International Correspondence Schools in Business Training, as well as in technical subjects, has been due not only to the personal, problem-solving method of instruction of which they were the originators, but also to the high business and professional character of the men behind the courses.

Among the more than 300 men who have contributed their experience and advice to the preparation of I. C. S. courses are:

J. Lee Nicholson, C.P.A., First President of the National Association of Cost Accountants; Edgar P. Trask, Assistant Naval Architect, The William Cramp & Sons Shipbuilding Co.; Charles J. Nasmyth, F.A.A., C.P.A.; Dr. Owen L. Shinn, Professor of Chemistry, University of Pennsylvania; Stanley Rhoades, Telephone and Telegraph Engineer, New York Central Ry.; J. H. King, Research Engineer, Babcock & Wilcox Company, New York; Bradley Stoughton, Mining Engineer and formerly Secretary of the American Institute of Mining Engineers; S. G. Whitehead, Special Traffic Agent of the American Express Company; A. Hamilton Church, the well-known industrial engineer; Edward P. Moxey, Jr., A.M., C.P.A., Professor of Accounting at the University of Pennsylvania; and Dr. Clarence Stratton, Director of English, Cleveland Public Schools.

Whatever the course, if it is an I. C. S. course, you can be sure it represents the best thought of men who are leaders in that particular field and is drawn from their practical experience.

It is the business of the International Correspondence Schools to help men to get ahead in business—to earn more money—to have happy, prosperous homes—to know the joy of succeeding. They are ready to help you—no matter where you

live—no matter what your circumstances or your needs. All you need is the will to do and the decision to make the start.

Here is the familiar I. C. S. coupon. It takes but a moment to mark the work of your choice, tear out and mail. There's no obligation and not a penny of cost, yet that one single act may be the means of changing your whole life. Today—not "Tomorrow"—is the day to take your first definite step toward Success.

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Persons residing in Canada should send this coupon to the International Correspondence Schools Canadian Limited, Montreal, Canada.

Radio War Strategy

The fine possibilities of radio are suggested in an account in the Telephone Press of Brig.-Gen. Edgar Russel, chief signal engineer officer of the A. E. F., who held back five German divisions without any army at all—with only a small group of telephone men.

It was learned from prisoners that the Germans apprehended an attack in the direction of Briey and Metz. No such offensive was contemplated, but it would be most advantageous to foster such a belief. Accordingly, Gen. Russel established a false army radio net and, using a code which could be deciphered without much difficulty, sent forth into the air a string of messages that would indicate a large and general offensive along that part of the front.

Telephone lines were strung in such places and in such ways that listening in would be easy and apparently valuable for the Germans. The telephone squad of the mythical "X Army" grounded their circuits so that the messages could surely be picked up by the enemy. They even crawled out into No Man's Land and hooked their wires over German barbed wires and German telephone wires. The "careless" squad also gossiped at night and talked shop over the wires, referring to friends who had just arrived with such and such a new outfit from America and had been hurried to this sector, and revealing by implication important secrets of the movements of the nonexistent "X Army" of shock troops.

Within two days the fine results began to show themselves. The Germans became very nervous. Raids to get prisoners and thus to secure information became frequent. Troops were concentrated at the threatened

sector and were held there even after the real offensive at another point of the line was started. And when the armistice came with its showdown of

forces, the phantom American "X Army" still held its front near Verdun and opposite it were ranged five of Germany's crack divisions.

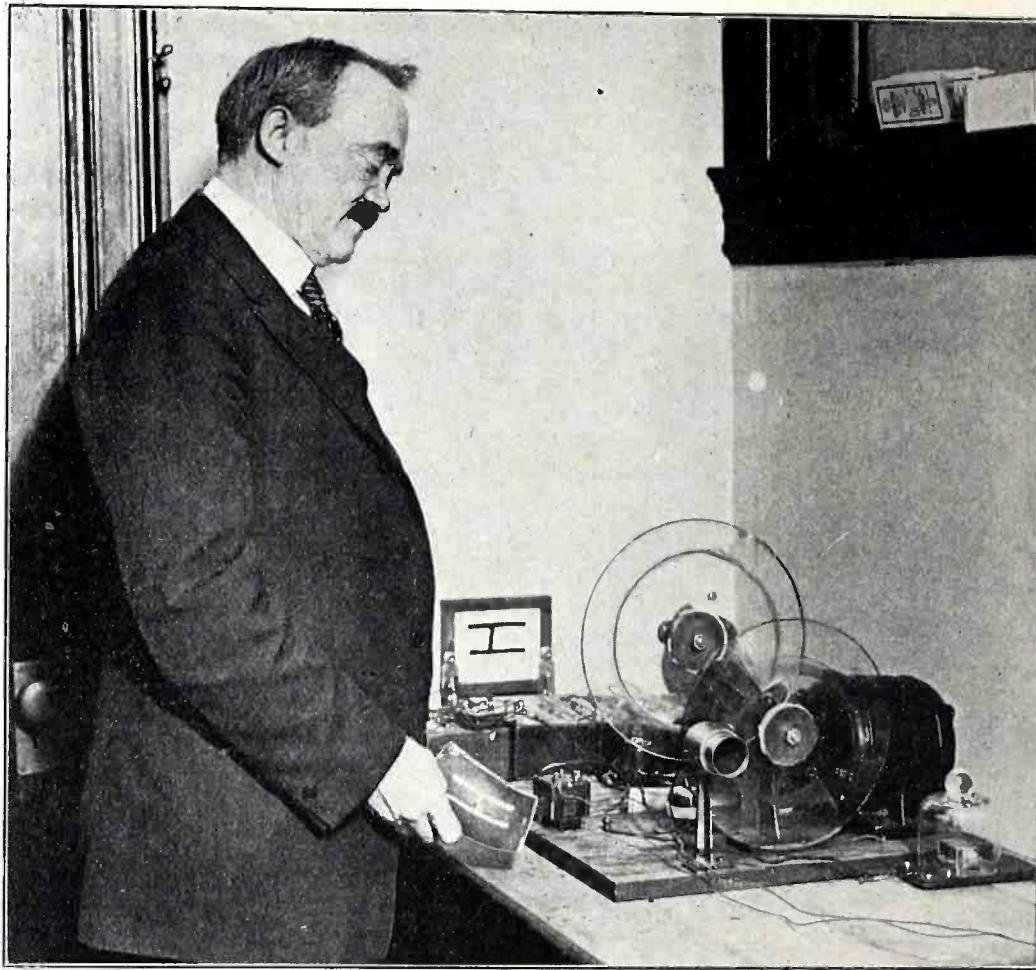


Photo by International Newsreel

HE WORKED TWENTY YEARS ON THIS

IT WOULD BE PRETTY SOFT TO SIT AT HOME IN THE BOSOM OF YOUR FAMILY IN THAT COMFY CHAIR WITH YOUR FAITHFUL JIMMY PIPE IN YOUR HAND AND SEE THE LATEST "MOVIE." WHAT? THAT'S WHAT C. FRANCIS JENKINS CLAIMS HIS APPARATUS WILL DO FOR YOU. BOTH ARE PICTURED ABOVE. ARISE AND GIVE HIM THREE CHEERS—HIS PATIENCE IS WORTHY OF THAT—AT THE LEAST.

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Made from
Oak, Gum, Spruce, Cedar, Mahogany, and Redwood
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Notes on Radio Regulation

Any differences arising as to the administration of radio laws affecting army and navy communication will be placed with the president for decision. While radio is in the process of growth there is little doubt that there will be many interpretations of existing laws attempting to control its varied activities.

A compromise has been reached between Senate and House on the time extension granted to the general public and the press in the use of Federal-owned radio. Gov.-Gen. Wood of the Philippine Islands forwarded to the War Department with his approval a resolution adopted by the American Chamber of Commerce of the islands urging continuation of the service which otherwise would have expired on July first.

Agreement was reached to permit public use of the facilities to June 30, 1925, with the exception of messages to China. The service to Chinese stations under the compromise agreement will be terminated January 1, 1924. International radio agreements made the shorter period necessary.

It is interesting to note that the House conferees rejected the proposed extension until 1927 in the belief that ample private radio facilities will have been established before the expiration of that period, capable of handling all commercial and press business.

The Sherman Anti-trust law has appeared in the radio field in the resolution introduced by Representative Fred A. Britten of Chicago directing the Attorney-General to investigate the operations and accounts of the Radio Corporation of America, the American T. and T. Company, the Westinghouse Electric and Manufacturing Company, the General Electric Company and the United Fruit Company, and to report to the House at his earliest opportunity, what, if any, combination in restraint of trade exists between them in the field of wireless communication.

According to report an agreement exists between all of these companies which gives the Radio Corporation of America complete control of the manufacture, sale and regional rights of the fundamental appliances and parts connected with wireless communications. It is further reported that although the shortage in radio tubes is so great as to inconvenience thousands of amateur operators, the United States government is refused permission to sell nearly 500,000 of these tubes which it has on hand as surplusage since the war, and which it could sell at less than 50 per cent of the \$6 charged by the Radio Corporation.

A legal decision in the matter of radio not being a nuisance was rendered by Chancellor J. E. Martineau of Pulaski Chancery court, who had refused to restrain two radio enthusiasts, father and son, from operating their wireless outfit at Little Rock, Ark., between 9 p. m. and 7 a. m. The restraining order was asked by several persons who complained of buzzing noises caused by the radio set interfering with their sleep. The chancery declared that the noise is one that persons must become accustomed to, just as they have become accustomed to noises of street cars, whistles, etc.

Congressman Wallace White, Jr., of Maine, a member of the radio conference at Washington, is at work drafting the proposed radio bill regulating radio activity.

At about eight o'clock every evening the police department of Boston broadcasts descriptions of fugitives from justice, and offers ten dollars to every radio amateur who assists in making an arrest.

* * *

There are close to three thousand American ships carrying radio equipment.

Exchange Doubt for Certainty

The Braun Corporation, with its 20 years of experience in technical merchandising, has stocked radio supplies and equipment.

Trained radio men have carefully selected every article.

The stock is complete.

The quality is right.

The deliveries are certain.

You perhaps have not the time to make the necessary investigation.

We have made thorough investigation.

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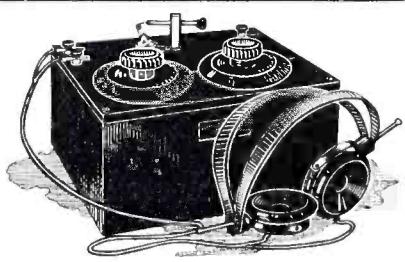
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HOW TO MAKE
A
SIMPLIFIED CRYSTAL
DETECTOR RECEIVING SET
with
HOOK-UPS AND DIAGRAMS
15c

We have had innumerable demands for the June Radio Journal from "fans" desiring to construct a receiving set according to C. H. Dillinger's article, but this issue was sold out almost over night, and we could not fill the bill. Because of this demand we have reprinted this article with hook-ups and diagrams, in booklet form, for sale at 15c. If you want a copy get your order in early. Stamps accepted with mail orders.

Radio Journal Pub. Co.
113 Stimson Bldg. Los Angeles



(Under this head we want to print "Calls" received by Amateurs which are received under difficult conditions or from long distances. Send them in with your name and address and also your "Call.")

Since an uninitiated Mirandy used the aerial for the family wash, there has been a new version of the familiar doggerel:

Mother shall I hang out the wash?
Yes, my darling Muriel;
Hang the clothes on the telephone wires
But don't go near the aerial.

* * *

A petition has been offered in the common council of Kansas City to equip each fire station in the city with a radio receiving outfit so the firemen can "tune in" during the leisure hours before bedtime and enjoy the concerts which are "agitating" the air thereabouts nearly every night. We wonder if the ancient game of checkers which has survived some thousands of years is about to succumb at last. The firemen above mentioned say that they are "tired of checkers and want jazz."

* * *

Broadcasting for public entertainment is conducted from the Eiffel Tower station within a radius of fifteen hundred miles from Paris. A station in north Africa 1450 miles away reported having heard a concert. It is intended to install a more powerful apparatus for permanent service to reach all parts of France.

* * *

The Actors Equity Association has registered a protest against its members giving radio entertainment gratis, on the ground that the radiophone is a commercial enterprise and enters into competition with the theater.

* * *

Those who have business with Catalina cannot too definitely impress their minds with the fact that the radiophone catches up all the telephone messages between the island and the mainland. Recently the fiancee of a Catalina resident spent the day with him on the island, and returning with her chaperon listened in to the entertainment that came through the radio equipment on the boat. Suddenly the performance was interrupted by her fiancee's voice telephoning to another girl. "Come on over, sweetie. It's all right now." The engagement is off.

WOODEN RADIO PARTS

Mahogany Cabinets
Rotors 50c
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Special Parts to Order
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1338 San Julian St., Los Angeles

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Radio Sets Built
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"Principles of Radio Communication"

Professor Morecroft's new book is said to be America's most authoritative volume on radio. It is published to sell at \$7.50. It will be given gratis for six yearly subscriptions to Radio Journal. This book deals with all phases of the radio art, going completely into both theory and operation. It contains 788 illustrations.

J. F. BRACKETT RADIO CO.

A Complete Line
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Head Phones In Stock

Our Prices Are
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CRYSTAL SETS
AUDION SETS
A and B BATTERIES

169 N. FAIR OAKS
Pasadena

Radiosophy

By FLORENCE G. ROGERS

Where there's an aerial there's a fan.

* * *

A little static now and then Will irritate the best of men.

* * *

As the whisker is bent, the tune's defined.

* * *

Breathes there a man with soul so dead Who never to himself hath said, "I'm going to rig up a receiving set, b'gosh!"

* * *

Distance lends enchantment to the listener-in.

* * *

The curfew tolls the knell of parting day; The joyous flitter vibrates on the lea; The owl car passes on its grinding way And leaves the world to Radio and to me.

* * *

Tune in, and the world listens with you; Broadcast, and you broadcast alone.

* * *

Home is where the receiving set is.

* * *

Oh what a tangled web we weave When we can't tune in to receive.

* * *

Oft in the still night Ere slumber's chain has bound me, I tune exactly right To get the music round me.

* * *

Tall towers from little roof-trees grow.

* * *

If procrastination is the thief of time then radio is the thief of distance.

* * *

Though lost to sight, to Radio dear.

* * *

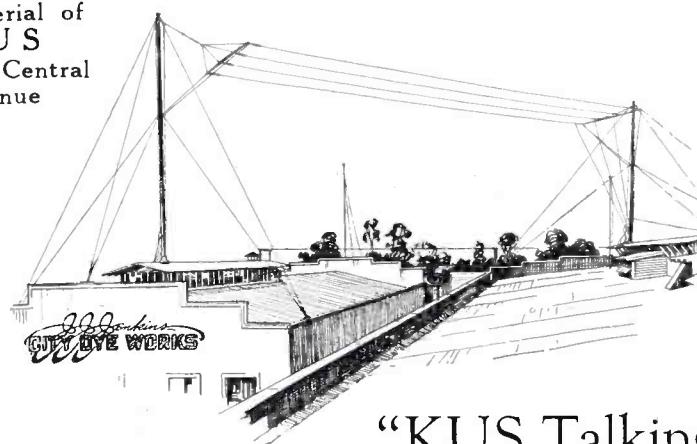
Far from the madding crowd's ignoble strife Their sober wishes never learned to stray; They listened in and got a kick from life, Yet never from their fireside moved away.

PROMPT-RADIO-SERVICE COMPLETE STOCK

Fresh Supply of Eveready B Bats.....	\$5.00
Remler Dials.....	\$1.00
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FRESNO, CALIF.

The Aerial of
KUS
at 3000 Central Avenue



"KUS Talking"

Here's a fact that is of interest to every man in Southern California--because of reduced costs, we are now able to clean their clothes by the famous Jenkins Process for \$1.50--50c less than it used to be.

Call KUS on the air or South 120 or 27071 on the telephone--our representative will come to see you.



Uptown Store, 417 W. 7th St. Branch Stores: 224 S. Western Ave., 6529 Hollywood Blvd.; Pasadena, 390 E. Colorado; Long Beach, 4 Pine Ave.; Ocean Park, 140 Pier Ave.

¶ Ambitious boys can earn Scholarships in the International Correspondence School's Radio Course by a few hours earnest work securing subscriptions to Radio Journal. Use this coupon for advancement.

Radio Journal Publishing Co.,

113 Stimson Bldg., Los Angeles, Calif.

Gentlemen: Kindly mail me complete details as to how I may earn a Radio Course Scholarship in the I. S. C. by securing subscriptions to Radio Journal. I understand that this inquiry obligates me in no way.

(Name) _____

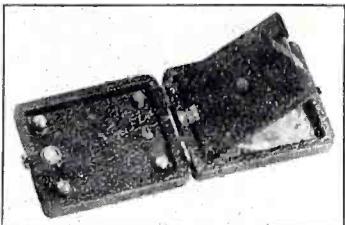
(Street Address) _____

(City) _____

Since the night of the Lewis-Carrier fight, when the newspapers broadcasted the results of each round into the homes of countless amateur radio fans, the London public has been held by the possibilities of this craze. Newspapers are filled with radio news

At Last, a Crystal Receiver

Equal to any high-priced sets
Sold in two forms at unheard-of low prices
Dealers investigate—It's a wonder
\$3.50—\$5.00



This Little Wonder receiver, which tests have proved is equal to the best crystal receivers, has received concerts clearly and audibly from 1 to 30 miles, code messages several hundred miles. It's finished in Black Leatherette, ornamental in design and sells postpaid for the small sum of \$5.00. We also manufacture the same instrument in the unassembled form with detailed cut showing the simple means of assembling, which also affords the purchaser the pleasure and educational view of radio construction, for \$3.50 postpaid. This is something unheard of in the annals of radio, and we advise all purchasers to place their orders now to assure immediate delivery.

Please remit by money order only, favor

CLARK RADIO COMPANY

1034 South Flower St. Los Angeles, Calif.

and doings. Broadcasting reports are now allowed as the result of a conference of officials of the government and postoffice departments. The Manchester Society—an amateur club—has started the construction of a high power wireless station at Baguley, Cheshire, for the purpose of transmitting and receiving from America.

* * *

Police reports show that radioactivity is increasing in the criminal class with radio propensities. Every month that passes records an increased number of thefts of radio equipment.

* * *

Cleveland is behind the radio procession. Her city fathers are proposing to charge a fee of two dollars for the installation of every receiving set. Although the sixth largest city in the United States it has but one broadcasting station and comparatively few receiving stations.

* * *

A neurologist of Newark, N. J., has been experimenting with radio waves for medical purposes. He claims that radio waves can be utilized to increase metabolism, promoting secretions and excretions, and otherwise toning up the general health.

* * *

Los Angeles broadcasting has been reported as having been heard as far north as Walla Walla, Wash.

The members of the Chicago Real Estate Board who attended the convention of the National Association of Real Estate Boards held in San Francisco, traveled on a special train equipped with radio.

M. P. M.**Million Point Mineral**

NATURES FINEST
SUPERSENSITIVE HIGHEST TEST

DETECTOR CRYSTAL

(Direct From the Mine)

Carefully selected, INDIVIDUALLY TESTED, and packed. (Galena or Pyrites). SATISFACTION GUARANTEED.

Insist on getting "M.P.M." from your dealer or by mail.

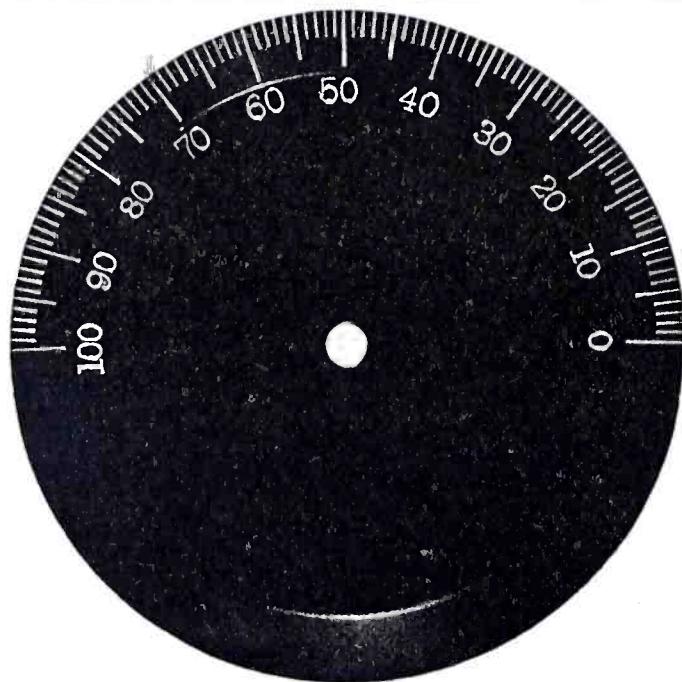
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Million Point Mineral Company

Los Angeles Office

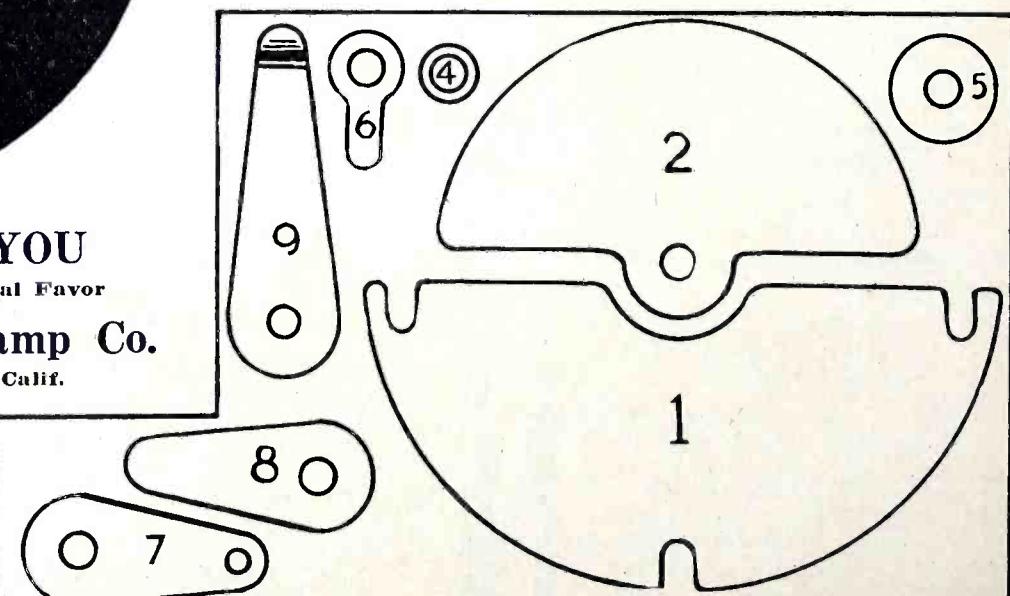
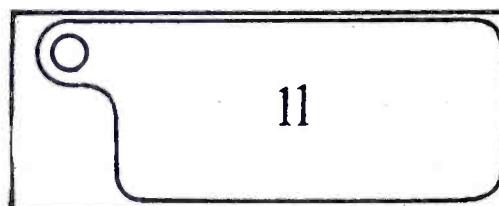
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No.	Article	Metal	Finish	Size	Hole	Thickness	G	Dec.
1.	Stationery Condenser Plates	Alum.	Natural	3"	1/8"	24	.0201	
2.	Rotary Condenser Plates	Alum.	Natural	2 1/2"	3-16"	24	.0201	
3.	Dials—Calibrated to 100	Brass	Black	3"	3-16"	20	.0319	
4.	Stationary Washers	Alum.	Natural	9-32"	11-64"	12	.0808	
5.	Rotary Washers	Alum.	Natural	1/2"	3-16"	12	.0808	
6.	Solder Clips	Brass	Silver	5/8"	3-16"	28	.0126	
7.	Loose Coupler Spring	Brass	Silver	1 1/8"	1/8"	28	.0126	
8.	Socket Spring	Brass	Silver	1 1/8"	3-16"	28	.0126	
9.	Rheostat Contact Spring	Brass	Silver	1 5/8"	5-32"	28	.0126	
10.	Star Spring	Brass	Silver	7/8"	3-16"	22	.0253	
11.	Grid Condenser Plates	Copper	Natural	...	5-32"	36	.005	
12.	Condenser Ends	Fibre	Natural	1/8"	.125	

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With The Publisher

The wiseacres said, "Oh, it's just a fad. Radio will soon die out." And they proceeded to bury it.

But say, for one who was "counted out" Radio is the liveliest "come-back" we have ever seen.

All those who have noticed the interest in radio waning please rise in their seats. "Thank you, Mr. Pessimist, we hoped you would stand up. Now that you are on your feet, please take a look over the assembled multitude. They believe in radio. They are working in the interests of radio. They see no decrease in radio enthusiasm. To the contrary, they are aware of the fact that radio is rapidly becoming a vital and integral part of modern life. They realize that radio is here to stay—that it is getting bigger and better—that it is a new industry—that it is going to be a wonderfully helpful servant of mankind. You, too, Mr. Pessimist, will realize this about ten years from now. Then you'll wish you had taken advantage of your present opportunities. Now sit down before someone crowns you with a brick for obstructing his view of the glorious future."

Out of our mail sack we have picked a letter at random of the many we receive commending Radio Journal.

Here it is—

HUGH HARLAN, Editor,
Radio Journal,
Los Angeles, Calif.

Dear Sir:

Am taking this opportunity of expressing my sincere admiration of and faith in the future of Radio Journal. The helpful hints and most interesting local matter places it far above the others, and I have tried them all.

I constructed the loose-coupler set as described in your July issue, and am getting excellent results. In fact, much better results than from a set I bought on the market.

Very respectfully,

F. S. RENSHAW,
134-B W. Vernon,
Los Angeles.

Thank you, Mr. Renshaw. It is mighty good to be appreciated.

* * *

In this issue we are glad to intro-

duce to our readers Mr. Samuel G. McMeen.

Mr. McMeen has had a wonderful experience in telephone and radio work. Just now he is engaged in experimental work, the results of which will be chronicled in Radio Journal in due course. He will contribute regularly to Radio Journal.

In the September issue Mr. McMeen will have an extremely instructive and timely story on "Waves, Wavelengths and Wavemeters," with diagrams; also an article on How to Use the Lighting System for an Aerial, together with a diagram showing just how it can be done.

Then in the October issue Mr. McMeen will have a feature story that the whole world will read. It is entitled "Hearing the Unhearable." It will have many diagrams. It is going to make people sit up and rub their ears. Sounds interesting, don't it?

* * *

We have many other features in store for you. It is our ambition to make Radio Journal a *real* Radio magazine for *real* Radio fans.

We Have It... If it has anything To do with Radio

When you buy your radio supplies from us, you are sure of the best high grade and nationally recognized lines on the market.

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In keeping with Newberry Expert Service we are giving to all those interested a complete set of wiring diagrams. These show all standard hook-ups, parts needed and how to hook them up.

They are invaluable to the beginner and offer to the expert many new and different methods of receiving.

Let our experts help you with your home made sets and problems.

We are never too busy to give you information.

Why Buy Imitations?

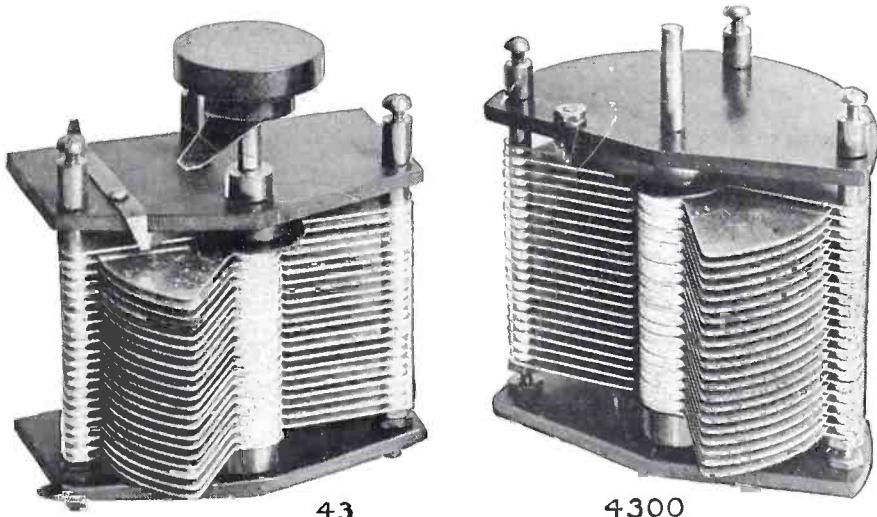
The WIRELESS SHOP "Quality" Variable Condensers, due to their superior design and reliable reputation, are being imitated by many new concerns, most of whom are newcomers in the Radio field and are inexperienced in the manufacture of Radio Apparatus.

Our experience in the manufacture of "Quality" Radio Apparatus extends over a period of years, and our men are trained in the manufacture of "Quality" Instruments. Our equipment is the finest obtainable.

In other words, "Why buy Imitations" when you can get "Quality" and Real Service from a Pioneer Radio Company? Our Reputation is behind every piece of apparatus we manufacture—and, incidentally, we really **manufacture** practically everything that is included in our extensive line of "Quality" instruments. We are not an **assembling** plant. Our instruments cost no more than the imitations—if "Quality" is considered. You pay for "Quality" in the end. Why not buy "Wireless Shop" Apparatus and be assured of the "Quality"?

And—just a little tip—if you are figuring on building a receiver (either standard or special), the time is ripe to go after it right now. The summer slump, which occurs every year, is well on its way, and we can give you exceptional service on special work for the next few weeks. Remember the rush and shortage last winter. It will be worse this fall and winter, and although we are doing everything to increase our output and stock up on materials, it will be impossible to give you the service later that we can give you now.

We have a fully equipped plant and an exceptional machine tool equipment. Our men are especially well trained in their line. Our stock is complete. The "Wireless Shop" Reputation is nationally known for "Quality." Let's get together.



Genuine "Wireless Shop Quality Apparatus," for your protection, is stamped, "Manufactured by The Wireless Shop, Los Angeles, Cal." Do not accept substitutes or goods represented as being of our manufacture unless they bear our stamp. It costs you no more and you take no risk.

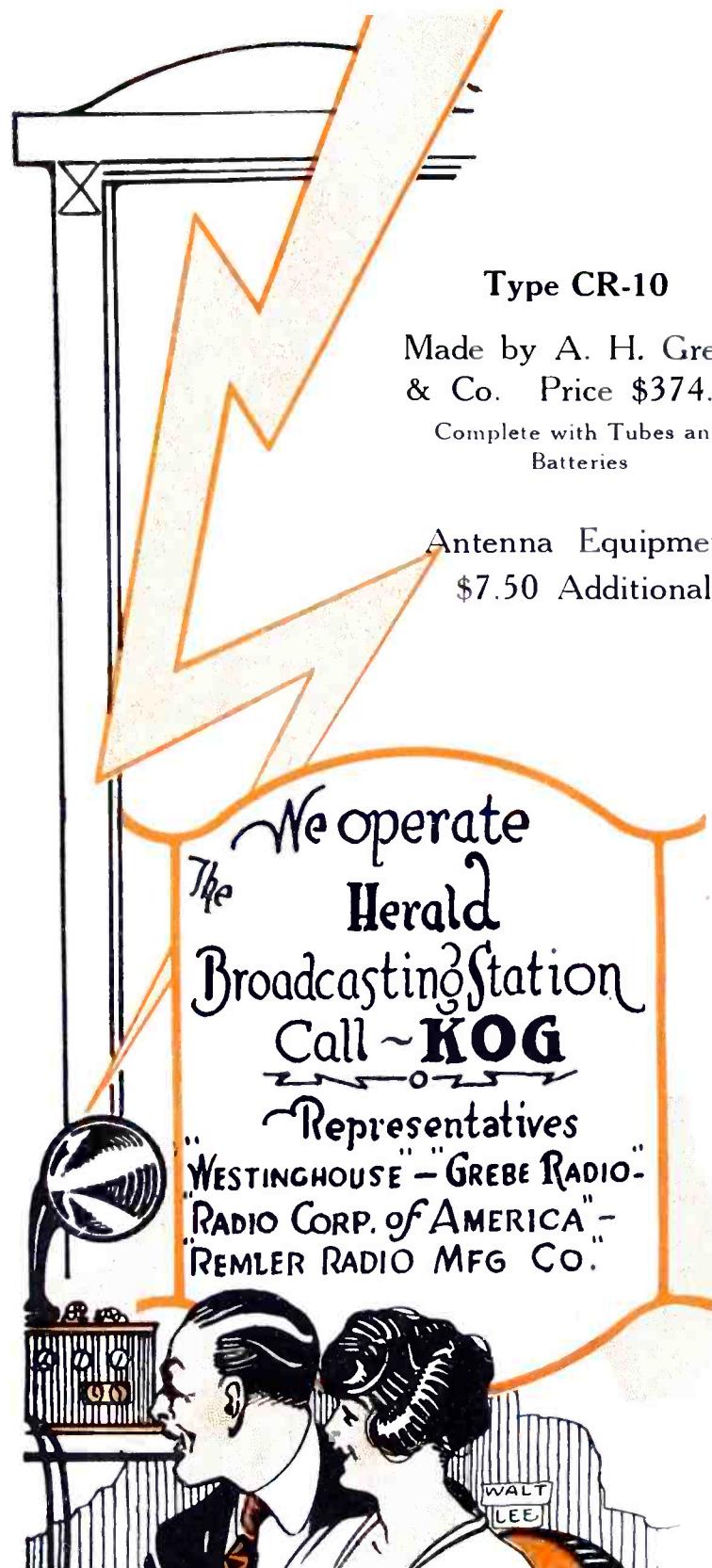
The No. 430 43-Plate Condenser selling for \$5.25, and the No. 230 23-Plate, selling for \$3.60, are only two of the fourteen sizes and exceptional values we offer in the variable line.

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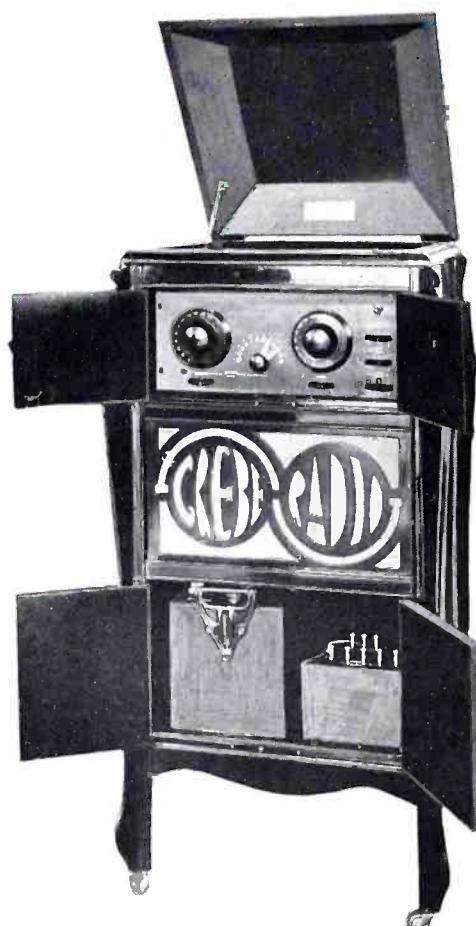
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Type CR-10

Made by A. H. Grebe & Co. Price \$374.50
Complete with Tubes and Batteries

Antenna Equipment
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The latest thing in Radio. An ornate Cabinet Receiver, very simple to operate. Range up to 1000 miles.

Radiotone has Regenerative Tuner with wave length from 150 to 3000 meters; Vacuum Tube Detector and 3-stage Amplifier control. Also B-Battery and 6-Volt, 100 Amp. Hr. Storage Battery. Has Loud Speaker attachment similar to phonograph, a unit with Cabinet. Radiotone is an innovation on the Coast, having so far been sold only in the East.

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